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CONSCIOUSNESS AND REALITY

The Human Pivot Point

Edited by Charles Musès and Arthur M. Young

A multi-dimensional, kaleidoscopic exploration of the nature of consciousness . . . from telepathy and reincarnation to the mythology of primitive tribes and the notion of immortality . . . with intriguing speculations on the evolution of the human mind.

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CHARLES MUSES AND
ARTHUR M. YOUNG

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Foreword

This collection—over a decade in the making—provides a multi-dimensional kaleidoscope in depth on the nature of consciousness—including the "unconscious," to which we have potential access on all its levels.

The spectroscopic and radio-telescopic exploration of outer space, the manned moon landings and the Mars fly-bys have all sharply pointed up the almost hopeless sparsity and distance of inhabitable bodies outside of earth. The potentials of consciousness remain well-nigh the last reachable domain for man not yet explored—the Undiscovered Country. These unexplored frontiers await the future endeavors of all those young in spirit and ready to pioneer anew.

By all evidence man is approaching, in the 1970s, a unique point in his evolutionary path—one that shows every sign of becoming a historical discontinuity, hopefully an ultimately happy one. All that man has thus far achieved is the result of an ever more able use of his instrumentalities of awareness. His cultural heritages, skills, techniques and creative arts were each so gained. Also gained—but not wanted—were unhealthy results, psychological and ecological. We face them now. It is a consistent hope that the unwanted things may be weeded out, and new heights of human destiny achieved by making better and deeper use than ever before of man's trump card—the untapped potentials of his consciousness.

It is the moment of evolutionary truth for the race, and what man does with that moment will be more important than the events of the previous millennia. It is the aim of the following pages written by knowledgeable pioneers of human thought and discovery to induce examination of the key factors in the currently ongoing crisis of man and to seek out and point up ways and means of negotiating it.

Phrases in the text in square brackets are editorial, but any unsigned footnotes are by the respective authors and all the commentaries are by the first editor. The compiler-editors contributed material where there was nothing adequate or available on the matter in question. The field has still far more gaps to be filled: we are living in the Age of Consciousness, the era of noetics.

C.M.
A.Y.

CONSCIOUSNESS AND REALITY

THE HUMAN PIVOT POINT

EN-TRANCING IS THE WORD

I

Introduction

The word *entrancing* is quite literal, being the term used by early hypnotists such as Dr. James Esdaile to denote the process of inducing the trance state. Something "entrancing" was something capable of inducing the trance state in the one perceiving it. The common meaning of the word today is derived from that origin.

Scratch an "ordinary" state, find a trance state. There are so many workable induction techniques to alter ordinary states of consciousness into trance states—short or long term, light or intense, waking or sleeping—that many words have been used to describe such apparent departures from ordinary consciousness. In all candor, however, there is really no such thing as an "ordinary state of consciousness." Everyone to the degree governed by his or her acculturation, upbringing and value system development and entrenchment is in a state of waking trance to some degree. That degree can be greatly intensified in highly propagandized or emotionally affected communities. In the twentieth century the most powerful propagandas are secular (including industrial and commercial*) and political; in previous ages they were religious and ecclesiastical. But it still may be said that the world is run by trance states, focused on this subject or that, by this means or that, to this depth and intensity or that.

But the principles remain the same. Acculturation is slow hypnosis, as is all conditioning and behavioristic manipulation. One of the most naive failures of behaviorism has been, like so many human failures, the failure to see itself; and more particularly, to see itself as a very efficient set of techniques for slow hypnosis and the implantation of suggestions and values by the stressing of certain lines of behavior. That stress can be brought about by reward (material, psychological or both) or

*Indeed the commonest light-trance induction technique is called "a TV commercial" in our culture.

punishment in those domains of behavior. It is probable that if skillful enough trance-induction techniques are used, the entire manipulation can be done by rewards only. Practically speaking, however, some sort of mild deprival punishment or at least threats of such are found to emerge in all the *slow* hypnosis techniques of the behavioristic school—naive because it imagines itself innocent of all psychic components, whereas it is constantly inducing and manipulating low-degree or light hypnotic states.

Any psychological school truly realistic with itself cannot evade and must face the facts of hypnotic life, trance states and paranormal phenomena. The breakthrough must eventually come when the flood tides of intellectual honesty and repeatedly confirmed observation will finally re-establish a truly consciousness-oriented science of psychology in the twentieth century, which, hampered by inadequate "isms," is still groping for one.

For a start, certain dramatic altered states of consciousness will be considered. Then we shall trace the knowledge of trance induction back to its beginnings, literally millennia before Mesmer.

C.M.

Fire-Walking in Ceylon: An Eyewitness Report

1

Arthur Paul

The Asia Foundation's adviser on regional economic affairs, the author has worked in Asia during the past decade and up to the present, including five years as Adviser to the Minister of Commerce in Afghanistan and two years in a similar capacity in Ceylon. In Washington, D.C., Mr. Paul has served as executive director of the Foreign Economic Administration, as director of the Office of International Trade and as Assistant to the Secretary of Commerce. He thus qualifies as an official witness in the following account of an extraordinary state of consciousness, here published for the first time, in verbatim excerpts from the author's journal. The reader may be interested to know that fire-walking is also practiced on the island of Mbenga in Fiji, in Surinam, and in Raiatea.

This afternoon [Wednesday, July 19, 1967] Maxine Harrison and I drove upcountry with the Noyes' to a small fishing village, a Tamil community on the coast some sixty or seventy miles north of Colombo [Ceylon], where each year there is a traditional "fire-walking ceremony." We had been invited to attend by the local member of Parliament, who also asked us to come to his house for refreshments after the performance. When we arrived, the M.P.'s servants took us to a field a mile or two from the shore, on which there was an old Hindu temple. In front of the temple, a shallow pit about 15 to 20 feet long and 4 or 5 feet wide had already been dug. There were about a dozen people busy with the preparation of the burning coals in the pit, which were already red hot. These people were continuously dousing themselves with buckets of water in order to keep cool enough to go on working at the fire pit.

I sat on the ground in the front row of the spectators who surrounded the pit. I was about twenty or thirty feet from the pit and could feel its intense heat from there.

The ceremony did not begin until after dark. The fire-walkers went first to the temple and then left the field to bathe in the sea. They waited until the crowd of perhaps three or four hundred people had reached a high pitch of excitement before they came up from the ocean. They were accompanied by people carrying torches and by drummers, and they were led by a high priest with a striking headdress, who, we were told, has officiated at these ceremonies for many years. The priest was the first to walk across the live coals. He walked slowly and sedately, showing not the slightest sign of pain. The priest was followed by fifteen or twenty others, many of whom walked more rapidly. Some of them carried babies in their arms; one had two children, one in each arm, as he walked across the pit. Some of the fire-walkers were young boys, one or two of whom jumped out after the first step. Two little girls, not more than eleven or twelve, walked all the way across. Then a number of the walkers returned for second or third walks across the coals, which brought great applause from the people who were watching. At this point the high priest collapsed in a dead faint and was carried to the temple. This marked the end of the ceremony. I was told that this fainting spell is part of the annual ritual.

The path leading to the pit had become wet from the dousing of the workers who prepared the burning coals. Therefore the feet of the walkers may have picked up some damp mud before they crossed the pit and there may have been some sand on their feet from the sea. But the coals were so intensely hot that this does not seem to me to be an explanation for the ability of these people to perform this feat; in fact, I could see no ordinary rational explanation for what I had watched.

The next day I told my friend Navaratnarajah, who is a Tamil and whose religion is Hindu, that I had seen a fire-walking ceremony. He was formerly the Governor of the Province in

which the performance took place and has himself been present at a dozen or more fire-walking ceremonies.

Navaratnarajah is a pragmatic person with what seems to me to be a rather matter-of-fact mind. He said that he knew of no explanation of the ability of the fire-walkers to accomplish their feat other than "complete faith." Navaratnarajah also told me that on one occasion, a Christian Missionary who was a Protestant Minister, tried to accompany the fire-walkers. He bathed in the sea with the others and then started across the pit but had to jump out and was badly burned. I asked Navaratnarajah whether he had ever thought of trying to walk on the coals himself. He laughed and replied that he knew he couldn't do it because he had not led a "pure" life.

Editorial note. *The mere presence of a convinced belief of "not being able to perform"—no matter what the conscious or unconscious reason, in this case social conditioning, that is given as the basis for such belief—will interfere with the ability to perform or block it completely. In all such cases we are evidently dealing with a psychophysiological alteration of state involving subtle and delicately balanced unconscious processes. That balance is strengthened (or upset) by suggestions pro (or con) that the subject fully accepts. The unconscious process of this acceptance is the key to all trance induction, auto or hetero. It is also clear from the phenomena of fire-walking and suggestion-implemented healing that such psychophysiological alterations of state involve far more than purely psychological effects. The converse is also true, as shown by hypnosis. (See also page 152, vol. 1., no. 2, of the* Journal for the Study of Consciousness.*) Such phenomena are a compelling demonstration of the inadequacy of the concepts "subjective" and "objective"—directly implying a similar inadequacy in "unconscious" and "conscious."*

It is thus unscientific because untrue to separate the psychological and the physiological in living organisms. After falsely separating them it is absurd to pronounce a "principle" connecting them; that device, wherever used, indicates merely a semantic patching of an inadequate model, for they were never disconnected in nature to begin with and need no "principle" to unite them. (See in this connection the note [page 145, vol. 2, no. 2, Journal for the Study of Consciousness*] on the profound noetic control of body chemistry.)*

There is much of "the Emperor's New Clothes" in some of the writing

today about the "psychophysiological feedback" or "biofeedback." Even Dr. J. Kamiya (Langley-Porter Institute, San Francisco), who is one of the more responsible investigators and who first developed the refinement of auditory rather than visual instrument-reading in "biofeedback," warned (Wall Street Journal, *April 19, 1971) that much of the information spread so sensationally about instrumentally guided "bio-meditation" is unfortunate and misleading. Another authority—a psychiatrist adds that if it becomes a fad many "will get fleeced." Under the category of such misleading information fall the somewhat wild promises* (Wall Street Journal *same piece) by a staffer of the usually dependable Menninger Foundation in Topeka, of a new world of incalculable significance to be attained through masses of converts to the belief in yoga-by-teaching-machine. Promises that imply to the average person some kind of "instant mastery" or automatic self-development are suspect because they tend to be unreliable and are too often signs of a set of new opportunists trying to leap on a new bandwagon with P.T. Barnum techniques directed toward the gullible. Man's actual self-development requires a profound change of heart, and not merely a new machine technique or a new intellectual game.*

Instrument-mediated control of skin temperature, blood pressure and pulse rate, by the simple expedient of the subject's perceiving an instrument reading, has been, since the 1950s, a new technique rather than a new understanding. The concept of the psychophysiological unity of man stems from ancient times, and medical science has never been wholly without it. The discoverer of that unity is ancient and anonymous.

The brain contains about 10^{10} *neurons, which are highly specialized amoebas. The reason that human consciousness—beyond that of neurons—is natural in this symbiotic context lies in the fact that the brain, vastly more complex and profound than a* machine, *is a* biopsychic organ. *Thus the deepest advances of science in the late twentieth century will be those directed toward accumulating evidence tending to show that the "dualism" of body and consciousness is that of two branches of a tree, and not any unjoinable dichotomy—that all matter is indeed alive in a protobiological sense on some level, and hence can respond to consciousness when the proper techniques are used; and that there are forms of living substance far subtler than our relatively crude polarized (i.e. electron/proton) matter—forms already hinted at in the mysterious physical effectiveness of the so-called "vacuum state" as revealed by modern quantum physics.* C.M.

Trance-Induction Techniques in Ancient Egypt

2

Charles Musès *

While there are vague references in ancient authors to practices that might be considered as methodical induction techniques, the first specific instructions are found in the so-called Demotic Magical Papyrus of London and Leiden (British Museum Manuscript 10070 and Leiden Museum Manuscript I.383).

The papyrus dates from about the year 225, when Demotic Egyptian was giving way to Coptic under the pressure of the growing numbers of Christian converts among Egyptians. Coptic Egyptian reflected the influence of the Christian Gospels in making Greek a sacred and authoritative language for the Egyptian Christians, a process strengthened by the fact that Greek had already been an official language in Egypt for five hundred years, ever since the conquest of Alexander's general, Ptolemy.

Under this double pressure, civil and religious, the non-Christian Egyptian speech forms became inevitably corrupted by the Greek alphabet, phonemes, syntax and vocabulary—the final result being first old Coptic and then late Coptic. The language is still spoken by some families, today mostly in Upper Egypt.

*The author, editor of the *Journal for the Study of Consciousness*, is a life member of the American Oriental Society.

Ancient Egyptian Roots of the Idea of an Induced Trance

The papyrus that concerns us was written at the very end of the time when written Demotic was popularly and generally understood, the evidence for this being many glosses by the same hand that wrote the manuscript, giving synonyms in either Greek or old Coptic. On the other hand, the contents of the manuscript point to an unambiguously ancient Egyptian source, even though the present text seems to be the result of at least one translation into Greek and another back into Egyptian. The characteristic terms and concepts, however, can be traced back as far as the Pyramid Texts of the Early Dynastic period.

It is therefore legitimate to conclude that the trance-induction techniques detailed in the manuscript are of very ancient origin and enjoyed a duration of practice extending some five millennia; for the Pyramid Texts themselves were old and corrupted already in the Fourth Dynasty when we first meet them.

The Method of the Lamp

In the procedures presented in the papyrus, one looked at a lamp* or, if the process was hetero- rather than auto-induction, one had a subject (usually a young boy training for temple priesthood) look steadily at the lamp—in both cases, after the precaution of using a special eye ointment of vegetable origin to prevent strain. (The ointment favored was one prepared from the flowers of the Greek bean [column 5, lines 24-30] .)**

*Alternatively, one could use the shining surface of a vessel filled with oil or water.

**References to the manuscript are to the best edition of it, that of F. Griffith and H. Thompson, London 1904-1909, in three volumes. Neither Griffith not Thompson realized that they were dealing in important part with procedures for hypnotic induction. The trouble was that practically no one who knew Egyptology was technically trained in psychology, and vice versa. (H. Brugsch, we recently found, was a notable exception.)

Here is a typical auto-induction from the papyrus (c. 5, l. 29-33):

> When you desire to make inquiry of the lamp, fill your eyes with the ointment aforesaid, and then say "I pray thee [meaning the deific power ruling the day] to reveal thyself here tonight, speak with me and give me the answer truly concerning the questions I ask of thee." Pronouncing this spell over the lamp [while gazing at it], you will see a figure of a god standing behind the lamp and he speaks with you about your query. Or you may lie down on green reeds, having abstained from sexual communion, your head southward and your face looking north toward the lamp.

Another invocation to the lamp (for auto-trance induction):

> O Osiris, O lamp that giveth vision of the things above, and of the things below on earth. O lamp, O lamp, Amen is moored in thee. O lamp, O lamp, I invoke thee, go thou up to the shore of the great sea of Syria, the sea of Osiris. Go and find Osiris on his papyrus and tehun boat, Isis at his head, Nephthys at his feet, and the gods and goddesses about him.
>
> Speak, O Isis, and let Osiris be told the things I ask, let him cause the god to come here in whose hand is the command of this day, and give me full answer to all I request here today.
>
> And if it is inquiry by the boy that you are about, then say:
>
> He that giveth exceeding light, he in whose mouth is the fire that is not quenched, the great god that sitteth in the fire, he that is in the midst of the fiery lake of heaven, in whose hand is the divine might and greatness, reveal thyself to this boy at my lamp today, and let him give true answer. I will then glorify thee before him of the great glory, who lives forever, in whose hand is the beautiful staff, He who created the gods, none having created Him. Come then into the midst of this flame that is here before thee; and do thou* give strength to the eyes of the boy before my lamp, causing him to see and hear. May this lamp flame be opened to him for all my prayers!

You recite this until the great light appears (to the boy). Note

*The same passage furnishes an alternative text for *auto*-induction, and from "and do thou" continues:

> Cause me to see that which I ask about here today, let it be seen, let it be heard, and do thou cause my eyes to be opened to all about which I ask here today.

the repetition, a characteristic of all induction techniques including behavioristic ones.

A similar spell for hetero trance induction contains the suggestionally resourceful phrase,

> May this boy enchant the light [of the lamp].

The trance-summoning utterances were said with one's own (or the subject's) eyes closed. Then (c.18):

> You open your eyes or those of the boy and you (he) see(s) the light. You invoke the light, saying, Hail O light, come forth, come forth, O light, rise, rise, O light, grow, grow, O light! O that which is outside our vision come in! You say this nine times until the light increases and the god appears. When you have finished your questions, you dismiss him [that is, induce the waking state using another standard formula].

In another hetero-procedure (c. 27) you have the subject stand before the lamp and you cover his eyes with your hand and recite the invocations [induction procedure] above his head seven times. Then tell him to open his eyes and ask him, What things have you seen? If he says, I have seen the gods about the lamp, then have him gain from them the answers concerning your queries. You may also do it by yourself alone. [An auto-inductive procedure is then sketched in the papyrus.]

Column 17, lines 15-19, is very explicit:

> You say these things [a formula just given] seven times above the head of the boy and then tell him to open his eyes asking, Has the light appeared? If it be that the light has not come forth yet, you command the boy to speak with his own mouth to the lamp, thus: Grow, O light, come forth O light, rise O light, lift thyself up O light, come forth O light of the god, reveal thyself to me, O servant of the god, in whose hand is the command of this day, and who will ask for me.
>
> Then he reveals himself to the boy in the moment named.
>
> You recite these above the head of the boy as he gazes at the lamp. Do not let him look towards any other place except the lamp. . . .

When your inquiry is concluded, you return him to his first condition, make him close his eyes again, and speak the following invocation:

O Zéou [plus other names] watch over this boy, let him not be frightened or terrified, and make him return to his original path. Open the earth again to him.

The extra instruction is given (in c. 2) that if, after opening his eyes before the lamp, the boy does not experience the phenomenon of a marked increase in radiance, then the operator commands him to close his eyes again and says:

O darkness, remove thyself from his vision. O light, bring the light to me! O Osiris, who is in the Neshmé boat bring the light to me! O thou in whose hand is the ruling star of this moment summon the light! Anubis, the Good Shepherd, bring the light to me! Thou shalt give thy protection to me today for I am Horus, son of Isis, the good son of Osiris . . . . O great god, whose name is great, appear to this Child without alarming or confusing him. Let him speak clearly and truthfully.

You utter this seven times and then command him to open his eyes (again). If the light is now good and he says, Anubis is coming in, you then call before him Anubis.

Now another induction formula is given, ending with the words:

Come to the earth, show thyself here today! Then the boy is told to ask Anubis to bring in the other gods.

Then you ask the boy saying, Have the gods come in? If he says, they have come, you recite [a formula just given] seven times.

The procedure climaxes with the god of the day answering the questions of the operator through the boy. Any practicing hypnotist will note the sophistication of the preceding technique, using one result (Anubis) to entrain more (the other gods).

Islam Adopts the Lamp

From the evidence it is more than likely that the concept of Aladdin's Magic Lamp arose directly out of this ancient

Egyptian tradition of hypnotic induction, and that the beautifu
sura of the Lamp in the Koran reflects the same tradition and
perhaps arose from a mystical auto-inductive experience o
Mohammed himself—thus filtered into Islam from Ancien
Egypt, as did so much else.

God is the Light
Of the heavens and the earth!
It is though there were a Niche
And within a Lamp:
The Lamp within a Glass;
The Glass as a brilliant star
Lit from a blessed Tree,
An Olive, neither of East nor West,
Whose Oil is luminous
Though barely touched by fire:
Light upon Light!
God doeth guide
Whom He will
To this Light . . .
For the Day
When hearts and eyes
Will be transformed
In a world wholly new.

The Earliest Attested Hypnotherapy

The earliest hypnotic sessions on record were those con
ducted by the ancient Egyptian psychiatrist (described in th
hieroglyphic text as "an artist of the heart") and priest o
Thoth, Tehut-m-hobi, and his colleague Khonsu-p-'ri-seker on
royal female patient during the reign of Ramses XII of th
Twentieth Dynasty at Thebes, some 3000 years ago. The fina
cure by the latter was so phenomenally successful that the Kin
ordered it recorded permanently on a stone monument, nov
called the Bent-rosh Stela, first translated by Lauth in th
February 1875 *Proceedings* of the Bavarian Academy o
Sciences.

Tehut-m-hobi was treating the royal sister-in-law in the Mesopotamian region then called "Bukhtan." The princess in question, named Bent-rosh, a Semitic title equivalent to "Her Magnificence the Princess," had suffered a pronounced psychotic episode, described as "possession by a spirit." She did not respond to Dr. Tehut-m-hobi's ministrations, which the inscription indicates involved hypnotic techniques—he is called "one with skilled fingers" in a context which implies much more than the mere ability to write hieroglyphic Egyptian, which was an elementary prerequisite for a priesthood and physicianship.

The Bent-rosh Stela goes on to say that only when a very high priest of Thoth in his aspect of the healing moon-deity Khonsu travelled to the patient's homeland with a great stone statue of the god (a trip which took almost one and a half years) was a cure affected. But then it was immediate—because of the powerful suggestive presence of the god's statue in a culture impregnated with the concept of indwelling power in divine images, coupled with the undoubted trance-inducing skills of the high priest, who in the Stela assumes the deific title of Khonsu-p-'ri-seker or "Khonsu as He-who-goes-above-Death," of whom the priestly psychiatrist was considered a living incarnation very similar to a Tibetan "living Buddha" or a Mongolian *butuktu*.

Wrapping It Up

So we see that times really have not changed very much in the deepest psychological processes active in man. We also see that hypnotic induction in controllable and repeatable form was a body of well-organized knowledge with a concrete training program at least two thousand years before Mesmer's reintroduction of some of the techniques in eighteenth century Europe. James Braid's discovery in 1841 of trance induction by means of a bright or shining object is thus seen to be a rediscovery of what ancient Egyptian psychiatrist-priests had known thousands of years before him, only to have that

knowledge temporarily lost to mankind through colossal ignorance, superstitious bigotry and a paranoid fear of competition on the part of a new set of historically dominant establishment organization men, fanatically devoted to only one aim: to conserve the societal power of their group. Happily that climate is changing, and we are witnessing a tremendous and increasingly enlightened revival today of the therapeutic use of trance-induction techniques of all kinds. On the debit side of the ledger, there is also a concerted tendency to the misuse of such cliquish means in order to gain, increase, or maintain political, social, or economic power.

But interestingly enough, the more the general public becomes aware of such techniques, the less easily can they be imposed upon. We may look forward to a time where all men and women individually and voluntarily control their access to those levels of consciousness normally termed sub- or supra-conscious. We prefer the term trans-conscious, since the fact of the matter is that consciousness itself extends throughout the entire spectrum of possible states on all levels.

We can look forward to a society where such knowledge is commonly available if we actively recognize another ancient Egyptian doctrine. In his treatise on the Egyptian temple teachings, Jamblichos noted that ancient peoples regarded the world as a great organic system of being, containing multiple relationships between all things -a life-unified system filled with a complex tapestry of interwoven affinities (cf. the recent discoveries of the fundamental importance of "affinity sites" in the theory of protein and antibody formation). Here truly was the first reasoned—and essentially accurate—statement of not simply a terrestial but a fully *cosmic* ecology.

Editorial note. *It should also be mentioned here that the physician James Esdaile was the first to perform successful modern surgery under anesthesia, the anesthetic being the hypnotic state rather than a drug. His extensive case records, published in 1846, abundantly testify to the profound surgical analgesia he succeeded in producing, together with absence of systemic shock and the greatly accelerated and often painless healing the hypnotic method induced. His operations were often three hours long or more, and included amputations and the extraction of large tumors, the opening and cleaning of abscesses, and other ordinarily*

extremely painful surgical interventions. He also cured sciatica and rheumatic lameness by hypnosis. Dr. Esdaile also observed, in case after case, that parapsychological ability was stimulated in the hypnotic state, and concluded that this was evidence of "the existence in certain states of the organism, of the phenomenon of sensory perception without the use of the appropriate organism." This was the first scientific announcement of extrasensory perception.

In October 1970 Dr. Michel Bader, division chief of space sciences at a NASA research center, told a private scientific gathering of an interesting phenomenon he had personally produced in his avocation of research in hypnosis. Dr. Bader was able to "progress" as well as "retrogress" subjects. His magnetic tapes demonstrate that when the entranced subjects were progressed to a future date as though it were present to them, they were able to describe specific events that they did not do (thus ruling out posthypnotic suggestion), which later in fact came to pass. This entire question of progression as well as retrogression should be investigated further.

In addition to these observations should be mentioned the remarkable researches of the late Dr. Linn Cooper, embodied in the book by him and the noted hypnotist-psychiatrist Milton Erickson, Time Distortion in Hypnosis *(2nd ed., 1959). Their study concerns the fact that temporal experience in trance states may be greatly expanded or contracted with respect to the experience of time in the normal waking state. Even dreams demonstrate this to some extent. Under hypnosis the effect becomes directable, repeatable and controllable. We visited Dr. Erickson in early 1967, and our conversations included an illustration (summarized in the note on page 157 of vol. 1, no. 2, of the* Journal for the Study of Consciousness*) of how hypernumbers—more of which later—can help to resolve the apparent paradox of two experiential modes of time belonging to two different states of consciousness.* C.M.

Toward a Theory of ESP

3

Arthur M. Young

The author, after a career as an inventor in aeronautic (culminating in the invention of the rotor for the Bell helicopter conceived and set up the Foundation for the Study of Consciousne (1951), one of the first organizations of its kind. Shortly afterward, th Foundation was officially chartered. Interested readers should see th extracts from the presidential reports to the Foundation, to be found i the Journal for the Study of Consciousness *(vol. 2, no. 1, 1969)*

It was in 1945, some twenty-five years ago, that I began t intensively pursue my present interest in higher psychologic and parapsychological phenomena, an interest that has grow into what I now call the study of consciousness.

As I had done many times in pursuit of other subjects, I wen to the Library of Congress and looked in their file catalogue fo relevant books on this subject. My eye fell on the title "Thirt Years of Psychic Research," published in New York. I filled ou a slip and continued to thumb through the card index. "Fift Years of Psychic Research," published in England, then caugh my attention. A few cards further, "Sixty Years of Psychi Research," published in France.

But a perusal of these and other volumes did not indicate tha these years of research had produced any explanation of th phenomena involved, nor was there evidence of the progressiv discovery that characterized other sciences. Indeed, the qualit and caliber of the research seemed, if anything, to hav deteriorated. More recently, the work of Rhine, patient

thorough, and statistically exhaustive as it has been, has not resulted in any basic explanation or theory of how these phenomena occur.

At any rate, I became convinced that a theory was needed if only to be able to ask the right questions. It is generally assumed that a theory must be based on facts, and that facts can disprove a false theory, but as Kuhn has pointed out, a theory is not dislodged by facts, but only by another theory.*

There is also an important interrelationship between fact and theory which makes the nature of fact depend on the theory available to account for it. If we witnessed a telephone conversation in 1850, we might suppose that the human voice travelled along the wire, and thus be forced to accept as fact what was contrary to sense, and as would develop, not true.

On the other hand, pseudo-explanation has been the curse of parapsychological phenomena. To say that telepathy works like a radio** may make it more acceptable to the layman, but does not stand up as a proper explanation and does not lead to knowing more about telepathy.

Science has, of course, discovered previously unknown kinds of phenomena—magnetism, x-rays, radio waves, etc.—and the temptation is to regard ESP as based on some unrecognized force or field which, like magnetism, reveals itself only under special conditions and with appropriate material (iron filings).

But such explanations, while seemingly scientific, are rather imitative of science and fail to touch the real issue, which does not so much concern physical objects in space and time. Rather, as will become clearer, it has to do with how space and time come into existence. Precognitive (prophetic) dreams, for example, pose the issue. I experienced several such dreams early in my investigations. How can we explain precognition in terms of objective forces, however subtle or fantastic, between physical objects? We need to go deeper and discover how it is possible to transcend time in some way.

*Thomas S. Kuhn, *The Structure of Scientific Revolutions*, University of Chicago Press, 1962.

**As did Buckminster Fuller in a 1971 telecast, for example. *C.M.*

To examine this issue, which suggests the existence of something other than physical entities as we know them, we are thus led to a deeper kind of inquiry and to questions about the physical universe. How does the objective physical universe, which it is the business of science to describe, come to be? How does time come into existence? Space? Such questions are the more universal counterpart of similar questions we might ask about man. Is there a non-objective animating principle (which we may entitle soul) in man?

The Foundation for the Study of Consciousness was founded in 1952 with these objectives in view, and the name—"For the Study of Consciousness"—was chosen just because it was felt that since both man and universe are only known to us through the operation of consciousness, that consciousness is a more inclusive term than others, such as "Parapsychology Foundation," which were at the time suggested as alternatives.

In fact, it is difficult to think of anything that consciousness in the broader sense does not include. It might be objected that it does not include the unconscious, which psychology has found to be so important, but here we would offer that the word unconscious is undefined. In any case, we can expect that the study of consciousness must include the unconscious, if for no other reason than that the unconscious is the source and origin of consciousness.*

If I may be permitted to jump to the conclusion I have reached in the twenty-odd years I have devoted to the study, I would say that, like icebergs, only a small part of whose bulk appears above the surface of the ocean, we float in a psychic sea, and unknowingly (unconsciously, if you like) have access (more or less, depending on individual development and other factors) to forms of knowing that are not explicable in terms of immediate sense experience.

Rather than press the scientific mind beyond what it can currently credit, we can instance the obvious case of memory.

*See also *Journal for the Study of Consciousness*, vol. 1, no. 2 (1968), pp. 152 and 77 *ff.*

Memory provides knowledge not based on immediate sense experience. But you say memory is based on previous sense experience. True, but what limit are we to place on *previous*? As Jung has shown, dreams give evidence of drawing on a greater range of experience than is available from the individual's own lifetime (i.e., from the subconscious, as defined by Freud). Dreams reach to deeper levels and may include the collective memory of the race, and it was this backlog of experience that induced Jung to refer to the *unconscious* as a far more inclusive concept than the subconscious of Freud.

But what is the unconscious? It seems to me that this is the kernel of our problem, and in order to study it, or even to discuss it properly, we need a cosmology, or perhaps I should say an ontology, of the self. We need to know the ontological basis for the self-consciousness.

To return to precognitive dreams, the question we need to ask about them is not so much of the nature of: "Do precognitive dreams occur?"—because if we are tied to a narrow ontology or system of reality which denies such occurrence in principle, we cannot rightly admit their existence, regardless of evidence. Nor is "open-mindedness"—while still adhering to such an ontology—the proper attitude, for to be willing to accept the existence of what our assorted premises deny in principle is worse than hypocritical. It is self-deception. The question is rather "Is the assumption that denies precognition in principle valid?" Here is where we need true open-mindedness and courage to root out the unconscious presumptions that encumber our world view and heavily handicap our ability to appreciate the available facts.

We are thus driven back to re-examine these presumptions, allegedly based on the findings of "science."

Precognitive dreams are but one instance in which we are driven to such re-examination. Take, for another example, dowsing. We begin with ordinary water divining, a practice that is far more common than is generally admitted in academic quarters. A dowser carries a hazel fork over the ground. It bends down at a certain spot, revealing underground water. We investigate the hazel fork, then find other dowsers doing it with

a fork of whale bone, or even a bent wire from a coat hanger. So we investigate the electrostatic field of the earth in the vicinity on the assumption that the high dielectric constant of water is a factor; then we find dowsers who can locate other substances than water, such as metals or buried objects.

We might still have faith that there is some physical influence in the field of the earth that the dowser picks up. But now we find that dowsers are able to dowse from a map, and can do so thousands of miles from the actual location. There can be no physical cause in the case of map dowsing, and the problem escapes the net of physical experiment.

Telepathy is another example. Hundreds of experiments and many years have been devoted to trying to find ways of screening (i.e., preventing) telepathy on the assumption it is a form of electromagnetic radiation. Up to this point there has been no evidence that telepathy can be screened. The further evidence that the image or message is not affected by how far it travels would appear to indicate that telepathy does not operate according to the inverse square law (diminution of a force as the square of the distance across which it acts) and is hence not accountable as electromagnetic.

These examples are the despair of the physical experimenter. I recall talking to two scientists who were interested in developing screens for aiding in seeing the aura or energy—normally invisible—surrounding the body. The wife of one of them was also present, and since she herself was a sensitive who could "see" auras, I queried, "Why don't they ask you about the subject?" She then spoke up, "They don't like me to say this, but I see them [auras] with my eyes shut!"

Even if these examples of extra sensory perception are beyond the analysis of physical experiments, they nonetheless give vital clues as to the nature of ESP and indicate that we need to look at the problem from a different viewpoint than the one usually taken. The examples suggest, in fact, that we need to probe deeper into the nature of all sense perception and not limit our analysis to extra-normal phenomena. We are challenged to discover the invisible proto-physical and proto-objective factors in a reality, only one of whose aspects is that

of material objects moved about in accordance with the strict determinism of classical physics.

Curiously enough, modern quantum physics proves our strongest ally in this endeavor. Here the discoveries of this century have revealed not only the inadequacy of classical physics for the explanation of the behavior of individual particles but the existence of something more basic in the universe than material objects. Moreover, this something, known as the quantum of action, behaves in some ways that seem quite similar to psychic phenomena. For example, this quantum of action—essentially an "atom" of radiation—does not obey the inverse square law, but transmits its energy with no diminution due to distance, much as a telegraphic message suffers no change in its meaning with the distance over which it is sent.

But this is not the place to plead the case for parallelism between the unexplained aspects of the two domains. The point is that, quite apart from questions of the nature of perception, the world of the physicist is undergoing an enlargement which takes it into immaterial expressions and transactions that were undreamed of in the 19th century.

What is most unfortunate today is that the scientists most concerned with the problems of communication, human interrelations, psychology and biology are trying to build their science on foundations which are now known to be inadequate,* even for the interpretation of the interactions of physical particles, atoms and electrons.

Our philosophy has become emasculated by the anxiety to propitiate deterministic science. We strive, like obsequious morticians, to provide consolation by enshrining a corpse. But true science no longer upholds the sanction of the inert, though there are undertakers everywhere that still administer to it.

I mentioned that we need a theory, even if it is only a tentative one, which permits us to hear evidence for ESP, because without a theory we fall victim to denying evidence on

*Professor Wigner has also alluded in his chapter to this present inadequacy of method in the biological sciences.

principle. The sort of open-mindedness we truly need is not the passive acceptance of inexplicable phenomena, but the active examination of normally taken-for-granted postulates. We must discover their relevance and limitations with the same care that we exercise in the establishment of facts.

We thus realize that in the study of ESP we embark not only on the search for facts, but on the search for theory. For an example, let us turn to an experiment in which the sensitive allegedly is able to read the meaning of the contents of a sealed envelope, in some cases even in an unfamiliar language. This contradicts the assumption that we need the sense datum of vision to read, and we either have to deny the validity of the experiment or entertain some fantastic concept of ability to read through fingertips or with x-ray vision. But if we broaden our theoretical base and distinguish the message from the written words, we can begin to note that the sensitive is reacting to the emotional content of the message, rather than to the letters which spell it out. This distinction is confirmed by the surprising fact just noted that the sensitive can often read a message written in a language he cannot read or speak.

This re-interpretation of what has happened circumvents the contradiction of seeing invisible words. The reinterpretation may lead us to invoke some other difficulty (how is emotion transmitted?), but this new difficulty is an improvement because we have moved toward the proper statement of fact. The sensitive was not demonstrating x-ray vision, he was picking up the "emotional feel." The transmission of emotional feel is quite different from transmission by the written word. It is not achieved by objective data alone. It requires a certain internal or subjective receptivity which in communication between persons involves sympathy or empathy. It is not exact, as is objective communication, and may because of bias in one or both parties have different results. The perception "cat" would have quite a different emotional content to a bird than to another cat. This is indicative of the importance of subjectivity and is a step nearer to a theory of communication not based on sense data.

Let us re-examine what we call subjective. The theory of the spatio-temporal universe of physical objects is unable to

account for or describe subjective states, feelings, and emotions. However, as living creatures, we all can testify that we have such feelings. Such subjective feelings cannot be weighed, measured, or observed by other persons. They can only be inferred. We give names to these states, but the names have meaning only to one who has experienced the state. It cannot be conveyed by a definition or formulation, for that would require observability.

Since there is no external referent in the form of a physical object or no observable to describe a subjective state, it can have no identity: we can say of spatial objects that they have identity, but we cannot say of a headache that it is the same headache we had last week. It is reasonable, too, to say that emotional states do not have location, another spatial attribute.

It then follows that subjective states, not being spatial, need not follow spatial laws, and if this conclusion is really accepted, we can no longer, on categorical grounds, rule out their transmission. Following the thought a bit further, we might ask, have we any grounds for isolating the subjective side of persons in the same way that we know their objective and physical bodies are isolated? Is your subjective spatially separate from my subjective? On the ground we have covered, I have to say that it is not.

Jan Ehrenwald, in an interesting book, describes a common form of insanity in which the patient is unable to distinguish his own thoughts from those of the doctors.* The patient reads the doctor's mind. But since he can't discriminate, the phenomenon is not a skill, but the lack of one. Like a country invaded by subversive agents, the integrity of the self—as that of this patient—is threatened by invasion. As a further example of the unimportance of physical separation in extrasensory transmission, we might instance Louisa (Mrs. J.B.) Rhine's theory that telepathy does not operate as supposed. Thought is *not* "sent out and received." Rather, the receiver reaches out and picks up the thought. This theory is now generally recognized to better account for the facts.

Then how, it might be asked, are subjective thoughts separate

*New Dimensions of Deep Analysis, Grune & Stratton.

from one another? How does the recipient pick up a thought? These are the questions pertinent to ESP.

By way of answer, we can refer to *attention.* Like a flashlight in a dark attic singling out different objects, one can shift one's attention from one subjective state to another. Direction, rather than space, separates states from one another.

Closely related to attention is *intention.* Intention has the same directive control over action that attention has for observation. Such control is the source and origin of the self.

This directive function of selfhood, intention or attention, is likewise subjective. It cannot be directly observed by another. It must be inferred. The task of detecting the intention of others is basic and all important, irrespective of whether the other party desires to communicate or to conceal it.

We thus have in addition to subjective states, that is, feelings and emotions, another non-objective existence and one that is of equal or greater importance. Indeed, because the capacity of attention to select subjective states and of intention to initiate and direct action is the origin of selfhood and is primary to the states or acts it deals with, we place attention (or intention) at a higher hierarchic level than the feelings (or acts) it singles out.

Let us now consider an example of ESP and examine what conventional science would be able to do with it. In the book *Psychic Discoveries Behind the Iron Curtain,* it is recounted how the psychic, Messing, while giving a stage performance demonstrating his telepathic powers, was apprehended by the secret police and driven to an unknown destination.* He was ushered into the presence of Stalin. Stalin was interested in his abilities and had charged him with the task of robbing a bank of 100,000 rubles. Messing went into a bank, handed a *blank* slip of paper to the teller, who thereupon had handed him 100,000 rubles.

Assuming for the sake of argument we accept this account as factual, how would we go about a scientific analysis of what had occurred? We know that it is possible for a person provided

*By Sheila Ostrander and Lynn Schroeder, Englewood Cliffs, N.J.: Prentice-Hall, 1970.

with a draft or a money order to go to a bank and obtain payment. We also know that it is possible for a robber to enter a bank, threaten the teller with a real or imaginary pistol, and obtain the funds. What is common to the three examples? Obviously, it is the intent to obtain an amount of money. The gun or the money order are means. Messing presented a blank sheet of paper, but we may suppose that he impressed on the clerk that the slip of paper was a proper draft. In any case, the common factor was the intent to obtain the money. Yet this essential point would be impossible to describe in terms of the science of physical objects in which there is no such entity as intent.

Thus, we can recognize that it is not only the psychic power of Messing that is unaccountable to physical science. The ordinary power of persons to cash a check at the bank is not accounted for by science, either. True, we know that the average person uses some visible means and that the robber uses another visible means, but the central issue, the purpose to get the money, is not a scientifically verifiable entity. Conventional science is very strict about excluding purpose from its descriptions.

But we are citing this example to show not only the importance of purpose, but that purpose, even as it occurs in ordinary situations, cannot be accounted for by the science of spatio-temporal objects, that is, classical physics.

To sum up, purpose is of primary importance to life. We accept its existence without question. Not only does it spark our own endeavors, but, as we said, we seek to know the intention of others to guide our own actions. Yet purpose is immaterial, it is not objective. At best, it can only be inferred or guessed.

This brings the problem into focus. Can science, presumably based on objective and material existence, give recognition to purpose? Biologists say it cannot; "philosophers of science" say it cannot; and classical physics denies purpose categorically. But it is not true that science deals only with the objective. The revolution brought about by quantum physics has elevated the quantum of action (which here means mass times velocity times

distance), alias the quantum of uncertainty (in either momentum or else position), to primary status. Uncertainty is by definition unobservable and, hence, non-objective. We will shortly make use of its recognition by physics to establish an ontology which includes non-objective categories, one of which correlates with purpose.

Before doing so, however, let us point out a rather important aspect of ESP that the preoccupation with objectivity and scientific proof has tended to overlook.

This is that most ESP constitutes a special skill or talent, and that even with those who have native ability, ESP requires great effort and extended training. What this implies is that extrasensory, and for that matter, *any* perception moves away from limitation and away from law. An inert object may respond to force, but it has no *perception.* An inert object responds to the law of gravitation by falling, a bird responds by flying. In seeking for "laws of ESP" we are looking through the wrong end of the telescope. Laws have great importance, but to elevate law to be the sole determinant of action is as absurd as to say there can be no such thing as theft because it is against the law.

It is a question of what *is* versus what *ought to be,* and natural law always involves the proviso that initiative is excluded. It is often forgotten that the laws of classical physics operate only on the proviso that something or someone does not interfere. A body continues in its state of rest or motion *provided* there is no outside interference.

We may now take up a related subject, the question of human survival after death, for it will help us to clarify our theory of ESP.

The skepticism of the modern mind on this topic takes the form of two questions or doubts:

1. Since the body is a physical organism composed of molecules which disintegrate at death, how can there be any survival?

2. What *identity* could the surviving entity possess? And without identity, how could it be said to exist?

The first question assumes that the human entity is not other than the chemical activity of the physical organism. The answer is that volition, consciousness, and other human abilities are not reducible to or explained as chemical action. The chemical action in the body is substantially similar for all humans and most animals, and we cannot account either for the variety of human character or for its action as an integrated entity by referring to molecular motions. There must be something unitary that integrates molecular motions. Thus something conceivably could survive after death, which brings us to the second question.

As with ESP, we must recognize that the subjective states, feelings, emotions which constitute the most real part of our existence and are experienced directly, are not objects in space, as are atoms. Furthermore, *attention,* which is the true center of being and enables it to experience one of a number of these states, is at a still "higher" level, doubly removed from the atoms, molecules, or organic entities (cells) which comprise the physical body.

In an earlier essay, "Constraint and Freedom, An Ontology Based on Dimension,"* we described the necessary orders or levels of existence and derived their character from their dimensionality. The first, analogous to the point, is zero dimensional, by which we mean no constraints. It is not confined either by time or space. The second, like the line, is one dimensional. It has locus in time. The third has locus in space, and the fourth, locus in both time and space, as the following schema shows.

We now pose the question: where is identity in the sense of identifiability?

Applying the scheme to consciousness, we assign attention to level 1, correlating with the origin or point. Subjective states, occurring in sequence in time, we assign to the line. The rational faculty, dealing in comparisons (*ratios*), we assign to the plane,

Journal for the Study of Consciousness, vol. 2, no. 2, p. 146, and vol. 3, no. 1, p. 51.

Level	Dimension	Physical Description	Type of Constraint	Human Factor
Projective 1st	Point	Photons Quantum of action	Not confined to time or space	Attention, purpose orientation
Projective 2nd	Line	Nuclear Particles	Temporal constraint	Subjective feelings Archetypes, values
Objective 3rd	Area	Atoms	Spatial constraint	Form, concepts
Objective 4th	Solid	Molecules or molar objects	Constraint of time and space	Value + form (Material extent) Sensation

and sensation and the world of physical objects to which sensation gives access, to the volume or solid.

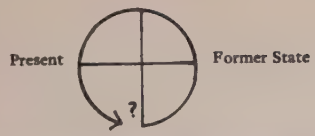
On these levels the first two are non-objective and cannot be defined. There can be no identity here in the sense of something which can be identified. To define a thing is to limit it, to bound it, and definition requires at least two constraints (space and time) which are not available at the first two levels. Attention at the first level is optional; it is by nature without constraint; it is always in the present—in fact, creates the present.

At the second level, we have subjective states. These states fall into a one-dimensional time sequence of memories. They may have infinite variety. Their sole constraint is that they occur in time in a definite sequence. Attention ideally has the option to travel back and forth on this line at will, but such is the compulsion of the suffering or the enjoyment of these states that attention becomes, as it were, ordinarily bound by them. It becomes intoxicated by them and reels about under their compulsive spell.*

There now arises with the third level the possibility of comparing one subjective state or memory with another. This implies that the line circles back on itself, bringing its present state into juxtaposition with a former state:

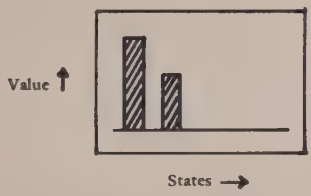
To compare the two states there must be created a *space* in

*Also, there remains much in perception and memory on unconscious levels inaccessible to ordinary attention. *Eds.*



which both states can exist together. This space is quite separate from the dimension of the time sequence, which provides only for sequence, and not for coexistence or simultaneity, which requires something not in time.

This new space must be two-dimensional. It requires one dimension to measure comparative value, and the other to separate one state from another.



To assist in this realization we can imagine trying to measure the length of a freight car by comparing it with another. We would require a separate track to bring the second freight car up alongside the first. A single track would not permit the lengths of the two cars to be compared.

This is the two-dimensional space of intellect. It is what we mean by third level, and it provides the basis for comparison, for rationalization, for definition, and thus makes *concepts* possible.

Third level also provides the possibility of self-consciousness. The self here can stand aside from the flow of subjective states and need no longer be wholly trapped by them. But it pays a price for this freedom because at this level it now mistakes the measure or the concept for the reality connoted by it. It is no

longer trapped by its feelings, but it now is no longer mobile; its fluidity becomes frozen in structure.

This self-consciousness is a very critical and important stage in development: in making the self aware of itself and able to compare experiences, it makes knowledge possible. It is, in fact, the "fruit of the tree of the knowledge of good and evil." The third level's correlation to self-consciousness is illustrated in Genesis 3:11:

> Who told thee thou was naked?
> Hast thou eaten of the tree
> whereof I commanded thee thou
> shouldest not eat?

That the recognition called bodily identity, which arises from self-consciousness, is third level should now also be clear. The third level is objective; it provides boundaries and makes possible form. Here bodily identity arises.

Boundaries isolate a thing and thus provide identity. Identity is thus bounded or finite. Strictly, this finiteness begins as spatial, but finiteness in time is an inevitable consequence. This comes about because identity, bounding itself off from the all, holds a part of itself isolated from the current of change. This makes identity a composite of peripheral elements and a central core, and since the composite can be dissolved, identity is mortal, finite in time.

Putting the whole argument together, what emerges is that the "fall" of man is the onset of objective identity or self-confirmation, and that with that identity comes a finite life span. Existence at level two has no terminus, no self-limitation; it is immortal because it lacks the self-limitation that would give it a boundary in time.

What, then, is that precious mortal identity to which we so desperately cling, preferring it to the life immortal, and for its sake leaving behind the Garden of Eden? Ask a man what he is, and he will pinch himself, point to his body. But his body is compounded of atoms, and these are not even the same atoms over the years of his life. He will be compelled by this

inquisition to deny his own existence, for there is no permanent isolated *object* he can call his identity. Yet *he* is there, actively squirming, protesting his opinion (perhaps insisting that he does not exist!), and his existence consists in this *activity,* this "non-compliance" with the ephemeral status of his body. Why is this activity not its own justification? Why does it need an object-body to pinch to assure its self of existence? We are face to face with the mystery of self-consciousness.

Perhaps it is the appetite for possessions that makes us turn to them for self-confirmation. I have a body, therefore I exist. I'm hungry, therefore I exist. Or even, I think, therefore I exist. *But true being is its own confirmation.* As soon as it pauses for self-confirmation, it is trapped in non-being.

Orpheus looks back and loses Eurydice. Lot's wife turns to salt. In the Dionysian cult, the infant Bacchus, seeing himself in a mirror, is enchanted, and the Titans are able to seize him and tear him to pieces. The cost of self-confirmation or identification is mortality. This answers the second question on page 28.

Our thesis, then, is that existence is primarily non-objective. Even in the objective world we clothe its bare sense datum with subjective coloration and images from the storehouse of memory.

But now we encounter a new embarrassment. We must account for objectivity. Why have a mortal body when one can enjoy the full content of subjective experience without one? Why leave the garden? Here we must literally invert our whole approach. This has the merit of dislodging the fixed bias with which both the pro and the anti factions (in the question of immortality) are inevitably encumbered.

The answer turns on the positive contribution of mortality. We are so accustomed to regarding death either as the unfortunate end to the goodness of life, or as the merciful termination to its misfortunes, that it never occurs to us to see it for what it truly is, the conclusion to an interesting experiment which if it took forever would be of no possible use.

I put emphasis on the view that life in a body is an experiment because as an inventor I have learned to appreciate

the significance of working models and of practice. It is not that practice operates under a different criterion from theory, theory saying one thing, practical consideration another, but that practice exposes the flaws in theory and leads to better theory. Theory without practice remains ignorant of its own flaws. Theory plus practice enlarges, deepens, and then refutes itself.

Now in practice we deal with the finite. If we did not, the time required to learn would be infinite, the learning process would not come to a halt. This is true in ordinary life and is the clue to the development of any new device, from a new type of aircraft to a possible means for expanding consciousness. Social science is open to criticism in that its experiments are on so large a scale (for example, the invention of new types of society) and take so long that by the time the experiment begins to show results, the sociologists have died off and a new lot taken their place.

Perhaps the thesis that relegates the physical universe to the function of a test bed for mere humanity seems too anthropomorphic and certainly not in agreement with that of some scientists, for whom life is but a green scum on the face of a minor planet, but in speaking for man, I am also stating the case for evolution of creatures generally. The Darwinian theory affirms that the cause of evolution is the survival of the fittest, and this thesis requires a theater in which life forms are finite, whether or not this be the only existence. We can add that while survival is necessary, it is not a sufficient cause of evolution whose complete account would require recognition of both the persistence of motivation (a conservation of energy) and the initiation of novelty.

With hope, then, let us stretch our minds beyond the laws of matter and try to imagine how these laws can provide a basis for greater living. Perhaps we may even envision creatures beyond men—as far beyond us as we are from the clam—but for even these creatures some testing ground would be necessary, and this may indeed be what is really going on in distant galaxies.

Vigilance, Dreaming and the Paranormal

4

Montague Ullman

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Introduction

Theories abound when the need arises to do something drastic about an intolerable and highly resistive state of ignorance. In the case of dreams, before the advent of the REM era—Rapid Eye Movement, characterizing active dreaming states during sleep—one monumental theory, the theory of Freud, overshadowed all others for at least five decades, although dissenting views never quite disappeared. With the new influx of factual data about sleep and dreams came a reawakening of interest in clinical theory and a general openness to experimentation, testing and discovery.

One difficulty is that it is hardly likely that theorizing at any one level can do justice to the complexity of the problem, yet very few theory builders seem humble enough to admit this. Theory building by disciplinary consensus appears to be what is needed and what unfortunately is lacking. In the absence of this there is apt to be an excess of dysfunctional partisanship. If I could set up a multidisciplinary arrangement for theory building—assuming, and I think rightly so, that much of the

necessary information is already at hand—it would include the following experts. I have also noted the questions I would address to each.

1. *The Psychiatric Clinician:* What are the psycho-dynamic considerations, transcending any narrow theoretical orientation, that would have to be explained satisfactorily by any dream theory?

2. *The Clinical Sociologist:* How do social arrangements and institutions influence dream style? In what sense do dream elements have social points of reference as well as personal ones? Conversely, to what extent can the social salience of dreams influence the social milieu?

The above two experts would, in the main, find themselves struggling with questions of dream *content.* The remaining experts would be involved primarily with questions of *form* or structure. Questions of *function* would involve an integration of both form and content, and hence of the findings of both groups of experts.

3. *The Neurophysiologist:* What are the underlying brain mechanisms for REM activity and how do they influence such activity? How do such mechanisms relate to the cyclic alterations in organismic states during sleep?

4. *The Computer Expert:* What computer analogies can be developed to explain two basic life processes on which dream analysis throws light: the conservation of identity and the necessity for growth? How is sameness maintained in the face of the necessity for growth? (It may be that only the first part of this question is really suitable for computer experts, but several intriguing theories involving both aspects have already appeared.)

5. *The Ethologist:* What is there in the comparative study of animal behavior that can help clarify questions concerning the development of REM in the species and perhaps in an individual?

One could perhaps think of other comparable experts, but they would represent classes or subdivisions of the above, such as specialists in brain chemistry (coming under neurophysiology). With the possible exception of the second category, all of the above experts are on the scene but working separately.

There have been sporadic beginnings with regard to the second category, the social dimension, in the past and a very occasional glimmer in the present.

There are at least two other experts of a different sort to add to this assembly, perhaps to the dismay of some of the more conservative members of the team.

6. *The Psychedelic Expert:* How does the world of drug-induced visions and hallucinatory phenomena fit into the general scheme of things and, more specifically, how do they relate to the natural alternation of thought modalities characteristic of waking and dreaming?

7. *The Parapsychologist:* The current temper of inquiry can no longer permit the insistent reports of parapsychologists to be swept under the rug. The parapsychologist would have to be included as a bona fide member of the team and would be faced with the question of how paranormal events are related to normal and altered states of consciousness.

It would take a group such as the above or one similar to it to arrive at a unitary theory of dreaming. In its absence any theoretical model or theory, such as the one to be presented, has a one-sided bias built into it.

The Vigilance Hypothesis

My own area of competence is in the first-named category, the clinical arena, with some spillage into the last, the parapsychological. My interest in dreams has drawn me to each of the other spheres but with no pretensions other than that of an interested observer. A delight in conceptual schemes and a dissatisfaction with classical dream theory led me in 1958, just prior to the work on REM sleep, to formulate a theory of dreaming based on the notion of vigilance. The theory appeared to be consistent with the emerging discoveries concerning REM sleep. I believe it remains compatible with current experimental findings, at least as interpreted by one leading investigator, R. Hernandez-Péon. We will discuss his work in more detail later on.

The essential feature of the theory is that while asleep there is, except for occasional motor automatisms such as sleep-walking, only one major *behavioral* act that is possible, namely, a change in the internal state of the organism leading to awakening. Because we do it every day of our lives, the drastic nature of this change from sleeping to waking tends to be overlooked. It is certainly the most marked qualitative change in state that the organism experiences in the course of a day. Compared to it, variations in levels of arousal that characterize changing interest patterns while awake are relatively trivial.

It follows that there must be a mechanism available to the organism to bring about such a change in state should a need arise of sufficient urgency to interrupt the otherwise physiologically controlled cyclic variations that occur during sleep. Such a need might develop if something either so painful or so intense were to arise during the night that its continuation was incompatible with the continuation of the sleep state.

A second feature of the theory involves the general statement that consciousness, in whatever form it is experienced, is not epiphenomenal but exerts a unifying, integrative, executive function. Furthermore, this function should not be seen as being isolated from either the afferent input—impulses carried toward the central nervous system—occurring at the time or the efferent output—impulses carried outward from the central nervous system—be the output immediate or delayed. Waking consciousness is organized in relation to a series of selectively attended to events, each one having a specific afferent component as well as an immediate or potential efferent component. We have a certain say in relation to the stimuli we attend to and the actions that we take. As a consequence of this, waking consciousness has a distinctly "voluntary" quality.

When we turn our attention to dreaming, the first thing we note is that we are conscious while we are dreaming but that the way that consciousness is experienced, as well as its specific form and content, is qualitatively different from waking consciousness. It is involuntary in quality, sensory in form and creatively organized in its content. All theories of dreaming must account for these characteristics. But despite these rather

dramatic differences and operating within whatever limits they impose, dream consciousness, like waking consciousness, is integrative and executive and just as contingent upon the capacity to attend selectively to an afferent input as well as to effect a behavioral response.

The difference lies not in the presence or absence of the input or the response. It is to be found in their nature. In comparison to the waking state, the dreamer is selectively attending to a different environment, scanning it in a different manner, and responding to it differently. These differences stem from the fact that in sleep there is an enforced attention to a self-generated afferent input and that the possibilities for a behavioral output are limited to a single act, namely, the act of awakening.

Awakening can occur reflexively in response to the overwhelming nature of the dream itself, or more gradually as a consequence of the dreamer's struggle to terminate the dream, or simply as the passive end-point of a dream sequence. Under most circumstances no overt behavioral change occurs and the only change to be noted is the shift to another level of sleep. In any event, consciousness experienced under these circumstances has an "involuntary" quality. It reflects the fact that the entire occurrence, from beginning to end, is largely outside the dreamer's control.

When one examines the form and content of dreaming in relation to this kind of unitary behavioral end-point, the notion of vigilance suggests itself. In fact, one can analyze the sequence of events that occur in dreaming by drawing an analogy to orienting behavior occurring in the waking state, behavior that focuses an individual's attention. This is the line of reasoning that will now be presented, in support of the thesis that dream consciousness is in fact an elaborate form of orienting activity designed to enable the individual to attend to, process, and respond to certain aspects of his residual experience, an end-point being reached in either the continuation of the sleeping state or its interruption and consequent transformation to awakening. This is a summary statement of the vigilance hypothesis.

In pursuing the analogy to orienting behavior, we will concern ourselves with (1) the characteristics of the environmental field, (2) the characteristics of the scanning apparatus, and (3) the characteristics of the response system.

The Environmental Field

What is the nature of the field in which novel stimuli arise compelling attention? In the waking state, the field is external to the individual and is spatially organized. In the dreaming state, the field is internal to the individual and is temporally organized. While awake, stimuli appear as aspects of an external environment and summon the attention of the organism by virtue of certain properties which are in part intrinsic to the stimuli and in part related to the present state of the organism as well as to its prior experience with the same or similar stimuli. The dreamer, on the other hand, stands (or rather lies) in relation to a subjective field encompassing his entire past personal history. The attention-compelling stimuli, while they have the same general characteristic of similar stimuli in the waking state (surprise, ambiguity, unfamiliarity), assume a different form. They are internally generated and consist of affective or emotional residues connected (sometimes symbolically) with events of the recent past. The so-called day's residue, seemingly trivial in itself, assumes importance because of its link to unconscious conflict or unmastered life content. Its recency accounts for its early reappearance in the field of consciousness and its disturbing quality accounts for its signal or orienting effect.

The Scanning Apparatus

What we have designated as the affective residue operates reflexively or automatically as a scanning mechanism. Ranging over the entire longitudinal history of the person, it exerts a polarizing influence, drawing to itself and mobilizing aspects of

past experiences that are related to it in emotionally meaningful ways. In a different context, E. M. Dewan (in 1969) called this process "emotional tagging" and has identified it as a device facilitating memory storage and consolidation. Here it is viewed as an energizing or mobilizing effect necessary to help the sleeping organism fully assess the meaning and implications of the novel or disturbing stimulus and through the participation of a conscious monitoring process either to allow the sleep cycle to remain intact or to engage in an arousal process leading to awakening.

The parameters of the past history brought under scrutiny are therefore determined by their emotional contiguity with the initiating stimulus, as well as by the nature and intensity of that stimulus itself. Any such stimulus, which had little or no orienting properties during the waking state—and, in fact, was overlooked at a conscious level—assumes such remarkable properties in the sleeping state for three reasons. By virtue of its recency, it reappears on the scene (in the dream) when the necessary level of arousal in the cerebral cortex obtains—that is, reaches the level that results in dreaming. The stimulus commands attention because it emerges on what presumably was a pre-existing quiescent conscious field or one characterized by random, familiar stimuli. Finally, it maintains attention because of its resonating and reverberating connections with unsettled, incomplete or unmastered fragments of past experience.

By engaging in the above operations, the organism is responding to three important questions that could be expected to arise when cortical activation reaches the level necessary to usher in the peremptory form of consciousness known as dreaming. Once the latter occurs a quiescent, absent or familiar conscious field is replaced by a novel, unfamiliar and strange one that has the added uncomfortable feature of being enforced and involuntary. In the face of all of this, the organism makes an attempt to regain a sense of coping by seeking the answer to three questions:

What is happening to me?

What are the implications of what is happening to me?

What can I do about it?

To explain the unique way in which he comes to grips with these questions we now turn to an examination of the special response system at work during periods of dreaming.

The Response System: Freud and Pavlov

When it comes to explaining the "dreamlike" features of dreaming, most theorists seem content either to accept prevailing ideas concerning primary and secondary processes as originally set forth by Freud or else, even if not accepting them, to feel they are too well established to challenge. Explicitly or implicitly, and with the use of correct-sounding but nevertheless scientifically pejorative terms, dream consciousness is dealt with as a release phenomenon linked to the instinctual, the primitive and the animal sides of our nature. I submit that this is an enduring myth, the continued belief in which blinds us to the often deceptive, self-serving quiet* or open violence of our waking lives. If this facet of our existence becomes more visible to us while dreaming, it is not as a consequence of any release phenomenon. Quite the contrary—it comes about as a consequence of the most exquisite honesty we are capable of as we allow ourselves to be confronted with what it is we actually feel at the moment that we feel it, particularly when the consequences may be disturbing or painful and are not known in advance. This is the human dimension to dreaming which has always been easy and convenient to overlook and which, indeed, has always been overlooked except by poets, writers and a handful of dream theorists.

What do I mean by honesty used in this context and how can it be related to the illogical, bizarre presentations we encounter in our dreams? I think the best way to start is to recall the conceptual scheme first proposed by Pavlov when he described what he called the primary and secondary signalling system. He indicated that, over and above the realm of involuntary or

*Which, however, may be very useful in preventing personality breakdowns. *Eds.*

unconditional responses, in man there was a conditional sensory or primary signalling system and a verbal or secondary signalling system. He further indicated that such basic alterations in consciousness as waking and dreaming could be understood in terms of the relationships between these two systems at the time that the alteration takes place. While awake, the secondary signalling system (the verbal system) is relatively dominant over the primary system (the sensory system), with the converse holding true for dreaming. Both systems remain in operation in both states with the more dominant system determining the quality of consciousness experienced at the time. The use of the verbal signal system, relating to a selected input and a willed output, lends a voluntary quality to consciousness. The sensory system, when predominant, responds rather to an involuntarily selected sensory input and results in a largely passively arrived-at output. Hence, the involuntary quality of our feeling or awareness while dreaming.

It is almost impossible to study the dream response system without distilling enduring truths out of the work of Pavlov and Freud. At the same time it is most important to eschew the mischief that can be brought about by blind adherence, rigid discipleship and defensive posturing. With regard to Pavlov I have already alluded to what I regard as useful and enduring, namely, the concept of the two signalling systems and the relative dominance of the primary signalling system over the secondary during dreaming and similar altered states of consciousness.

The enduring contributions of Freud concerning dreams have to be stripped away from some of their theoretical underpinnings. These contributions can be simply stated:

1. Dreams can be used to therapeutic advantage.
2. The basis for this advantage lies in the discoveries that (a) a day's residue, incorporated in a dream, touches on conflict-laden material; (b) the conflict can be explored in connection with the development of the individual; and (c) in the process of dealing with the conflict, healthy and defensive operations can be identified.

3. Dreams thus incorporate a wider range of information bearing on current conflict than is immediately available to the dreamer in his waking state.

The reader will note nothing in this list about wish fulfillment, instinctual gratification or symbolic disguise. I don't think any of these are necessary.

With this having been said, we can return to our theme of the nature of the response system and examine it with regard to both form and content.

Formal Aspects of Dream Consciousness

At the time dreaming occurs the EEG (electroencephalogram or brain wave record) indicates a state of increased cortical excitation, similar to that of the waking state, but even more intense. It has been likened to a state of hyper-arousal. At the same time, consciousness is experienced in the sensory mode, generally, but not exclusively, visually. Whereas the state of global excitation might be explained on the basis of a disinhibiting action—an action that removes inhibitions—the resulting sensory effects cannot be explained by any simple release mechanism. All we can say with any degree of certainty is that, in the absence of a supply of external afferents (crudely stated, external influences) and in the absence of any access to somatic efferents (crudely, outward behavior), and under the circumstances of cortical excitation that obtains while dreaming, there is a radical shift or transformation in the organization of the brain itself.

This shift can be characterized in Pavlovian terms as a shift toward the relative dominance of the primary (sensory) signalling system over the secondary (verbal). It must, however, be understood that now the primary signalling system is no longer a virginal system operating exclusively at a sensory level. It has undergone modification by a lifelong exposure to a human milieu in which verbal conditioning has occupied a prominent place. At the human level, the dominance of the primary signalling system does not imply that sensory expe-

riences are released from higher nervous (i.e., intellectual) control, but rather that life experiences, including the most subtle abstract elaboration of it, are transformed into a sensory mode. Far from being understandable in primitive, atavistic or release terms, the primary signalling system represents an enormously interesting application of creative energies dedicated to the task of creating visual metaphors to express both what an individual feels and thinks at a given moment. As dreaming proceeds, there is a succession of visual images (metaphors in motion) which reflect the experiential panorama unfolding under the polarizing influence of the affective residue and the coping mechanisms brought into play, both healthy and defensive.

The adaptive character of this can be further understood if we conceive of what is going on in the dream as a system of internal monitoring of the affective intensity of the particular sample of experience under scrutiny. In line with our vigilance hypothesis, awakening would occur if the affective level could not be contained and rose above a critical threshold. Neurophysiologically, this kind of interaction involves the connections between the cortex and the reticular activating system in the upper brain stem. The latter, when the individual is awake, is responsive to external sensory input and modulates variations in level of arousal. While asleep, it is likewise sensitive to sensory input, but this time the input is internally generated; and instead of modulating levels of arousal, since all dreams seem to maintain our unflagging interest, it stands ready to influence the arousal process itself, should awakening be the adaptive choice in response to the dream presentations.

The Content of Dreams

We have consistently stressed the all-or-none possible behavioral outcomes and the radical nature of the change of state that may ensue in the course of dreaming. The reasons for this emphasis will become apparent when we next consider the psychological requirements of a vigilance hypothesis.

These requirements are essentially twofold. First, the nature of the impinging threat (novel or disturbing stimulus) must be identified for what it is, rather than for what one may wish it to be. That is, it must be identified and portrayed with a rigorous honesty. Second, since feelings are our most accurate guide to the way the world impinges upon us, it is the *felt* residue of a waking event which is transformed into a sensory event in the dream. The initial presentations are then developed through their linkage to related past experience into a series of presentations which also reflect the available range of coping mechanisms, including, as a last resort, the mechanisms of awakening.

Why this thoroughgoing, rigorously honest exploration of a current issue? The answer is that the full implications of a presenting issue have to be explored in depth in order to assess whether or not the sleep cycle can continue uninterruptedly or whether they are, in fact, serious enough to warrant a radical change in state.

A Recapitulation of the Hypothesis

In developing a vigilance hypothesis, we have drawn an analogy between dreaming and waking exploratory activity occurring in response to novel stimuli.* We have indicated that dream consciousness is more than the passive consequence of failure to maintain secondary process thinking. It represents the active assumption of an alternate mode of consciousness suitable to the maintenance of vigilance operations in the deeper stages of sleep. The immediate transformation of a disturbing felt residue of recent experience into a visual metaphor represents the dreamer's effort to identify and assess an attention-compelling stimulus. The metaphorical quality highlights and dramatizes the felt aspects of the intruding stimulus. The sensory aspects highlight the potential arousal

*That is, there is always a part of us that is even externally vigilant although we are asleep. This fact is easily observable if one watches a dog or cat make responses to external stimuli while still sleeping. *C.M.*

effect this stimulus may have by virtue of its sensory impact upon the reticular activating system.

The further evolution of the metaphorical system occurs dialectically as the initial metaphor leads, by emotional contiguity, to linkages to past relevant experience. By virtue of the continuing impingement of these sensory presentations upon the activating system, there is a continuing assessment of safety, or threat, in connection with the developing metaphors. Safety is compatible with the continuing biological regulation of the sleep-dream cycle. A sense of threat, arising when the affect mobilized is too intense, invokes the only behavioral response possible for the dreamer, namely, awakening.

Vigilance Theory and the Current Experimental Scene

The theory offered above has been clinically derived. Therein lie both its strengths and its limitations. Any dream theory has to be compatible with clinical data. In my opinion vigilance theory succeeds in doing this with fewer metapsychological assumptions than classical dream theory. Its limitations arise from the fact that in being based on spontaneously recalled dreams it may not go far enough in explaining all dreams or explicitly deal with other possible tasks subserved by dream consciousness. This limitation comes most clearly into focus when vigilance theory is compared with dream models based on computer analogies. Here the emphasis shifts to the data-processing aspects and the assessment of recent experience in relation to the problem of memory storage. Dream consciousness is seen as managing the spillage from the day's excess input, with the dreamer involved in a kind of playback mechanism. Data are examined in their fit with past experience and anticipated future needs as they are processed for long-term retention.

The chief difficulty with the computer model as I see it is that it regards dream consciousness from the point of view of the

waking state. No account is taken of the executive function of consciousness in meeting the needs of the sleeping organism at the time dreaming is occurring. It should also be noted that there is a close fit between vigilance theory and the neurophysiological model of sleep and dreams previously developed by Hernandez-Péon.

Although vigilance theory is essentially derived from, and related to, psychological facts, it meshes with neurophysiological theory on three important issues: (1) the existence of functional interrelationships between the cortex and the reticular activating system, governing arousal levels and capable of inducing arousal; (2) the existence of a unique state of cortical excitability, making possible a more global orientation to present experience; and (3) the *physiological* control and monitoring of the REM state and its vicissitudes, with recognition of the possibility that once the cortex is sufficiently activated for dreaming to occur, psychological factors can play a role in determining the final behavioral outcome.

Parapsychological Dreams

The reader may recall that a parapsychologist was included in the multidisciplinary team described earlier. The reason for this is that I believe telepathic dreams do occur. I was led to the laboratory investigation of this as a possibility by a clinical curiosity piqued by the occasional occurrence of what appeared to be a presumptively telepathic dream reported by patients in the course of a therapeutic session. The existence of well-documented anecdotal accounts of the telepathic dream in addition to the carefully compiled statistical evidence for ESP that has accumulated over the years seemed to warrant taking the matter seriously.

My associates and I have been involved in investigations of this kind over the past ten years. We have sought to determine whether an agent or sender, looking at a target picture, can influence the dreams of a sleeping subject in the direction of incorporating elements of the picture. The basic design is a

simple one, the experimental integrity hinging quite obviously upon the rigorous precautions taken to rule out sensory cueing of any kind.

The subjects were usually young adult volunteers. For an investigation consisting of more than one night with a single subject, the subject was selected either upon the basis of his performance on an earlier pilot session or in a screening study. Subjects report to the laboratory at their normal sleep time and are prepared for all-night electroencephalographic and oculographic (retinal electrical wave) recordings. Over the past three years a sound-resistant, shielded room has been used to house the subject.

The targets that have been used have been postcard-size reproductions of well-known paintings by contemporary artists and old masters (see illustration). They are selected, purchased and prepared by people having no direct involvement in the experiment in which the cards are used. These pictures are sealed in opaque envelopes, coded and kept locked. On the night of the experiment, a target picture is chosen for the agent or sender by means of a randomizing procedure.

The agents have been either members of the staff or volunteers. After an initial contact with the subject prior to the time the target is chosen (to establish some measure of rapport), the agent is then escorted to a room where he is given the randomly selected target and where he spends the night. He is asked to open the envelope when he is alone, to look at the picture, to associate to it and to think about is as often as he can during the night. He is free to go to sleep if he chooses to do so, but he is awakened by a one-way communication system which enables him to hear the subject reporting his dream at the end of each REM period over the intercom to the experimenter in the control room.

The dreams are tape-recorded as they are related at the end of each REM period. In the morning the subject is asked by the experimenter to furnish associations for each of his dreams. This, too, is recorded and the entire night's recording is then transcribed. In order to objectify the judgment of degree of correspondence between dreams and target material, three

outside judges receive all of the dreams reported in a particular series along with all of the targets, one target picture being used for each night. The task of the judges is to allocate the subject's reports to each of the targets used on successive nights of a series without knowing the order in which the targets were used. The pooled guesses of the three judges are used to ensure objectivity.

To date nine experimental series have been completed and published. Of these, six yielded statistically significant results at an .01 level or better. These included: a 12-night screening study for the selection of future subjects, a 7-night study with a single subject, an 8-night replication study with a different subject, a 16-session study utilizing hypnotic dreams, and an 8-night study in which the agent was situated several miles from the subject. Three of the nine studies did not confirm the telepathy hypothesis: a 12-night screening study, an 8-night study with a single subject, and a 16-night study with a single subject; but six out of nine did.

In addition to the formal experimental studies, a number of pilot sessions have been performed. These sessions were not part of any formal experimental series but were exploratory in nature, investigating potential subjects as well as potentially useful procedures and techniques. Equally rigid precautions against sensory leadage were taken with the pilot sessions as were taken with the experimental sessions. Eighty-three pilot sessions involving one or more agents and a single subject have been completed. The distribution of hits from this series was significant (CR=4.90, $p<.00001$, two-tailed) over and above what pure chance would have yielded.

Telepathy in Dreams

Our studies have led us to the conclusion that information transfer occurring outside of known communication channels—telepathy—can influence dreaming. The correspondences noted between target picture and dream fall into a number of different categories:

(Opposite) The Moon and the Earth (Hina Tefatu), by Paul Gauguin. (Museum of Modern Art, N.Y.C., Lillie P. Bliss Bequest)

I. Correspondences based on form.
  A. Direct or explicit correspondences.
    1. With simple forms as targets.
    2. Abstracting simple forms from more complex targets.
  B. Indirect or implicit correspondences.
    1. Abstracting formal features of more complex targets.
II. Correspondences based on sensory qualities.
  A. Texture.
  B. Color.
III. Correspondences based on transferential factors.
IV. Correspondences based on incidental ideation.
V. Correspondences based on conflict activation.
VI. Direct correspondences.
VII. Correspondences contingent upon fragmentation and reconstruction.

The following examples illustrate some of the kinds of correspondences noted. Extracts from the dreams highlighting the correspondences have been selected.

Example 1.

Subject: Female, Secretary

Target: "The Moon and the Earth" by Paul Gauguin (see illustration).

Dream No. 2: "I was in a *bathing suit* . . . doing the dream experiment in the *bathtub full of water,* and we were finishing, and we had to get up out of the *wet bathtub, out of the water* . . . and we were dripping wet . . . They showed a clothesline where you could *hang your bathing suit out on.* And they were speaking about something. We had some drops in our eyes so that the water wouldn't bother . . . "

Dream No. 5: "I'm talking to someone. Oh—we're in church and somebody *introduces a girl who is a dancing girl* . . . and she comes over and she says *'Oh, I want to get a tan.'* She's very fair. And I'm yelling to her to *stay in the sun* instead of running in and out all the time . . . "

Excerpts from subject's associations: "We were in a big

church and . . . she popped out . . . came down, and everybody started to clap this Arabic melody, *and she was doing a dance . . . and she was very fair and she was complaining that she was too fair, and she wanted to get a tan,* and I said, *'Well, stay out in the sun; it takes time to get a tan.' And she said, No, she wanted a quick tan,* and was complaining and somebody came over and was kissing her shoulder. And I said to her, *'Look, your shoulders are tan. If you take your time you can get the rest of you tan.' " Experimenter:* "Was there anything unusual in these dreams?" *Subject: "I could picture the fair skin, the dark tan,* what she was complaining about, and the big colors in the church, but there were no unusual feelings or I wasn't upset by any of the dreams."

Example 2.

Subject: Male, Psychologist

Target: "Downpour at Shono" by Hiroshige

Dream No. 3: " . . . Something about an *Oriental man* who was ill . . . "

Dream No. 4: "The part I remember—it sort of faded away but *it had to do with fountains—a big fountain.* It would be like the one you see in Italy. A fountain. Two images and a *water spray* that would shoot up. No color."

Dream No. 5: " . . . *I was in this indoor-outdoor place. I assumed it was outdoors yet at one part of the dream it was indoors* . . . And there was an air conditioner in it too . . . "

Post-Sleeping Interview: "There was a young man. He seemed to be an invalid or something, and he was on a bed. And I just don't remember any more . . . I just had the two images this time. One with *the fountain* like the ones in Italy, *the elaborate fountain,* and a giant eye of a needle . . . *The fountain makes me think of pictures and scenes I've seen of Rome. In fact, a short time ago I was looking at a book. The book is called 'Fountains in Italy,' I think. They have so many fountains . . . I remember talking about fountains being renewing of life . . .* I was walking on the street. *It seemed it was raining a little bit* and we got to a particular point, and the street was blocked, so

we had to walk out into the street and around . . . Of course, *it was raining,* and it was night, and it had a sort of heavy feeling . . . "

Vigilance Theory and the Paranormal

We have indicated earlier that, while dreaming, conscious experience is organized along lines of emotional contiguity rather than temporal and spatial contiguity. We now have to amend this by noting that the affective or emotional scanning that takes place while one is dreaming can, on occasion, bridge a spatial gap and provide us with information independent of any known communication channel. *Emotional* contiguity, under conditions we know very little about, appears capable of integrating suprapersonal as well as personal content into the dream. Anecdotal accounts have for a long time pointed in this direction and the circumstances under which they occur strongly suggest that in matters of life and death the vigilant scanning of one's emotional environment reaches out across spatial boundaries in a manner that has yet to be explained.

Editorial Note. *T. E. Lawrence is such a familiar figure that the following little-known paranormal experience of his is of interest in connection with Dr. Ullman's conclusions. In this instance, the experience—which we present here as an eye-witness report—shows how the paranormal may invade waking states.*

"Two citations taken from Sir Ronald Storr's Orientations *concerning the state of mind of the late T.E. Lawrence during the last days of his life are of deep interest. First a few passages from Lawrence's last letter, written to a friend, which clearly reveal the condition familiar in primitive communities as 'loss of soul':*

'You wonder what I am doing? Well, so do I, in truth. Days seem to dawn, suns to shine, evenings to follow, and then to sleep. What I have done, what I am doing, what I am going to do puzzle and bewilder me. Have you ever seen a leaf fallen from your tree in autumn and been really puzzled about it? That's the feeling."

"[Sir Ronald] recounts how 'every day, for the last three weeks of his [Lawrence's] life, a bird would flutter to his window, tapping incessantly with its beak upon the pane. If he moved to another window the bird

would follow and tap again. The strange insistence was so visibly fraying his nerves that one morning, when he had gone out, his friend shot the bird. In that same hour, wrenching his handlebars for the last time, Lawrence was flung over them sixty feet head first on to the granite-hard tarmac [a kind of asphalt].'. . . Whatever we may think about it, no one who reads this story can remain unmoved, and no scientific explanation is forthcoming as to why a bird should behave in this way." (Pages 707n-708n, Mythology of the Soul: A Research into the Unconscious, *by H.G. Baynes, London, 1940.)*

One of the most arresting paranormal experiences on the part of a group is on military record, and occurred in Europe at 10:30 P.M. on November 14, 1915, being witnessed by French, German, Russian, Italian and British troops. The International Red Cross became involved just before the scheduled execution of four French soldiers, among them a Sergeant Vaille and a Private Lacoste, who had been court-martialed for laying down their guns and walking back to their lines at that day and time, and who were pardoned when it was learned that many other groups of soldiers at widely varying locations had had the same experience, and that cowardice was not involved. The Red Cross relayed the evidence between enemy forces and was similarly instrumental in preventing German soldiers from being shot by firing squad. It finally turned out that many combatants had seen the phenomenon of an amazing light that appeared in the sky and that gave to all who saw it such an intense vision of happiness that, in a kind of trance state, they let their guns fall as meaningless and insignificant objects, and turned their backs on slaughtering each other, each group of men walking back to his own lines.

The details of the French court martial, which originally gave a sentence of death (later revoked) are particularly revealing, even though the military court did not take them at first into account. The strange light made each of the four men so happy that they were transported into another state of consciousness. One mentioned feeling so much a part of everything that he wanted to continue that way for a hundred years. To another of the group, the icy November air became warm and perfumed with incense, jasmine and tangerine, and he felt the exaltation of a cosmic love. Still another heard rapturous singing that made him turn to follow it. None of these four men was a coward. One of the accused, Sergeant Vaille, had previously been decorated with the croix-de-guerre for bravery.

It then turned out—in time enough before execution of the death sentence—that a British mortar unit in Flanders had had a similar experience, as did a Russian sentry on the Eastern Front, an Italian infantry unit, and a German unit engaged in battle with the same French

group from which the four soldiers came. The men were of different temperaments, different nationalities, from opposing sides, and from contingents not in communication at the time. The men were seasoned soldiers who had seen ordinary flares many times. All testified that the light they saw not only lasted much longer than a flare, but was a totally different kind of light. By the amazing effects reported from so many different quarters, it was a light not normally of this world. The remarkable agreement in the experiences of all the disparate witnesses has never been explainable except by parapsychology, through psi *forces—in this case a group manifestation.*

Recognition of Reincarnation and the Supra-Physical Body

5

Denys Kelsey and Joan Grant

Denys Kelsey is a hypnotherapist, psychiatrist and member of the Royal College of Physicians and Surgeons, London. Joan Grant, his wife, is the author of Winged Pharaoh *and other books dealing with reincarnation; her concepts are principally the result of her own clairvoyant experiences. For further details see their joint book* Many Lifetimes *(Doubleday and Pocket Books).*

Recognition of Reincarnation (Denys Kelsey)

I should like people to share my belief in reincarnation: I think it would cause them to be much happier, much less frightened, and very much more sane. For a psychiatrist to hold this belief and to have made it the basis of his therapy is still rather unusual. It is not a belief which I have always held, so I will begin by explaining how I was led to it through clinical evidence which had been accumulating during the ten years before I learned that somebody called Joan Grant was able to remember many of her earlier lives. Without this work, I would not have been able so rapidly to appreciate the value of what Joan was able to contribute; because, like so many people, I cannot accept a concept unless it satisfies my intellect and relates to my empirical experience.

I was precipitated into the practice of psychiatry, at the age of thirty-one, without even an hour's warning. In this I was fortunate; it meant that I approached the subject without any preconceived ideas, for when I was a medical student, psychi-

atry played only a very small part in the curriculum. I remember being taught that the causes of thyrotoxicosis were "sex, sepsis, and psychic trauma"; and I attended a series of lecture-demonstrations, but rather lightheartedly because questions on psychiatry never occurred in the examinations. And that, to the best of my recollection, was that!

But immediately after embarking upon psychiatry, a series of cases came my way which, step by step, extended the framework of what I believed to be fact until, after four years, a session with a particular patient forced me to the intellectual certainty that in a human being there is a component which is not physical. To be taught this as a matter of dogma or doctrine is one thing; to be compelled to the same conclusion by one's own experiences is quite another. I did not realize it at the time, but this session was an important landmark on the way to a belief in reincarnation; at least I had got as far as the reality of something which could reincarnate!

In 1948 I was working on the medical side of a large military hospital, a post which I owed to the fact that three years previously I had passed the post-graduate examination which is the start of the long road to recognition as a consulting physician or internist. I was still travelling this road when an epidemic of influenza hit the hospital and abruptly changed my course. One of the first casualties was a medical officer in the psychiatric wing and I was asked, temporarily, to take over as much of his work as I could. Late that night, I learned that I had an aptitude for inducing hypnosis.

I was summoned urgently to the ward to give a sedative injection to a patient who had suddenly become acutely disturbed and violent. By the time I arrived, three muscular orderlies had the situation under control and were holding the patient firmly down on his bed. I had a feeling that he was unlikely to resume his violence, so I motioned to the orderlies to leave. But the patient was obviously still very frightened, and with no intention beyond trying to calm his fears, I sat down beside him and began to talk to him in what I hoped was a soothing and reassuring voice. I certainly did not realize that I

then began to use one of the standard techniques for inducing hypnosis. It had simply occurred to me that if I could get him to fix his attention on something outside himself he might be less disturbed by his ideas and feelings, so I asked him to fix his gaze on a dim light in the ceiling above his head. For the same reason I coaxed him to concentrate upon his breathing, making it perfectly regular and rhythmical, but a little slower and a little deeper than usual.

He was still very tense. His fists were tightly clenched and his arms and legs showed a fine tremor. So I drew his attention to each of his limbs in turn, urging him to relax them and to allow them to remain relaxed. These instructions were interspersed with reassurance that he had nothing to fight, nothing to fear. Gradually he became perceptibly calmer, until he was lying completely relaxed. Purely for good measure I continued talking to him in the same strain, and I recall suggesting to him, quite casually, that he might as well go off to sleep. At this, his eyes rolled up and his eyelids came down in a curiously positive way, and I suddenly realized to my astonishment that I must have hypnotized him!

The next morning I described the incident to the psychiatrist in charge of the department, who confirmed that this was almost certainly what had happened. He was as intrigued as I, and asked me to repeat the technique on another patient, a man who was suffering from a neurosis as a result of a horrific accident with an automobile. This patient entered hypnosis very quickly, and with a tremendous release of emotion, relived the circumstances of the accident. The psychiatrist assured me that it would now be a simple matter to clear up the residue of the neurosis. During the next few weeks I was able to treat several other patients in a similar way; they too relived the relevant episodes with great release of emotion and went on to a rapid recovery. I found these experiences in the military hospital so rewarding that I decided henceforth to specialize in psychiatry. Once back in civil life I took a post in a mental hospital where I remained for the next six years.

Hypnosis has played such a large part in the experiences I shall shortly describe that I will say something about it. A

convenient starting point is the widely accepted concept that there are three distinct compartments of mental activity. First, there is the compartment of consciousness, to which I shall usually refer as "normal-waking consciousness." This contains only the thoughts and sensations of which we are aware at any present moment. Next, there is the compartment known as "the preconscious." Here is stored every memory, every item of knowledge, that can be summoned to consciousness at will. Thirdly, there is the compartment with which a psychiatrist tends to be especially concerned and which is usually called "the unconscious."

The contents of this compartment lie behind a barrier, the precise nature of which is not known. It may prove to be essentially chemical, electrical, or even purely psychological; but whatever its nature may prove to be, the effect is that material which lies behind the barrier can be brought across it into normal-waking-consciousness only with considerable difficulty.

Hypnosis is sometimes loosely spoken of as sleep, but this is inaccurate. Indeed, unless a specific suggestion is made to the contrary, a person under hypnosis may be unusually wide awake, in the sense that his powers of perception may be abnormally acute. But since such a person is not in a state of normal-waking-consciousness perhaps the best description of hypnosis is "a state of altered consciousness." An important feature of this state is that it weakens the barrier which confines the contents of the unconscious. This can be of particular value in psychiatry because it may enable the therapist to bring material from the patient's unconscious to the surface much more quickly than would otherwise be possible.

I have always considered myself fortunate in that at a very early stage I encountered a patient who illustrated the reality of the unconscious, and the power of material held in that compartment, in an unforgettable way.

The patient was a young woman who was wheeled into the ward in a chair because she had lost the use of her legs. A few days previously she had awakened in the morning to find that

they were completely paralyzed. Examination showed that there was nothing wrong with the nerves or muscles or bones, and that this was a paralysis of psychological origin.

In conversation she was clearheaded, calm, and indeed rather cheerful: surprisingly so for someone who, on the face of it, might never be able to use her legs again. We discussed many details of her life, including the fact that since her marriage she had become very disillusioned about her husband. However, for the previous year life had not been too bad because he had been abroad on business. Then, almost casually, she mentioned that a few days before the paralysis had occurred, she had received a letter which made her feel obliged to join him. She admitted that she was "a bit scared" at the prospect, but her principles demanded that nonetheless she should go. She added that her parents would be terribly distressed to learn that all was not well between her husband and herself.

Her voice had been level and matter-of-fact as she was telling me this. There was nothing to suggest a young woman striving to speak coherently while in a state of acute fear. But under hypnosis, when I brought the conversation round to her forthcoming trip, a very different picture emerged. She was not simply "a bit scared": she was terrified! And as details of the conditions she expected to find at the end of her journey also emerged, her fear was understandable. She was weeping and trembling, but through her sobs I heard her exclaim, "I would rather have no legs than have to go!"

I then brought her slowly back to normal-waking-consciousness, insisting as I did so that she remember all she had been telling me. Now that the full extent of her fear was in consciousness, she was scarcely recognizable as the poised young woman who had been wheeled into the ward. But now her problems were where we could explore them and cut them down to size.

We were able to discuss in exactly what respect her parents would be distressed to learn the true state of affairs, and it was not difficult to get her to consider rationally whether it was really necessary to stay with her husband. I was able to remind

her that she had earned her living before her marriage and could easily do so again. By the end of this session she was very much calmer, and already had some power of movement in her legs.

During the next few days we had further talks along similar lines. Suddenly she declared that she had realized the significance of the paralysis of her legs. It was the only way in which she could avoid joining her husband without feeling that she was betraying what had been her principles. Within days after this session her legs were functioning perfectly normally.

I do not know if the wish to lose the use of her legs had ever been in her normal-waking-consciousness. But if it had been, and had remained entirely at that level, she would have been able only to fake a paralysis—a performance which she would have found impossible to sustain. But because it was flourishing in her unconscious, I was afforded a vivid demonstration of a principle which is often crucial in psychiatry: that an unconscious wish, if it is sufficiently powerful, may produce an effect that is tantamount to a physical fact. For her legs, temporarily, were as useless as if they had been amputated.

This case was instrumental in focusing my interest on an "analytically oriented" approach to psychiatry. I use this rather cumbersome phrase because, while I acknowledge a debt to psychoanalytic theory, it contains certain cardinal principles which I have never been able to share. Therefore to describe my work as psychoanalysis would be inaccurate—and incidentally unjust, both to the psychoanalysts and to myself!

Very briefly, I accepted the concept that the memory of an event, which includes the sensations and emotions associated with it, might be stored in either the preconscious or the unconscious. If it were stored in the preconscious, from which it could readily be summoned to consciousness, then it became part of the total experience upon which the individual could base future decisions. The majority of our memories fall into this category; but those which are associated with so heavy a charge of unpleasant feelings that they would make life too uncomfortable if they were liable to recur unbidden to our awareness are relegated to the unconscious. Such feelings are not integrated; and instead of contributing to the source upon

which we can draw at will, they have the power to force upon us the irrational ideas, feelings, and behavior which comprise the symptoms which we call neurotic. One of the basic principles of therapy is to extricate these feelings and memories from the unconscious so that they have no further power adversely to affect the personality. For this purpose I found the technique known as "hypnotic regression" particularly valuable.

To get a picture of what happens during regression under hypnosis, consider the two ways in which a person in normal consciousness may speak of an incident which has happened to him. From his position in the present he may simply be describing something which occurred in the past: in this case he will use the past tense, saying, "I was angry," "I was frightened," or "I was amused." But he may become so caught up in his story that he slips into the use of the present tense, and his gestures and the tone of his voice reveal that he is virtually reliving the episode. Either he has brought it up to the present or, and this may be the more apt explanation, he has temporarily left the present and merged himself with a past which for him is still extant.

Regression under hypnosis is an extension of this latter process. The subject may not only relive the incident as it occurred, but because of the breach which hypnosis may make in the barrier surrounding the unconscious, he may recover details of the event, and become aware of emotional facets, of which, on the original occasion, he was conscious only momentarily.

A vivid example of this mechanism was provided by a teen-aged girl whose relationship with her parents was going through a very difficult phase. I had induced hypnosis for the first time during her therapy and, simply to provide a starting point for the session, I asked her the name of her favorite tune. "I don't know any," she replied. This surprised me, because one of her mother's complaints had been that her daughter spent far too much money on gramophone discs.

I asked her how old she was. "I'm five," she said, and then burst into tears. She was already reliving an incident which had occurred when, at the age of five, she had fallen off a pony of

which she was terrified. Her parents were urging her to remount; she was convinced that they were doing so only in the hope that she would fall off again and be killed!

The important feature of this regression was that although, in normal consciousness, she could have remembered falling from that pony, which she had distrusted and feared, the conviction that her parents wished her to die caused greater anxiety than she could tolerate, and this aspect of the incident, which was psychologically crucial, she had buried in her unconscious.

Such a spontaneous regression is rather unusual. Far more often, a regression is initiated by a specific suggestion from the therapist. I would tend to use this technique when a patient expresses feelings which seem grossly out of proportion to the event he is describing; for this is nearly always an indication that it has a significance for him in addition to its face-value. If the patient agrees that there is a question to be answered, I induce hypnosis and make a suggestion such as: "I am going to count slowly up to ten. While I am counting, you will go backwards in time, becoming younger and possibly smaller. When I reach ten, you will find yourself back in some situation which will help us to understand why the episode you have been describing meant so much to you."

On other occasions, having induced hypnosis, I would start the session by using one of the so-called "projection techniques." I would ask the patient to visualize a blank cinema-screen, and then tell him that, at the count of ten, a picture would appear on it which we would take as our starting point. When he had described the picture, I would use regression to help us to understand its relevance.

An apparently trivial episode may prove exceedingly useful. A girl of nineteen found herself back at the age of ten, playing ping-pong with her brother. I asked her the score. Without hesitation she replied, "Nineteen-seventeen." She was looking worried, so I asked what was the matter. She answered, "I think I am going to win, and he always gets so cross when I do." Suddenly she brightened up. "Thank goodness! The dog has come in and we must stop playing because the cat is here already and they always fight." This small scene led us to her

intense rivalry with her brother, which was an important factor in her illness.

The task of a therapist is to use his understanding of the particular case, his knowledge of psychological mechanisms, and his intuition, to judge whether an incident to which the patient has regressed is relevant or simply a cover story. In any event, the patient seldom reaches the crucial situation at the first attempt, and it is usually necessary, following approximately the same procedure, to induce him to go back still further . . . .

I [have] helped many patients to relive the experience of their birth. I became familiar with witnessing revivifications of such details as being born headfirst or tailfirst: of the head being gripped by forceps: of the patient being almost strangled by the cord being wound tightly round the neck. I think an unprejudiced observer would have considerable difficulty in explaining each one of these as either an "act" deliberately staged for my benefit, or the enactment, at my suggestion, not of a genuine experience of which the patient's mind had retained a record but of a fantasy based upon information they had acquired.

I also gained reason to believe that from at least as early as the fifth month of intra-uterine life the unborn baby is aware of itself as an individual. It is aware of its sex, of its position, of the length of time it has been in the womb, and of the relationship of its limbs to one another. One patient, who had had a most difficult birth, regressed to a period which he stated positively was the fifth month of intra-uterine life. He was aware that the cord had become wound round his neck, and also that his right arm had become trapped beneath his right leg. I have no obstetrical records to confirm this, but it would account most adequately for the difficulty experienced in delivering him.

I remained puzzled by the fact that patients often dated memorable intra-uterine events so positively until, ten years later, Joan offered what I think is the correct explanation: a mother is usually very conscious of the precise stage of her pregnancy, and the fetus picks this up by telepathy.

By 1952, so many patients had relived details of their

pre-natal period that I no longer regarded it as anything remarkable . . . .

I was then still imbued with the idea that no part of an individual existed before his conception, and that there could not possibly be any developed brain. As it was, I was confronted with a series of regressions which bridged the period from birth to conception in three sessions. Clinically and intuitively I had accepted their validity, which was surely justified by the results: but before I had had time to speculate upon how they could have been possible the answer had arrived in my head: in a human-being there must be an element which exists and is capable of function even in the absence of a physical body! * Astral Body?

The concept of such a non-physical component, under one name or another, must be as old as mankind, but it was tremendously exciting to have reached it for myself through a series of experiences which had been acceptable to my intellect. I felt as though I had arrived at a clearing in a forest from which paths could be seen to run in a variety of directions, promising to lead towards the answers to such questions as the relationship of Mind to Body, the nature of Memory, and so on. But, not surprisingly, a new question now presented itself: "What is the origin of this component?"

It might be imagined that reincarnation dropped neatly into place as an entirely acceptable answer, but in fact this was not the case. There were, I think, several reasons. Probably the most telling was my assumption that since the body was initiated by a contribution from each parent, the psyche, as I then called the non-physical component, would be formed in a similar way. This error caused me to misinterpret [a] patient's reliving of her conception, to the extent that I assumed she was reliving the meeting of the sperm and the ovum, instead of, as I now believe was the case, the moment when her personality contacted the fertilized egg. I had, in fact, a mental picture of "half-psyches" bestriding the germ-cells like jockeys! However, artificial insemination made this difficult to sustain. I could not imagine several

million "half-psyches," each perched precariously on a sperm, waiting in a bottle in a refrigerator until some operator gave them the "Off!"

On the other hand, I could not see a really acceptable alternative.* It was undeniable that children inherited physical characteristics from their parents, and I still assumed, mistakenly, that certain traits of personality for which the body could not be held responsible were also inherited. The idea of a long personal history was obscured from me by Jung's concept of the "Universal-unconscious," which seemed so adequately to explain such phenomena as a man who had lived all his life in the depths of the country dreaming about the sea.

During the next six years, I encountered patients whose anxiety I still found myself unable to explain even after the most exhaustive scrutiny of their life-story in terms of classical psychoanalytic theory. Such cases caused me to wonder whether it was possible for an individual to inherit anxiety from a parent, but it still did not cause me to think in terms of earlier lifetimes of his own. Thus although my thoughts returned time and again to the question of where the psyche had come from, the rigidity of my own thinking prevented me from making any satisfactory progress.

Then, one evening early in 1958, I was talking with a chance acquaintance, an aeronautical scientist, about extra-sensory perception. I described to him an occasion when a patient who was deeply under hypnosis had apparently been able to project her mind to my home and to describe certain features of it with remarkable accuracy.

Her first comment had been that there seemed to be a double hedge round it. In fact, the garden was enclosed by a hedge, inside which was a fence I had erected because the hedge was not thick enough to contain my boxer bitch.

She then said, "There is a lawn in front of the house and there

*The concept of a "half-psyche," as the author admits, is untenable. A whole psychic entity entering the zygote after fertilization is the acceptable alternative. Old Egyptian knowledge, filtered down through the *Pistis Sophia* manuscripts, is of interest and pertinence here, the interval between fertilization and psychic entrance there being stated to be some 70 days. *C.M.*

are several small trees on it." This was accurate; I had recently planted some apple trees on this lawn, which was about the size of a lawn-tennis court.

Her next remark was surprising. "It is dark, and I cannot find my way into the house." I had overlooked the fact that this session was taking place late on a winter evening. Furthermore, the front door was recessed and set at an unusual angle. Several visitors had found it difficult to locate at night if the light above it had not been switched on.

I had been impressed by this small experiment. But my acquaintance accepted it calmly, merely observing that he believed there had been eras when a great deal more had been known about such forms of perception than was the case today. He went on to tell me that the faculty my patient had displayed had been used in early dynastic Egypt as we now use radar. He then asked me if I had read any books by Joan Grant.

I replied that I had never heard of them, whereupon he told me that this author had the faculty of being able to recall many of her earlier lives, and that seven of her books were, in fact, posthumous autobiographies. Such a faculty was far beyond the point to which my own work had brought me, but I felt a sense of great excitement; a sense that a door was about to open upon far more than merely the answer to a philosophical problem.

Before I had finished *Winged Pharaoh*, the book I read first, I knew, beyond any possibility of doubt, that reincarnation was a reality. It would be futile to try to account for this feeling of certainty in terms of pure reason. Only later did intellect bridge the gap between my own researches and an intuitive conviction that I had been reminded of a fundamental pattern of evolution which I had long known to be true.

I would have journeyed halfway round the world to meet the author, but fortunately such a long pilgrimage proved unnecessary. I soon learned that Joan was living only thirty miles away. I met her on the 14th of May. I came to dinner and left at three o'clock in the morning. Seldom can so many words have been exchanged in eight hours.

As I had anticipated, my experience with hypnosis linked with Joan's knowledge and experience of reincarnation as

effortlessly as a river meets the sea. But as the autobiography of her present life covers only the period up to 1937, I did not know that during the war years she had worked closely with a psychiatrist and had acquired considerable psychiatric experience. This was an entirely unexpected bonus.

It seemed to be absurd that the fullest possible use should not be made of her faculties, while she wished for nothing more than the opportunity to resume regular work in this field. So, before I left, we had already discussed tentative plans for working together. We neither of us foresaw that within two months we should have embarked upon life together also.

The Supra-Physical Body (Joan Grant)

Implicit in the recognition of reincarnation is the knowledge that the current personality is not only immortal, but is one of a series of personalities. But it is less generally recognized that the body, except for its outer, three-dimensional rind, is equally immortal.

The body of every individual has a physical and a supra-physical component; and when the energy-exchange between these two components ceases to exist, the physical body dies. But the supra-physical body does not die. It cannot die: for the simple reason that it consists of an order of matter which is not subject to the process which we call "death," a process during which the physical particles integrated by an energy-field have become inactive.

The majority of misconceptions about the conditions of discarnate life have stemmed from the illusion that the only aspects of the personality which can exist independently of the physical body are those concerned with concepts and emotions. If this were so, the dead would indeed be amorphous, creatures without passion or parts; but fortunately such apparitions exist only in the imagination, or in Gothic tales.

The true state of affairs is that the supra-physical body is the receptor of sensory experience on all its levels of activity, and when free of the need to operate through its physical

counterpart is infinitely more perceptive than when muffled in flesh. So the personality, whether the physical body happens to be dead or alive, awake or asleep, conscious or unconscious, always retains both form and function.

The knowledge that we have "bodies terrestrial and bodies celestial" is by no means new. It was a commonplace in more enlightened civilizations such as early dynastic Egypt . . .

It is because dogmatists, who could not accept a non-material reality, confused the supra-physical with the physical body, that the concept of the resurrection of the material particles came to be grafted onto the Christian heritage.

The same disastrous misbelief has caused death to assume a grotesque feature in our modern civilization. Morticians may benefit from the prevalence of necrophobia, but hundreds of thousands of individuals suffer exceedingly because their physical bodies are kept ticking over, by chemical and sometimes even by mechanical means, when they are obviously ready to be shed, just as a snake sheds its outgrown skin . . . .

Our body is not given to us: it is initiated by an earlier supra-physical of our own, although not necessarily its immediate forerunner in the series. [The author maintains that each individual has many supra-physicals. The ultimate identity must lie beyond these. She calls it "the Integral."]

The raw material which a supra-physical affects when organizing a new physical body is a fertilized ovum and its genes. A fertilized ovum has its own energy, but only sufficient to keep it alive for two or three days, unless it is adopted by a supra-physical. If the supra-physical has taken on this particular ovum after due forethought and by deliberate choice, it can make an efficient selection from the available genes. It is in fact choice not chance which has made a particular child far healthier and better looking than other siblings of the same family.

The alert supra-physical will also influence the mother so that she instinctively desires the type of food the growing embryo needs. If the embryo is being distressed by her over-smoking or too many martinis, the supra-physical will probably afflict her with a distaste for them, and if this fails to abate the nuisance,

may resort to giving her bouts of nausea until she takes the hint. But if the supra-physical grabbed the first fertilized ovum it could find, so as to scuttle back to a physical environment, it will probably make such an inept selection from the available material that the body which results will be far less admirable than it might have been.

It is the Integral, the sum-total of the wisdom acquired through the whole series of personalities, who should decide which supra-physical should organize the new body which will become the physical component of the incarnating personality. There will be an instinctive resonance between the supra-physical which has acted as a "parent" to the fetus and the incarnating individual: which is why the physical skills acquired in one particular pre-existence are usually more easily available than the skills acquired in any of the others.

The supra-physical which has been selected by the Integral will nearly always organize a fetus of its own sex. But if a supra-physical which has become split off from its Integral impulsively attaches itself to a fertilized ovum, it may create a fetus of the opposite sex with only partial success; which is the cause of certain types of sexual anomaly. For instance, a woman who has suffered many unwanted pregnancies, or who has died in terror after an abortion or during childbirth, may protect herself from a repetition of such an agonizing experience in several different ways. She may make her new body infertile; or if she decides to become male, may make it either impotent or sterile, so that she will not be able to inflict similar miseries on anyone else. She may decide to be immune to sexual desire except with a member of the same bodily sex, whether this be male or female. This is a very common cause of homosexuality, and if it were generally recognized not only would cure be facilitated but the infliction of further unhappiness by ignorant critics would be avoided.

Although the physical body can be affected by innumerable outside causes, such as being cured of sepsis by an antibiotic, or paralyzed by the virus of poliomyelitis, the supra-physical is very seldom affected except by causes within the personality . . . .

The Changing Scientific Attitude in Psychology

6

Charles T. Tart

This is an important chapter because it outlines the program which, implemented enough, will lead to even larger numbers of scientists' being able to use the insights in the other chapters of this book. Chapter 3 already signaled the need for a revision of accepted scientific method. Chapter 9 will confirm that the critical area of this attitude-revolution is psychology, which has already fundamentally entered physics.

Professor Tart, speaking from the establishment as a member of the psychology department of the University of California at Davis, is playing an important part in spearheading a new and significant movement within science itself: a self-reexamination leading to a broadened and deepened base of what is legitimately investigable and of the ground rules for such investigation. What follows is the essence of his latest project in this arena.

The author was reluctant to let us print more than the introductory pages of the first draft of his new and as yet unpublished paper, tentatively entitled "On the Scientific Study of States of Consciousness," "in which," he says, "I attempt to show that our conception of scientific method has been unnecessarily restricted, and that it can be broadened to allow scientific study of many aspects of altered states of consciousness that cannot be adequately handled by present scientific procedures." He felt his paper might not be accepted later by a specialized scientific journal (where it should appear to do its work) if more than a few pages were quoted before such publication. However, so that the reader understands clearly what is being talked about, it is necessary to explain some of the terms and bases of this important discussion, which may herald the first distinctive breakthrough in the reigning psychological establishment's adoption of a deepened use of scientific method more applicable to a consciousness-oriented psychology, and hence to human reality. This summary will be found in the comment at the end of this chapter.

Some readers might conclude from the text—and this comment is to

disabuse them—that the author is writing an apology for the marijuana user. Quoting more of his paper, had it been possible, would soon have shown that he was after much bigger game—nothing less than a fundamental improvement of the entire approach to scientific method in psychology.

William James, as he was prophetic in so many things, was prophetic here too, as the following key quotation from the first volume of his Principles of Psychology *(page 402) proves. In the quotation, we have substituted the term "behavioristic" for "empiricist school," the historical progenitor of behaviorism.*

> Strange to say, so patent a fact as the perpetual presence of selective attention has received hardly any notice from psychologists of the behavioristic school . . . . The motive of thus ignoring the phenomenon is obvious enough. These writers are bent on showing how the higher faculties of the mind are pure products of the environment; and experience is supposed to be of something simply imposed from without. Attention, implying a degree of reactive spontaneity and autonomy, would seem to break through the circle of pure receptivity which constitutes "experience" for them, and hence must not be spoken of under penalty of interfering with the smoothness of their story.

And again:

> Our normal waking consciousness is but one special type of consciousness, whilst all about it, parted by the filmiest of screens, there lie potential forms of consciousness entirely different. We may be through life without suspecting their existence, but apply the requisite stimulus and at a touch they are there in all their completeness. . . .
>
> No account of the universe in its totality can be final which leaves these other forms of consciousness quite disregarded. How to regard them is the question. . . . They forbid our premature closing of accounts with reality.

Thus James ushered in (the better part of a century before it caught on) the "new" consciousness-oriented psychology of the 1960s and 1970s; for it is the transfer or transformation of the focus of attention that is the basis of every altered state of consciousness.* C.M.

*Consciousness-oriented psychology (CO psychology) is a broad, modern non-cult-restricted term which many are finding preferable to less informative, slogan-like words such as "humanistic," "trans-personal," "psychosynthetic," and other comparable loosely used terms, which—whatever their merits—are more descriptive of campaigning or proselytizing movements than of clear understandings. CO psychology includes the ethology of mammals and other life forms as well as the human.

The Need for an Expanded Science

One of the most significant trends in American culture today is what might be considered an anti-intellectual or anti-scientific trend, two of whose main highlights are the tremendously widespread use of psychedelic drugs, such as marijuana and LSD, and the tremendous growth of various Oriental and mystical religions. The states of consciousness (SCs) produced by drugs or medication are phenomena which we know very little about scientifically. The volume of research on such subjects has been quite small, compared to the extent of social involvement in them. Further, while scientific investigation of such topics is rapidly increasing, one can strongly argue that much of this research, while well intentioned, is relatively trivial compared to the nature of the phenomenon.

For example, a recent Gallup poll indicated that approximately half of American college students had tried marijuana, and a large number of them use it fairly regularly. They do this at the risk of having their careers ruined and going to jail for several years. Why? Conventional research on the nature of marijuana intoxication tells us that the primary effects of marijuana are a slight increase in heart rate, reddening of the eyes, some difficulty with memory, and small decrements in performance on complex psychomotor tests.

Would you, dear reader, risk going to jail in order to have your heart speed up, your eyes redden, your memory slip, and your performance on complex psychomotor tests decline? Somehow these "objective" facts about the effects of marijuana intoxication seem rather trivial in accounting for why people use this drug. A marijuana smoker who hears a scientist or a physician talk about these findings as the *basic* nature of marijuana intoxication will simply sneer and have his anti-scientific attitude further reinforced. It is clear to the marijuana user that the [conventional] scientist is wasting his time on trivialities, that he has no real understanding of what marijuana use is all about. It is not the purpose of this paper to document these sociological findings in detail, but they suggest basic shortcomings in conventional scientific approaches to these important phenomena.

To express the above observations in a more formal way, in

our culture today an increasingly significant number of people are experimenting with inducing altered states of consciousness (ASCs) in themselves,* and finding the experience thus gained of extreme importance in their philosophy and style of life. The conflict between perceptions and experiences in these ASCs with the attitudes and intellectual-emotional systems evolved in our ordinary SC is a major factor behind the increased alienation of many people from conventional science. Experiences of ecstasy, mystical union, other "dimensions," space/time transcendence, rapture, beauty, transpersonal** knowledge, and the like, common in ASCs, are simply not treated adequately in most conventional scientific approaches, yet are of extreme importance to the experimenter (and to mankind generally).

The purpose of the present paper is not to devalue the importance of current work, which is appropriate for certain kinds of understandings, but to show that the conflict discussed above is not *necessary*, to show that it is possible to investigate and work with the important phenomena of ASCs in a manner which is perfectly compatible with the essence of scientific method.

States of Consciousness

An ASC may be defined as a qualitative alteration in the overall pattern of mental [including emotional] functioning, such that the experiencer feels his consciousness is radically different in the way it functions. From the investigator's point of view, it is worth looking for qualitative differences in experience and behavior rather than seeing them only as

*By yogic or other forms of meditation, as well as by substances other than alcohol, that alter the state of consciousness. *C.M.*

**The term "transpersonal," although widely (and loosely) used, is not quite accurate or meaningful; for it does not do justice to those powerful ASCs which open into a vaster but still quite individual self a process that transcends by metamorphosing rather than by relinquishing or obliterating the personality. This fact cannot be stressed too often, especially in view of the plethora of sects and movements whose leaders have tried to achieve dominance by obliterating the "personality" in their followers under the guise of the equivocal words "cooperation," "obedience" (to the leaders), "humility," and the like. *C.M.*

quantitative changes from the normal SC. Note that an SC is thus defined not in terms of any particular *content* of consciousness, or specific behavior or physiological change, but in terms of the overall patterning of psychological functioning.

An analogy with computer functioning can clarify this definition. If we think of a computer as having a complex program of many subroutines, and we vary the data fed into the computer, variations in the output can be predicted from knowledge of the program and the nature of the input data. If, however, we reprogram the computer to a quite different program, the same sorts of input data may be handled in quite different ways, and very little can now be predicted about the effects of variation in input from our knowledge of the old program. The new program and its input-output interactions must be studied in and of itself. An ASC is analogous to temporarily changing the program of a computer. There may be many similarities with the ordinary SC, the ordinary program, but there will also be important qualitative differences.

ASCs experienced by almost all ordinary people are dreaming states and borderline states (the hypnogogic and hypnopompic, the transitional states between sleep and waking). Many others experience another altered state, alcohol intoxication.

The relatively new (to our culture) ASCs that are now having such an impact are such states as those produced by marijuana, psychedelics like LSD, meditative states, powerful trance states, and hypnotic and autohypnotic states.

States of Consciousness and Paradigms

It is illustrative to compare this concept of an SC, a qualitatively important organization of the patterning of mental functioning, with Thomas Kuhn's (1962) concept of *paradigms* in science. A paradigm, according to Kuhn, is an intellectual and scientific achievement, underlying normal science, that attracts and guides the work of an enduring number of adherents in their scientific activity. It is a kind of "super theory," a theoretical formulation of important data of wide enough scope that it organizes most or all of the major known phenomena of

its field. Yet it is open-ended enough so that there are important problems still to be solved *within* that framework. Examples of important paradigms in the history of science have been Copernican astronomy, Newtonian dynamics, and Darwinian evolution.

All paradigms are first introduced as theories, and, as such, they are subject to the requirement of making predictions that are empirically varifiable. By virtue of being extremely successful at prediction, a paradigm comes to be an all-embracing framework which organizes known data and guides a scientist in his research into the unknown, in searching for research topics which are "likely" to yield useful results. Because of their tremendous success, however, paradigms undergo a change which, *in principle*, does not happen to an ordinary scientific theory. An ordinary scientific theory is *always* subject to further questioning and further testing as it is extended: it is always tentative. A paradigm, however, because of its tremendous success, becomes an *implicit* framework for most scientists working within it, that is, it becomes the "natural" way of looking at things and doing things, rather than a tentatively held theory that is always subject to further test. It does not seriously occur to its adherents to question it any more (ignoring, for the moment, the occurrence of scientific revolutions).

As a historical example, elementary physics textbooks do not teach one of the "theory" of gravitation, but rather about the "law" of gravitation. That particular theory has worked so well that we believe it as a *law*.* When we drop something, we *know* that it will fall in accordance with certain principles. Actually, all we really know is that untold numbers of observations have

*This is a felicitous example, because ever since J. D. Cassini, discoverer of Saturn's rings and founder of the Paris Observatory, published his as yet uncontroverted observations in the early eighteenth century that the earth's orbit was a Cassinian oval rather than an ellipse, the evidence has been growing that the inverse square "law" of gravitation—which characterizes an ellipse and which is used both in Newton's and Einstein's theories—may not be the last word on how gravitation actually operates. Darwinian evolution is similarly being questioned today as not the whole story, though good as far as it goes (see Introduction to Part II of this book). *C.M.*

accorded with this particular theory, and we can *assume* that it is highly likely that the next observation will also fit the theory, but we don't really *know* it.

A paradigm has advantages and disadvantages. It serves to concentrate researchers' attention on "useful" problem areas, "sensible" problem areas, and thus keep researchers from wasting their time on what might be trivial problems. On the other hand, by implicitly defining some lines of research as trivial or impossible, it acts as a set of blinders. Kuhn has discussed this blinding function as a key factor in the lack of effective communications during paradigm clashes.

The similarity between a paradigm and an SC is now clear. Both a paradigm and an SC are a complex, interlocking set of rules and theories for interacting with and interpreting experiences with an environment. In both cases, the rules and theories have largely become implicit. They are not recognized as tentative working hypotheses, they operate automatically and the person feels he is doing the "obvious" or "natural" thing.

Paradigm Clash

Kuhn's concept of the importance of paradigms in science is a way of bringing the human element into the scientific endeavor. The stereotyped image of the scientist is of a cold, unemotional calculating machine which constantly recomputes all its data, alert for the smallest discrepancy. In point of fact, human beings become emotionally attached to the things which give them pleasure, and a scientist making important progress within a particular paradigm becomes emotionally attached to it. The valued paradigm sinks below the level of a scientist's consciousness, becomes implicit, with the result that when data which "makes no sense" in terms of the paradigm are brought to his attention, the usual result is *not* a reevaluation of the paradigm, but a rejection or distortion of the data.

Such rejection seems "rational" to others sharing that paradigm and "irrational" or "rationalizing" to others committed to a different paradigm. An example of this rejection

process, concerning data supposedly proving the existence of extrasensory perception, is G. Price's article "Science and the Supernatural" in *Science* (vol. 72), 1955. His article stated, in essence, that no intelligent man could read the evidence for extrasensory perception and doubt that it existed, *but*, since we know that extrasensory perception was impossible, we must conclude that all the evidence was due to error and fraud. Thus, within a paradigmatic framework certain kinds of results are impossible, and if such results are claimed to have been found, there must be something wrong with the claim or the claimant.

The conflict now existing between those who have experienced certain ASCs (whose ranks include many young scientists) and the scientists who have not is very much a paradigmatic conflict. A subject takes LSD, and tells the investigator that "You and I, all of us, we are all one, there are no separate selves." The investigator reports that his subject showed a "confused sense of identity and distorted thinking process." The subject is reporting what is *obvious* to him, the investigator is reporting what is *obvious* to him. The investigator's implicit paradigm, based on his scientific training, his cultural background, and his normal SC, indicates that a literal interpretation of the subject's statement *cannot* be true, and therefore must be interpreted as mental dysfunction on the part of the subject. The subject, his paradigms radically changed for the moment by being in an ASC, not only reports what is obviously true to him, but perceives the investigator as showing mental dysfunction, by virtue of being incapable of perceiving the obvious!

Historically, paradigm clashes have been characterized by bitter emotional antagonisms, and total rejection of the opponent and his view, by each side in a paradigm dispute.* Currently we are seeing the same sort of process: the respectable psychiatrist (who would not take any of those "psychotomimetic" drugs himself or sit down and do that "crazy"

*Such disputes have historically begun with one man on one side, the other side being an entire establishment. Copernicus, Martin Luther, and James Esdaile (see comment at close of chapter 2)—whose successful operations under hypnosis were brushed aside or rejected by the surgical establishment of his day—are three of many examples. *C.M.*

meditation process) carries out research to show that such drug takers are "escapists" and that those who practice meditation are mentally "ill". The psychedelic drug taker or the meditator, on the other hand, views that same investigator as narrow-minded, prejudiced, and repressive, and consequently drops out of the university or otherwise avoids becoming involved in the scientific enterprise, which he judges from the activities of such investigators. Communication between the two factions is almost nil, because the *implicit* meaning in so much of their attempted communications is so different that they literally talk *at* each other rather than *with* each other.

Must this mutual rejection be continued? Must the experiencers of ASCs continue to see the scientists as concentrating on the irrelevant, and the scientists see the experiencers as confused* or even mentally ill? Or can science deal adequately with the experiences of these people, with the altered paradigms emerging in ASCs? The thesis I propose is that we *can* deal with the important aspects of ASCs using the *essence* of scientific method, even though a variety of non-essentials, which are unfortunately identified with current science, may be incompatible with such an effort.

Editorial Comment: *The Revision of Scientific Method and its Prospects*

It is important for the reader to know what the author means by "the essence" of scientific method. What he has usefully done is to boil down into clear points what had been less pointedly realized previously by the most gifted workers in the psychology of consciousness since Richard Bucke and William James:

1. Conclusions must be based on experience, *which can be made repeatable for trained observers, but which is not necessarily limited to physical (ordinary sensory) experience.*

2. Both the observer and his specific quality or state of consciousness must be included as part of the data of the experimental situation (as has already been done in part in twentieth century physics). This procedure Tart aptly calls "state-specific science." The "detached observer" is an

*Note that confusion or impaired functioning is certainly an aspect of some (not all) drug-induced states, but this is not our primary interest here.

unrealistic, unexperiential and hence unscientific concept. (To this, we would add that to be "detached"—in the sense of having no blind prejudgments and being willing to change explanations rather than force facts—is still a prerequisite for scientific method.)

3. Different states of consciousness may be governed by different logics because they have different ground rules or premises. Thus two different conclusions about the same object perceived by two observers (or even the same one) in two different states of consciousness may both be right. In such cases validity consists in the consistency of application of the rules in each *case, and we are not in general permitted to judge either conclusion as "wrong" with respect to the other. Taking into account such hetero-logics, which may importantly overlap, also characterizes "state-specific" scientific method.*

But in some cases, such as genuine fire walking (see chapter 1), the ASC may lead not only to the sensation "I do not feel any burning" but to the physical corroboration of that feeling even though the skin has been exposed directly to fire. In other cases (undiscussed by the author in this connection) such as the hypnotic state, the ASC may belie *the physical situation, and someone in that state may say "I do not feel any burning" and be in bodily fact suffering severe burns; or may, on the contrary say "I feel my skin being burned" when no external heat is being applied at all.*

Thus all we reliably can say is that sometimes the ASC may agree with or even enable one to override normal physical conditions, while in other cases it may dangerously mask them. (This latter possibility, in our view, is not sufficiently stressed in the absent portion of the author's essay.) This point should be made clear in a final version of the author's paper.

4. Two persons in different states of consciousness, for the same reason as given at the beginning of point 3 (different sets of ground rules and hence no common basis for inference), may not be able either to intercommunicate or agree; yet both may be right with respect to their own state of consciousness.

On all this Jacob Boehme said long ago (early seventeenth century) that "I listen to him if he has the hammer that can strike my bell"—if he can talk in my language, using the ground rules of my dominant state of awareness at the time. In 1951 we discussed Boehme's outlook, and concluded then that given two people differing only in value systems (let alone the use of meditative techniques or psychedelic substances), the respective alterations of their state of consciousness can be so different as to interfere with their communication or agreement.

That interference becomes serious or even violent if the discrepancy between their basic values, and hence their prevalent ASC, becomes too

wide. Only sufficient kindness, *generating goodwill (which cannot be simply "willed" as some naively believe), seems to be able to bridge such gaps in communication and type of logic. Reason alone, unaided by kindness, simply cannot generate sufficient sympathy for the other fellow's viewpoint so as to empathetically perceive his state of consciousness accurately enough for him to feel an actual communication which he then perceives as "being understood." It is these all-important affective factors that will always ultimately govern the realities of human communication.*

5. The author feels that by recognizing the previous four points, the traditional scientific verification by agreement between several observers—the so-called consensual validation or endorsement by a consensus of informed opinion can be achieved even when altered states of consciousness are part of the data.

To this, we would add two cautions that one must bear in mind with regard to "proof" by consensus. As the whole world has witnessed during almost every war, large groups of people, including "informed" ones, can all agree to go temporarily insane. Here is a consensus that proves nothing except that consensus may not be a proof of anything. The second caution is a fact that every discoverer of something new and valid knows: consensual validation is a later stage of endorsement, and cannot ordinarily be historically expected either soon or easily, as too few are prepared for new concepts at the time of their discovery. M. Ferguson !

The process of finding scientific demonstration of a new effect or valid proof of a new concept, and the process of obtaining a consensus of endorsement for that effect or concept, are two very different things between which the author does not sufficiently discriminate in the unpublished portion of his essay. The first process requires a good, and possibly even enlightened scientist. The second, however, demands an expert publicist and promoter, or a group of them. That on occasion these two capacities occur in one man does not change the fact that the two processes are quite distinct, nor that this distinction has resulted historically in many delays in the development of human thought at large, when valuable discoveries (e.g. Mendel's laws of heredity) lay unpublicized and unknown for a generation or more.

6. The author furnishes timely warnings not only for people interested in ASCs chiefly as observers but also for those deeply involved as participants. He too modestly relegates to a footnote in his paper what should be underlined a hundred times these days, saying that in general, people who develop a personal interest in ASCs or "higher" SCs tend to think that once they become interested in "spiritual" matters of this sort

it is very difficult for them to err, that they have transcended ordinary human concerns and problems, whereas in point of fact, it is clear that all the various kinds of neuroses and pathologies that occur in the context of everyday life can also occur around the subject matter of spiritual development or higher understanding, and are that much worse for being unrecognized. The author concludes the note with the penetrating observation that a major contribution will be made by someone who develops an adequate psychopathology of the spiritual path, in order to make people more aware of the very real distortions and dangers that can occur.

Professor Tart's keenly aware proposal to revise scientific method needs to be newly said for the twentieth century at large, even though some few have said it before. And, within the limits above clarified, he says it very well, stressing that, in view of the previously predicted "impossible" becoming so often shortly afterward possible in our times, we should remain scientifically "rather humble"—a timely antidote to an arrogant technocracy.

The author sees some interesting prospects if the foregoing revision of scientific method is adopted by the establishment, for it has been ill-understood altered states of consciousness that have been behind humanity's finest and most atrocious acts of history. It is high time that science came to grips with such ASC phenomena, which from our present viewpoint can be regarded, to use the author's term, as "arational" (heterorational would be better) to denote the realm of assumptions on which the superstructure of rational behavior is erected. He does not make clear enough, however, in his unpublished discussion, that either these assumptions or the basis of their choice is unconscious, and that sometimes both are. That is why offered "reasons," or the lack of them, are façades and do not explain human behavior. These discrepancies are the basis of both comedy and tragedy.

Included in the term "unconscious" (as we suggested to Tart in a telephone conversation of early May 1971) is an often overlooked factor: posthypnotic suggestion(s), which may be in the guise of conditioning, indoctrination or acculturation. As we have pointed out on other occasions, conditioning and acculturation are forms of slow hypnosis. The behavior of people in a given culture must hence be regarded in the light that the understanding of such culturally induced posthypnotic suggestion may shed on their actions and attitudes.

If science becomes consciousness-oriented, as Professor Eugene Wigner predicted about a decade ago that it would, it will then begin to answer

the really important questions of how we came to be as we are, whither we are tending as a race, as distinct (or not) from where it might be most desirable to go. Along with these answers will come a steady improvement in our voluntary control, change and manipulation of altered states of consciousness, with the long-range goal of a rise in level of the state defined as "normal waking consciousness." All the present experimentation with meditation, biofeedback and psychedelic substances as means to induce altered states of consciousness, appears to be part of this long-range trend.

In a consciousness-oriented science, much training will be devoted to the scientist's increased understanding of himself so that biases of which he would otherwise be unaware will not seriously be able to vitiate his investigations.

Such a development of scientific method may well produce a better life for all than the previous tries of either various sects and ideologies or the present human-starved technology have been able to do. If so, it will be without the arrogance and intolerance that have regrettably vitiated the history of politics, religion and science as practiced by controlling groups.

The crying outstanding need, then, which should be added to the author's criteria for a revision of scientific method, is for a new psychodynamics of human groups*—one based essentially on kindness and excellence rather than on domination and power-seeking. That is the real Revolution to be fought. The battleground is within each man, and not between men.* C.M.

FORM OF AN ALIEN CONSCIOUSNESS
Orchid mite 3000 x by William E. Gardner of Sloan Laboratories, Santa Barbara, California. This strange tiny creature lives symbiotically with a mold on the plant, feeding on mold secretion and in turn distributing the spores of the mold.

CONSCIOUSNESS AND SCIENCE

II

Introduction

Altered states of consciousness have been responsible for all great successful scientific discoveries. Science really has its genesis in the phenomena of intimate, immediate and even normally inaccessible states of consciousness. Nikola Tesla's induction motor was born early in this century out of a spontaneous vision of incredible exactitude. F. A. Kekulé was similarly struck in his discovery of the idea of the benzene ring, which began modern organic chemistry. So much so that he published an account of his *ouroboros*-type revelation in the 1890 proceedings of the German Chemical Society, ending with the memorable sentences: "As though from a flash of lightning I awoke [and] occupied the rest of the night in working out the consequences of the hypothesis . . . . Let us learn to dream, gentlemen."

Henri Poincaré similarly left us a record of his ultraconscious finding of automorphic functions—so important in modern mathematics. The discovery of the laser by an American scientist in a visionary experience in a park at dawn is a well-known twentieth century addition to the evidence.

Finally, the quantum physicist Max Born, in a letter of his of 1967, wrote that he had experienced during his lifetime "perhaps a dozen flashes of ideas which proved to lead to scientifically significant . . . results." He compared the quality of his experience to that of Kekulé and added that "I know for certain that in the few cases where I have discovered something of importance it came like a flash, and a minute before I knew nothing of it."

Among the findings thus made, Born lists the important quantum formula $qp - pq = ih/2\pi$ and the relation between wave mechanics and probability.

The evidence adduced by Coxeter in the following chapter provides other cases in point.

Science is verifiable knowledge integrated by key concepts that render the data intelligible. The beginnings of such

knowledge come from normally inaccessible levels of human awareness. In this sense, the genesis of all science lies in noetics—the master science of the knowledge of consciousness and the release of its potentialities.

The latter half of this century has seen enormous breakthroughs in understanding and we may expect more—especially in psychology and biology—as men bring these largely untapped and tremendous possibilities into use.

Evolutionary Theory in the DNA Era

At the core of the new breakthroughs will be a deeper grasp of the ways consciousness manifests itself. In particular, evolutionary theory, we surmise, will shift markedly to a less reductive view than the present too rigid and too inadequate notion of natural selection—so useful up to a point and yet insufficient to render intelligible all that can be observed. The explanatory inadequacy of natural selection, instances of which will follow, has become especially noticeable in the DNA-RNA era ushered in by Wilkins' brilliant X-ray photography of the molecular double helix and the subsequent relating by Crick and Watson of his photographs to the key genetic molecule and the process of cell division, mutation, and hereditary transmission.

The weakest point in present mutation theory is the notion that mutations are *wholly* undetermined and unpredictable, a view comparable to the outdated idea of "spontaneous generation."

Random Mutation Is Not Enough

The curious fact remains that even in the view of evolution that depends on natural selection (the dying out of forms that are unable to survive, by the deaths of individuals before sexual maturity), there is a persistent theoretical and observable need to assume the constant occurrence of mutations. The trouble is

that the mutation induced by all the heretofore supposed agents—that is, radiation and cosmic rays, undirected chemical or micro-mechanical shock or microscopic lesion—is insufficient to explain the arising of the tailor-made mutations necessary to explain the observed amazing patterns of species differentiation, for the mutations produced through random shocks are known not to be patterned, to be at best neutral, and in fact mostly harmful or even lethal to the organism.

Patterning Mutations

The observed differentiation in species is quite different from the simplistic schemes based on randomness and natural selection, and is highly, often most intricately and complexly patterned. Thus the harmless Bolivian moth *Pseudosphex ichneumoneus*, has become mutated so as to depart almost completely from the normal lepidopteran form (the antenna being the one noticeable external exception), and the insect has come to appear almost exactly like a poisonous wasp. Blind natural selection certainly had a hand in this, but also some very patterned mutation process was needed. In other cases, like certain extinct elephants and the saber-toothed tiger, the mutation pattern was persisted in and even developed by the species in complete defiance of natural selection, until the species literally put itself out of business and became extinct because of the anti-survival effect of its extreme and finally unusable appendages—the incisives in this case.

Darwin, as with many originators, was far ahead of the school that codified him as "Darwinism." In his early writings, he had called attention to the astounding and varied devices of certain orchids to achieve pollination. These devices—far from being original necessities to survival—are extremely involved and often bizarre in character and have not been found necessary by any other flowering plant, even in those cognate with the orchids. For example, a lovely Javanese orchid flowers in a form that seems, with amazing exactitude, to be a bevy of butterflies above the branch. Another orchid native to the Peruvian

highlands apes exactly the genital appearance of a female fly of the same region. The male fly, completely seduced by the ersatz Mata Hari, pollinates the orchid when he attempts intercourse with the shamelessly exhibitionist "female fly"—the wily orchid in lurid disguise. Other equally exotically evolved orchids temporarily drug their victims with specially exuded substances, making the pollination process easier.

A small field orchid of Northeastern United States, though not so colorful as its tropical sisters, exhibits the same morphological ingenuity. The *labellum* (literally "lip" or "small basin"), or largest of the three petals of an orchid, is here startlingly modified into resembling a pollen-laden group of stamens, but is really a trap door, on which an unsuspecting bee lands (to collect the mirage-pollen) and falls through the door into a one-way passage in the orchid that thus forces the victim to pollinate it.

Plant hormone (enzyme) controls operate in all these phenomena and in some cases very obviously, as in those orchid flowers that begin to wilt only after they have been pollinated, sometimes having to wait as long as a dozen weeks or so—far longer than the bloom period of most flowers. Pollination changes the enzyme pattern with remarkable swiftness—similar to the mammalian shift from estrogenic to luteal hormones after fertilization.

The Role of RNA-DNA in Patterned Mutation

In a 1962 lecture given before the Cybernetics Group of the Institute for Theoretical Physics of the University of Naples (published at Rome, 1965, by the National Research Council of Italy in the volume edited by Prof. E. Caianiello, "Cybernetics of Neural Processes," pp. 189-190), we voiced the proposition that the *central nervous system* is "the source of modification of the DNA-RNA through the organism's choice of adaptation to its environment" via—to explain the precise technical procedure—"mutant genetic RNA-DNA patterns which are biochemically coupled with a tagging hormone directed to the

gonads for mutant penetration into selective target areas in the formative germ plasm." In short, decision—deep in the unconscious in most cases—is involved.

Six years later Carl C. Lindgren, professor emeritus of the Biological Research Laboratory of Southern Illinois University, voiced the same proposal: that the brain, by its interaction with the environment, could influence the DNA patterns of the germ cells, resulting in a new kind of pangenesis worked through a feedback control of the nervous system on the germ cells.*

The recent work of the molecular biologist Thomas H. Jukes and the geneticist R. King at the NASA-sponsored Space Sciences Laboratories at the University of California at Berkeley now demands mention. Drs. Jukes and King found that there were "Darwinianly neutral" mutations, formed independently of the process of natural selection and oblivious to its censoring power. Previously in 1967, under NASA grant NsG-479, Jukes had written that "a major point in the evolution of the [genetic] code had been played by mutations that are transcribed into the various transfer RNA molecules." He was referring here to adaptive and non-pathological mutations.

It is only time before full verification of the thesis first voiced in 1962 will be established; namely, that the brain (or its lower life-form analogue)—the central organ of environmental interaction—mediates adaptive changes in animal or plant germ plasm via modified RNA, doing so whenever a brain reaction is forced to be repeated enough by the environment in token of some constantly re-arising situation. Then a new era in evolutionary theory—now only adumbrated—will be at hand.

Awareness, consciousness on some level, is always the touchstone of nature's ways. The following chapters will demonstrate that richly, carrying this seminal concept even into the foundations of modern science: physics and mathematics. *C.M.*

**Cold War in Biology*, Ann Arbor, Michigan, Planarian Press, 1968.

Cases of Hyperdimensional Awareness

7

H. S. M. Coxeter

Of great interest to the investigation of creativity and unusual states of consciousness are the available records of persons who were able not only to conceive and imagine higher dimensional forms, but to do so exactly enough as to make new discoveries which then could be tested by logical demonstration even by persons unendowed with such gifts. An important noëtic distinction between discovery and proof arises, here well illustrated. Discovery involves more creative power than proof, just as proof requires more than explanation; and explanation, more than transcription or repetition. Sometimes all these levels are present in one person.

Every student of these matters must be indebted to Dr. H.S.M. Coxeter (Ph.D.) for having collected between the two covers of one book (Regular Polytopes, *Methuen, London, 1948, now in a second edition by Macmillan, 1963) so many remarkable examples of unusually powerful states of consciousness, resulting in new, strange, yet always verifiable forms. The following biographical sketches are collected here. "Polytopes" means closed geometrical figures, usually solids of more than three dimensions.*

Professor Coxeter is a member of the Department of Mathematics at the University of Toronto, and an international authority on the geometry of higher dimensional spaces. He is vice-president of the American Mathematical Society and has been one of the active leaders in the new movement to make modern mathematics teaching more interesting and significant. C.M.

Alicia Boole Stott

Alicia Boole Stott (1860-1940) was the middle one of George Boole's five daughters. Her father, who is famous for his algebra

of logic and his textbook on Finite Differences, died when she was four years old; so her mathematical ability was purely hereditary. She spent her early years, repressed and unhappy, with her maternal grandmother and great-uncle in Cork.

When Alice was about thirteen, the five girls were reunited with their mother (whose books reveal her as one of the pioneers of modern pedagogy) in a poor, dark, dirty, and uncomfortable lodging in London. There was no possibility of education in the ordinary sense, but Mrs. Boole's friendship with James Hinton attracted to the house a continual stream of social crusaders and cranks.

It was during those years that Hinton's son Howard brought a lot of small wooden cubes, and set the youngest three girls the task of memorizing the arbitrary list of Latin words by which he named the cubes, and piling them into shapes. To Ethel, and possibly Lucy too, this was a meaningless bore; but it inspired Alice (at the age of about eighteen) to an extraordinarily intimate grasp of four-dimensional geometry . . . . Her methods remained purely synthetic, for the simple reason that she had never learnt analytical geometry.

In 1890 she married Walter Stott, an actuary; and for some years she led a life of drudgery, rearing her two children on a very small income. Meanwhile, in Holland, P. Schoute was describing the central sections of the six regular four-dimensional polytopes.* Mr. Stott drew his wife's attention to Schoute's published work; so she wrote to say that she had already determined the whole sequence of sections, the middle section for each polytope agreeing with Schoute's result.

In an enthusiastic reply, he asked when he might come over to England and work with her. He arranged for the publication of her discoveries in 1900, and a friendly collaboration continued

*The sixth—the one without a parallel among the five regular three-dimensional solids—is the most unusual of all the regular hyper-solids in four dimensions. It is the higher analogue of the three-dimensional cuboctahedron—which is the semi-regular solid whose twelve vertices lie at the centers of twelve equal spheres all packed around a thirteenth. Just as only six equal coins fit around a seventh in their midst, their six centers forming the vertices of a hexagon, so just twelve ping pong balls will fit around a thirteenth. In four dimensions, twenty-four hyperspheres will just fit around a twenty-fifth, the centers of the twenty-four forming the vertices of the polytope in question. It has also twenty-four octahedral cells. *C.M.*

for the rest of his life. Her cousin, Ethel Everest, used to invite them to her house at Hever, Kent, where they spent many happy summer holidays. Mrs. Stott's power of geometrical visualization supplemented Schoute's more orthodox methods, so they were an ideal team. After his death in 1913 she attended the tercentenary celebrations of his university of Groningen, which conferred upon her an honorary degree, and exhibited her models.

She resumed her mathematical activities in 1930, when her nephew, the physicist G. I. Taylor, introduced her to me. The strength and simplicity of her character combined with the diversity of her interests to make her an inspiring friend. She collaborated with me in the investigation of Gosset's semi-regular four-dimensional polytope, which I had rediscovered about that time. She made models of its sections, which are probably still on view in Cambridge.

Paul S. Donchian

Paul S. Donchian was born in America of Armenian parentage. His great-grandfather was a jeweller at the court of the Sultan of Turkey, and many of his other ancestors were oriental jewellers and handicraftsmen. He was born in Hartford, Connecticut, in 1895. His mathematical training ended with high school geometry and algebra, but he was always interested in scientific subjects. He inherited the rug business established by his father, and began operating it in 1920.

At about the age of thirty he suddenly began to experience a number of startling and challenging dreams of the previsionary type soon afterward to be described by J. W. Dunne in "An Experiment With Time." In an attempt to solve the problems thus presented, he determined to make a thorough analysis of the geometry of hyper-space.

His aim was to reduce the subject to its simplest terms, so that anyone like himself with only elementary mathematical training could follow every step. For this purpose he devoted many years to the task of making a set of exquisite models. Their

construction required all the patience and delicate craftsmanship that could be provided by his oriental background. In the complicated cases it was not feasible to superpose sections, because frequently the edges of a section are not edges of the polytope. He took the central section as an "exterior shell," but for the rest he made use of various plane projections published by Schoute and van Oss, regarding them like an architect as plan and elevation.

He observed that any solid projection may be regarded as an intermediate stage in the formation of a plane projection, which means that the solid projection should present the appearance of a plane projection when viewed from far away in any direction. To quote Donachian's own words:

> My system is to build first the central grouping, then the exterior shell, with the central grouping inserted at the last moment and suspended by temporary stay-cords. The process of connecting the innermost and outermost portions proceeds by constant testing of the results [by comparison with the known plane projections] and the plodding application of common sense. The models are fortunately fool-proof, because if a mistake is made it is immediately apparent and further work is impossible. The final joining of the inner and outer portions carries something of the thrill experienced by two tunnelling parties, piercing a mountain from opposite sides, when they finally break through and find that their diggings are exactly in line.

In 1934 the models were exhibited at the Century of Progress Exposition in Chicago and at the Annual Exhibit of the American Association for the Advancement of Science, in Pittsburgh.

Thorold Gosset

Thorold Gosset was born in 1869. After a largely classical schooling, he went up to Pembroke College, Cambridge, in 1888. He was called to the Bar in 1895, and took a law degree the following year. Then, having no clients, he amused himself

by trying to find out what regular figures might exist in n dimensions.

After rediscovering all of them, he proceeded to enumerate the "semi-regular" figures. He recorded the results in an essay, which he sent to J. Glaisher in 1897. Glaisher showed it to Alfred North Whitehead and William Burnside. It is tempting to speculate on the possibility that some of its ideas, unconsciously assimilated, bore fruit in Burnside's later work. This, however, is unlikely; for Burnside declared (in a letter to Glaisher, dated 1899) that he never found time to read more than the first half. [It is also a pity that Whitehead, co-author of the *Principia Mathematica* with Bertrand Russell, did not appreciate Gosset's profound mathematical insights.]

"The author's method, a sort of geometrical intuition," did not appeal to Burnside, and the idea of regarding an $(n\text{-}1)$-dimensional lattice as a degenerate n-dimensional polytope seemed "fanciful." He thus failed to appreciate the new discoveries, and Glaisher was content to publish the barest outline. That published statement remained unnoticed until after its results had been rediscovered by Elte and myself. As he was a modest man, Gosset let the subject drop, and pursued his career as a lawyer. [Gosset was also the first to conceive of and measure semi-regular shapes in higher dimensions.]

John Flinders Petrie

John Flinders Petrie, who first realized the importance of the skew polygon that now bears his name, is the only son of Sir W. M. Flinders Petrie, the great Egyptologist. He was born in 1907, and as a schoolboy showed remarkable promise of mathematical ability.

In periods of intense concentration he could answer questions about complicated four-dimensional figures by "visualizing" them. His skill as a draftsman can be seen in his unique set of drawings of stellated icosahedra.

In 1926, he generalized the concept of a regular skew polygon to that of a regular skew polyhedron. The theory is complete

only up to four dimensions, and the analogous "skew polytopes" have not been investigated at all.

Ludwig Schläfli

Practically all the ideas in this chapter (with the exception of Schoute's generalized prism or rectangular product) are due to Schläfli, who discovered them before 1853—a time when A. Cayley, H. Grassmann, and A. Mobius were the only other people who had ever conceived the possibility of geometry in more than three dimensions.* [John Graves, who had first conceived Cayley's later eight-dimensional algebra by December 1843, should also be mentioned, as well as Graves' friend W.R. Hamilton, discoverer of four-dimensional quaternion algebra.]

Ludwig Schläfli was born in Grasswyl, Switzerland, in 1814. In his youth he studied science and theology at Berne, but received no adequate instruction in mathematics. From 1837 till 1847 he taught in a school at Thun, and learned mathematics in his spare time, working quite alone until his famous compatriot, the geometer Jakob Steiner, introduced him to Jacobi and Dirichlet. Then he was appointed a lecturer in mathematics at the University *(Hochschule)* of Berne, where he remained for the rest of his long life.

His pioneering work was so little appreciated in his time that only two fragments of it were accepted for publication: one in France and one in England.

The French and English abstracts of this work, which were published in 1855 and 1858, attracted no attention. This may have been because their dry-sounding titles tended to hide the geometrical treasures that they contain, or perhaps it was just because they were ahead of their time, like the art of van Gogh. Anyhow, it was nearly thirty years later that some of the same ideas were rediscovered by an American. The latter treatment (W. I. Stringham, 1880) was far more elementary and perspicuous, being enlivened by photographs of models and by

*Mobius realized, as early as 1827, that a four-dimensional rotation would be required to bring two enantiomorphous [e.g. a right and a left-hand glove] solids into coincidence. This idea was neatly employed by H. G. Wells in *The Plattner Story*

drawings . . . .The result was that many people imagined Stringham to be the original discoverer of the regular polytopes. [Schläfli had not only been the first to conceive of regular hyperdimensional forms, but was also the first man in recorded history to compute and measure the content and hypersurface of a higher dimensional sphere. Ways of closest packings of hyperspheres, though adumbrated by Gosset, were not explicitly investigated until Minkowski in 1904. Not until 1963 was it begun to be clearly realized that packing patterns changed remarkably after eight dimensions, and Musès' concise single formula discovered then for the packing of spheres up to and including 8-dimensional space will be found in Coxeter's chapter in Vol. III of *Lectures in Modern Mathematics* edited by T. L. Saaty, 1965.]

As evidence that at last the time was ripe, we may mention the independent rediscovery [of regular higher dimensional solids] between 1880 and 1900, by G. Forchhammer, K. Rudel, R. Hoppe, V. Schlegel, A. Puchta, E. Césàro, H. Curjel and T. Gosset.

The Exploration of Consciousness*

8

Charles Musès

The author's work has been published in scientific periodicals and books here and abroad on both pure mathematics and the relation of mathematical ideas to the structure and process of mind and awareness. Dr. Musès (Ph.D., M.A.) is an associate editor of the International Journal of Bio-Medical Computing *(Elsevier, London), as well as editor of the* Journal for the Study of Consciousness.*

Twentieth century science, through the technology it has made possible, of necessity governs or substantially affects the greater part of the living conditions, and hence behavior patterns, of the vast majority of the human race.

Therefore the interpretation we put on science conditions our entire outlook and behavior.

We will be talking about the nature of the sensorily observed world. Under "sensorily observed" we include "instrumentally observed," for instrumental readings cannot be known without sensory observation of the instruments, which is the ultimate pathway all data must follow in order to stand in the presence of awareness, in order to be observed, and thus become "observations."

A tree, a table, a cloud, a stone—all are resolved by twentieth century science into one similarly constituted thing: a congeries of whirling particle-waves obeying the laws of quantum physics. That is, all the objects we can observe are three-dimensional

*The term *consciousness* here includes the sub- and supraconscious aspects of awareness. We are not normally conscious of the extent of all of our awareness. C.M.

images formed of standing and moving waves by electromagnetic and nuclear processes. All the objects of our world are 3-D images formed thus electromagnetically—super-hologram images if you will.

Our World of Simulacra: Superholograms

It is thus obvious that whatever physical science tells us is simply about the substance of the images and not about the substance of whatever realities to which those images refer. The nature of the images is one thing; their reference and meaning, another. It would be as futile to expect that science could tell us the significance of the world—the point of it, its "so what?"—as to expect that the cinema projectionist or television engineer could tell us about the meaning of a scene projected on the screen simply by virtue of being a projectionist or engineer.

However, if we listen openmindedly to what science tells, we can learn a very important fact, namely that the objects we see *are* images, all made up of whirling, rapidly moving constituents. Here science rests, returning to the old insight of Herakleitos, the dictum of *panta rhei* or "all things move," an insight reached also by the old Hindus and embodied in the Sanskrit word *jagat* or "movement" for the world. The very heart of the images which our senses are equipped to observe is their incessant and rapid motion, and the consequently changing relations, of their constituents.

This restless world-view, born of the images revealed by science, has come to dominate the twentieth century, only because nothing deeper was hitherto found. "Change," "dynamism," "incessant revision," "movement," "revolution," "interaction," "process"—all are much used keywords of today, expressing where man's insight is at this anno domini 1970.

Those key words, however, also represent a whirling squirrel-cage type of cul-de-sac unless we return to the implication we already noted, namely that images are never fundamental and always imply a *projection process*, about which our present science can of necessity say little since it deals by definition

with the constitution and nature of the projected images. Before attempting to delve into the projection process and the source of our super-hologram cosmos, let us look some more at the observed world.

We live in a projection world of solid, neuro-"wired" holograms—a world of simulacra.

Physical science by its micro-analyses, through instruments, of input data ordinarily received only by the bodily senses (or by instrumentally detecting signals not sensorily perceivable) has revealed a great deal of the modus operandi of the production of our sensory observations.

Thus what appears to our senses as a table or a vase, say, is—we are now told—"actually" a configuration of minute whirling particle-waves, all these components constantly involved in complicated patterns of motion vying in velocity with the speed of light. That, we are told, is the reality of the table and the vase—as well as of the leaf and the sunset.

It is as though we were told while witnessing a cinema of some beautiful building that the projection machinery and lights were the ultimate reality of what was being depicted on the screen. It is merely a series of colored dyes on some plastic film being projected at sixty-four frames per second by a thus-and-so specified apparatus and that is all. So we are told.

Yet here we demur, saying, But that is not "all" at all; for that scene existed or exists somewhere, and the projection apparatus is, if anything, the more illusory of the two—certainly not the ultimate reality of the scene it serves to depict. Indeed, the entire science of the projection is irrelevant to the scene's reality.

In summary terms, the means of depicting something is not "more real" than the *reference* of what is thus depicted.

Once we begin to be aware of the fact that our hologram type of matter is not the last word in substance, nor even the best kind of substance, we cannot accept that the projection mechanism for such superholograms is ultimate reality. We can then begin to understand that the admittedly highly intelligent and complex manner of referring to this reality by means of

moving particles and their standing-wave patterns is simply the means appropriate to our type of body—and understand that such means do not exhaust reality at all.

Men change their cars almost *de rigueur* annually, yet are not educated to realize that they could acquire a much better model body, with notable improvements in the digestive and reproductive systems. Imagine, for instance, wombs (not merely eggs) that do not have to be carried about by the mother.

Thus the facts of science (insofar as they are not theories to be changed tomorrow) are correct but any claim thus to reveal final reality or significance is not warranted. Physical science has revealed the imagistic modus operandi but not ultimate reality—much less meaning on the point of life itself.

Present science, as we have seen, is concerned solely with the super-holograms, their constitution and interrelations. It does not take us into the projection process itself, much less to the source of our hologram world.

A new branch of mathematics, which occupies the unique position of being itself not an instrumental science and yet at the foundation of all sciences, can take us one step further. For the nature of hypernumbers can reveal the projection *process* and shed specific light on the source of the hologram world or ordinary bodily experience.

Without such insights, we would remain in the world of whirling and unenduring images, a world-view which by its own limited logic could not go beyond mortality and the belief that bodily dissolution means total annihilation of an ongoing personality and memory—a belief necessarily characteristic of the twentieth century at its stage of believing that there is nothing beyond the world of the super-hologram images revealed by its technology.

However, the very nature of an image, however sophisticated, cries out the existence of a concomitant projection process and image source—both realities (that of the projection apparatus and that of the image-source) being of necessity beyond the image world of the whirled images.

The source world is obviously the more stable one. To know

more about it is clearly the historically and evolutionarily indicated main concern of late twentieth century man. Such knowing would explain our world.

It is the object of our writings on hypernumbers, their nature and behavior, to develop that concern, and the facts of that world which is the basis of ours.

Thus "all things metamorphose to higher states of awareness" is a deeper view than that all things merely flow or move. We are ready to go beyond *panta rhei*.

We must now go on to develop the capacities that will bring us into more intimate acquaintance with that greater world a deeper insight has thus shown awaits us.

The mystery of the nature of the world remains, but it is now in findable form. The next step is clear: to find out how to prepare ourselves to be able to go between the image world and the source world at will. Here is where knowledge of the hypernumbers can help us. But first we need to know something about them.

We must now interpolate a transition concept, leading to a new method of discovery related to the exploration of consciousness. We will be engaged with the question of what is communicable or expressible, and with how a fundamental tool for investigating the (inner and outer) world–number–can be used to reveal new discoveries about the nature of the world.

Pedagogy and Symbols

Pedagogy is a tremendous exercise in sanity, for one is always restoring the proportion between the viewpoints of one person (the teacher) and another (the student). Inasmuch as we learn anything from someone else we are all students, and this learning process from others by seeing better what their viewpoint is is an essential part of sanity. As long as we continue to learn from others, with an attitude of appreciation towards them for their contribution, however small, it is impossible to go insane or even to become very neurotic.

This interchange of viewpoints is done by means of symbols.

Words—spoken or written—are the basic symbols we use. In this we are distinctively human since human or syntactical language uses symbols to operate upon other symbols.

A noun following a verb denotes an object of the verb—"James hit the ball." "The ball hit James" denotes an entirely different situation. The *sequence* of the symbols is part of a system of operational or intersymbolic rules governing the objective reference of the symbols to some experienced situation. Such intersymbolic rules are what syntax means. To employ syntax is a distinctively human capacity. No animal language, dolphin or otherwise, has it. Man is the only creature on earth that can manipulate symbols by means of symbols, as word order and word endings (or prefixes) in human languages demonstrate. (Moreover, in addition to vocalizing such manipulations, human beings can write them! Without this veritable tour-de-force of *written* language, a science of number could not have evolved.)

Communication and Syntactical Language

Animal communication by sounds possesses vocabulary in the limited sense that various sounds refer to responses to different situations. Thus a sound may denote satisfaction, fear, anger or a warning to other members of the group. Dogs and cats under the guidance of humans develop sounds for "please," and an understanding of sound-signals for even such complicated action sequences as "go-get-the-newspaper-from-the-store." The preceding hyphens denote that the dog did not understand this as a sentence or syntactical combination, but on the contrary as one sound symbol meaning a specific chain of actions to be performed in sequence. Animals under affectionate training can learn extremely complicated behavioral responses to sound or motion (gesture) symbols, but can never learn syntax or the operation of symbols upon symbols. Not even the most intelligent of the anthropoid apes such as the chimpanzee can learn this.

Conversely the human moron is a moron to the extent that he

does not have a developed ability to manipulate symbols by symbols, that is, to use syntactical language. A low-grade moron, unless the two sentences were acted out for him, would even lose the distinction between "the man hit the ball" and "the ball hit the man." Most morons have some syntactical ability, and this is exactly what places them above animals in the intelligence scale.

Though words used syntactically are our basic means of communicating ideas, they are like a first-stage rocket to an even more powerful means: that of number used syntactically—i.e. under laws of sequence and arrangement connecting placements, patterns, and specified changes of either, with significance and meaning.

The Emergence of Number as Language

Men in the primitive, tallying stage of number simply made marks or piled sticks, seeds or stones in groups to enumerate some set of objects. But they did this also for events. The latter was accurate initial tallying a necessity, but re-tallying being events, unlike objects, could not be re-tallied with the counters or marks. Hence with events (for example, full moon) not only was accurate initial tallying a necessity, but re-tallying being impossible, the set of counters or marks were no longer mere tallies but collections of units or numbers. The difference is roughly that between four notches and the number symbol "4."

Through time man learned number. Hence the first number man factually learned was the number "2," since tallying is pairing, and the simplest possible tally involves two things: the object and the mark referring to it. Tallying is a time and referral process. It is also a twoness.

Thus twoness was the primitive number concept, from which the number 1—previously not quite consciously perceived—was deduced consciously; since before tallying, the "1" (which could mean either the object or the marker) was not consciously realized as a number but simply as an object or marker *in se*. The twoness of the tallying situation reveals the number

one. The number 1 is thus in the unconscious only, until the number 2 enables it to become conscious. Like 1, zero lay even deeper in the unconscious, and it was many centuries before man learned that he needed a symbol for *no* thing as well as for one or two things. The Greeks and Romans, for all their intelligence, failed to attain a symbol for zero in their number systems.

Thus time (succession) and twoness evolved number in the human mind. Many people still consider number as merely magnitude or amount. Indeed some people never get much beyond numbers as mere tally marks. When numbers are used as amounts, or *collections* of units, that is of course one step beyond number as tally or marker. With the powerful motivation of profit, and its inverse, the danger of loss, the merchants became skillful in manipulating accounts by addition and subtraction. Already in Sumero-Babylonia the idea of charging interest on loaned money had arisen, which involves multiplication and division as well. Spurred by the loftier motive of love of truth—though the desire for power, as it still does in modern science, played a great part—the temple priests or Chaldean class in ancient Babylonia developed trigonometry, or the manipulation of angular measure and number in relation to linear number. (Thus the ratio of two lengths, such as the base and hypotenuse of a right triangle, measures the amount of angle between those two lines. That ratio is now called the "cosine" of the angle, and was one of the ratios used in ancient Babylonian trigonometry.)

The same remarkable civilization attained knowledge of the square roots of numbers, and the oldest known version of the famous Pythagorean theorem (the sum of the squares of the base and the altitude of any right triangle is equal to the square of its hypotenuse) is written in cuneiform.

Thus the manipulation of number as magnitude began the second great syntactical language distinctive of the human stage of development. By this manipulation or syntactical use of number, man was able to think more accurately, profoundly and quickly along many more lines than words alone could enable him to do. By comparison, men at the tallying or

counting stage of number were on a level like that of the non-syntactical language of animals.

But there is more to this accomplishment than the simply syntactical. Syntax is a beautiful instrument, but its point is the power, depth, and above all *clarity of meaning*. Every animal conveys some meaning by physical attitude, movement and cry; but only syntax enables meaning to achieve depth, extreme clarity, and many-faceted content with delicate distinctions, as well as time and space reference.

Hyperstages of Meaning

With respect to the animal level of meaning, the human being communicates hyperdimensionally because of his capacity to combine and convey several contexts in just and harmonious proportions with all nuances and interchanges preserved, and because of his ability to refer to past and future linguistically.

Hence when we arrive at the syntactical use of number, that second-stage rocket which is able to compress, distill, and resolve meanings even more powerfully and finely than words, we see that we have still a third-stage rocket available to us in that journey of self-discovery which is called evolution. This third stage is the interpretation of the intensely concentrated meanings conveyed by this most powerful form of syntactical language: number.

First let us notice that the linguistic use of number is capable of literally infinite distinctions that preserve meaningfulness whereas words, even in their finest use, if pressed too far will no longer yield meaningful distinctions and will often leave us in the bogs of equivocation, ambiguity, and confusion, in which the great proportion of even honest and able philosophers have foundered. In fact it is safe to say that without the deployment of syntactical number-language on its highest level—that of the deepening of meaning—none of the abiding philosophical questions can be satisfactorily answered.

That highest level is the third-stage rocket, the very core of number language. We are now liberated from bondage to the

naive notion that number is merely magnitude or measure or counting from a base point or base line. The moment we ask ourselves, Are there any other *kinds* of number but the ordinary ones? we open the door to an immense journey and the means of traveling it. Numbers are then seen to be powers of transformation, of which change of magnitude is merely the most elementary one. The essence of number is *qualitative,* not quantitative. Higher kinds of number are distinguished from each other by their *nature,* their unique properties, and not by magnitude.

Just as the deepest meaning of number is qualitative, so the deepest mathematics is also qualitative, as topologists were among the first to suspect. However, going beyond topology, the deepest mathematics does not deny or relinquish size and ratio, but subordinates them to the much more significant and compelling issues of the differences in nature between the elements of the fundamental alphabet of mathematics: the alphabet of hypernumber types, of which topology uses only three.* Now we turn to what is ineffable and what is not.

Bliss With Communicability

We will explore this basic question of utterability further later on. But before we continue it would be well to dispose of the misconception that the highest levels of comprehension are "incommunicable" or "ineffable", and hence beyond the power of any use of symbols to convey.

Often linked with the belief that the highest levels of comprehension are incommunicable is the kindred one that states of bliss are "higher" and more worthwhile than any meaning, as if bliss to be worthy of the name had to be meaningless. Let us deal with this proposition first.

The state of bliss without any symbolic insight being present is a necessary part of maintaining mental health, is very extensively distributed in living creatures, and is not distinctive

*Namely 0, 1 and σ, or u_0, u_1 and u_9 in our notations; that is, characterizing unconnectedness, connectedness and motion. See Chapter 26 and its appendix.

of human beings alone. We have seen pet cats go into definite and extended trances of complete bliss after being caressed by their master. We have seen this in dogs though not as frequently. Now, if long and intricate practices are to lead only to this, the cat can often as not do as well as the yogi or mystic. Indeed the writings of most mystics suggest the unconsciousness of suckling babes held in a mother's arms—and not even that of children gods.

There are rare and notable exceptions such as Jacob Boehme, whose states of bliss were accompanied by insightful illuminations of great penetration, clarity and perspicuity, which he was able to remember after the trance-like state and to record, sometimes even recording his insights at the same time as he experienced them, his pen moving as rapidly as his hand could make it. Anyone who develops to this stage will have the same experience, for the nature of reality is not exclusive, and we all are due to go beyond the suckling stage (having first to experience it however).

It is clear that the baby type of mysticism will have to give way to a more mature stage of the higher development of human consciousness, in which the role of the learner is beyond that of a baby or a pet. The religious preachers who inculcate remaining at these first stages of spiritual infantilism are no longer in step with the needs of human evolution. Men now need to know the rest of the path to their nascent godhood and how to follow it. As everyone who has been in the jungle knows, to be able to walk is not enough to be able to follow a trail. Higher development is following the trail.

It is true that initial psychological purgations of previously gathered and now useless or hindering habits of feeling, thought, and action are often needed, to such an extent that, as we are going through them, it seems as though we have been reduced to nothing. But this "nothing" is a positive thing, for we have passed from our negative condition to the threshold of positive or joyful and serene living. That threshold, lying between negation and affirmation, may indeed be called zero. It is also the gateway to an abiding happiness, raising the threshold

of our being to a place where cycles of mood and vicissitude can no longer subtract it into the region of melancholy or irritation.

To follow this trail is not only to retain but to develop the ability to communicate ideas, concepts and skills far beyond those we were able previously to express even to ourselves, much less convey to others. The ability to generate and communicate insight by the use of symbols (whether words, numbers, pictures, models or any combination of them) does not decrease, but on the contrary increases as a human being evolves to higher and higher levels of understanding of himself and the world. We are saying nothing less than that there is no absolute ineffability, and hence no absolute inexplicability. There can be utterance and explanation that are not circumscribed, and which therefore can communicate to someone else the otherwise ineffable. This we call genius and holiness.

To be speechless and mindless may be the beginning of true insight, but is by no means the end; and if persisted in as the be-all and end-all of the development of man, it will result merely in a cessation of inner growth and the inevitable development of an inverse and destructive arrogance that strives to hinder all others from ever passing the infantile stages. In this form the teaching of mindlessness and ineffability as ends in themselves becomes actually destructive of progress. It is well, therefore, to have disposed of these two related misconceptions at the beginning. The highest serenity is not "mindless" but is rather the essence of all wisdom. We turn now to an historically famous aspect of the question.

Can the Deepest Truths Be Told?

Plato and Zen thought not, but really gave no proof save their own inability. Rather, all human knowledge has progressed towards the *ability* to say what before could not be said. Experience makes this process possible, and the potentialities of man render absolute denials relative.

How could a man unlearned in electronics explain how a radio or television set operated? Moreover, the explanations would have to rest on *experiences* with the behavior of electrons and electromagnetic waves, without which the words used in the explanation would mean little or nothing to one not possessing that experimental knowledge.

Thus any asserted "proof" of ineffability must needs be very fragile for it may be overthrown by the least evolution in insight. Rather, it is much more demonstrable and safe to say that no *absolute,* but only relative, ineffability exists—relative to the experience and education of the one for whom something is as yet ineffable. If anything is clear enough to the expressor it may be expressed; but, since all the references of words are finally based on experience, such expressions may be understood only through maps or analogies by those not yet similarly experienced. Such a person who still refuses the benefit of such explanation becomes like a congenitally blind man faced with understanding the experience of redness.*

The latest apostle of a cult of ineffability is Marshall McLuhan who, ironically enough, built up his entire career by the deft use of the printed word which he so successfully affects to despise. Verbal language—oral or written—is the greatest gift any creature has thus far attained to during the long saga of evolution on this planet. Let no man scorn that gift, for to do so is to scorn his very humanity. Written language evolved out of the symbolic use of pictures. Like oral language, it follows the line-like nature of time itself, which is its wave-guide. Without written language, its most sophisticated form, mathematics, would be impossible. Moreover, words are always needed at the beginning, in order to explain the meaning of the symbols which then can enable thought to rocket-flight in its own space.

As for Plato, those who read his Seventh Letter (of his preserved correspondence) to mean that he taught a doctrine of absolute incommunicability or ineffability of the highest truths,

*Hypernumbers go beyond present experience, however, and *can* express presently transcendental or unattainable experiences—in terms of the universal symbolism of the nature of number and the operations of which number is capable.

in the sense that language finally could not state the highest truths—have not read to the end of the sentence they quote. Let us read the passage in its entirety.

> The truths of philosophy cannot be expressed in words as other subjects can, but after personal assistance in these studies from a guide, after living for some time with that guide, suddenly a flash of understanding, as it were, is kindled by a spark that leaps across, and once it has come into being within the soul it proceeds to nourish itself.

Plotinus furnishes a useful commentary:

> Therefore Plato said it could neither be spoken nor written. But we speak and write to direct people to it and to awaken them from arguments to the vision, as if pointing out a road to someone who wishes to behold something. The instruction covers the road and the procedure, but the vision is the work of the one who has wished to see.*

An unknown Hellenistic Egyptian sage went even deeper into the question:

> There are glories too exalted for descriptions engendered by thought and even for the intuition sparked by symbols, unless one finds a master who is a kinsman of the deathless race beyond our sphere. From such a one can be learned something of the Spaces and Realms whence he came . . . and the root of all things . . . . Nikotheos is one of these and has revealed One who is otherwise the Unperceivable, . . . he who is called the Dark Ray for it is only the excess of his light that makes him dark to us.**

It is clear that Plato taught only relative and not absolute ineffability, stating that a book was not enough and that actual living and conversing from day to day with an enlightened man is necessary to learn the highest truths. This was simply the

**Enneads*, VI, book 9, sec. 4. G. H. Clark's literal translation.

****From the unknown Gnostic Apocalypse of the Coptic Codex Brucianus, Folios 104 *verso*-106 *recto* Bodleian Library, Oxford.**

guru-chela doctrine of India, and indeed of all the ancient religions—the master-apprentice system of any skilled profession and in no way expressed a defeatist view toward language as a means of communication. On the contrary, Plato taught that only by means of language could the ground be sufficiently prepared so that the spark of experiential understanding may leap from the one who already knows to the one who hitherto did not.

Communication is of course no substitute for experiential knowledge, and never was meant to be; but it is the essential means of preparing, focussing or initiating a learner or neophyte into becoming prepared to generate that experiential, first-hand knowledge within himself.

There were many who did not read the Seventh Letter more than superficially, and who concluded with equal superficiality that truth in general was incommunicable, with a correspondingly defeatist view toward language. This conclusion was never that of the best and most knowledgeable minds, those possessing *gnosis* or first-hand knowing. Indeed the superficial view that communication fails at the most critical point devaluates the entire human contribution made to conscious evolution, which contribution is par excellence that of language and symbolic communication. Thus both history and enlightenment support the conclusion that all asserted ineffability is only relative to the limitation of the percipient's attainments and skill, and that there is no absolute ineffability.

Lao-tse was hinting at the same view point when he wrote the *Tao Teh Ching* in order to communicate an insight into something he said in the book was incommunicado by words: "The Tao that can be named is not the eternal Tao", meaning that the name or word as read and heard is not the same as the living meaning of it experienced. Lao-tse, however, expressed himself somewhat more ambiguously than Plato and is more open to the criticism of having taught a defeatist doctrine of communication and hence performed a cynical act, since he was using words to do so. The intent of Lao-tse, however, as the history of Taoist masters and disciples proves, was the same as that of Plato. The Zen approach also belongs to the same

category, though its more modern practitioners tended to become rather superficial and authoritarian, losing sight of the original broad and kind viewpoint and consciousness of Hui-neng, the Sixth Patriarch of Zen Buddhism and also a follower of Lao-tse.

Later Zen Buddhism which, through Chinese Ch'an stems directly from Taoism overlaid with a thin Buddhist veneer, mostly incompletely or not at all understood Lao-tse. Bodhidharma, the founder of Ch'an and Zen, was himself a Hindu Buddhist follower of Lao-tse, as his frequent citations prove.

Lao-tse's position was not that truth was incommunicable, or that words were completely useless (otherwise he would never have written his book), but rather that unless words are supplemented essentially by communication through the transconscious mind, no true understanding or enlightenment will develop, nor will the highest truths be understood. His later Ch'an and Zen followers in intellectualistic arrogance often derided words and language completely, revealing their self-contradiction in their voluminous writings and incessant speaking about what Zen "really means."

Lao-tse specifically mentions a Tao that can be named which is efficacious in nature as well as one that cannot be named and which is even more efficacious, but which also can be understood by use of unconscious and transconscious processes of the mind, which are independent of the ordinary discursive use of words.

Plato's Seventh Letter, as we have seen, comes to the same conclusion. The flash of illumination that carries the highest explanation does not belong to the conscious verbal apparatus of the mind. All discoverers concur. Proclus (412-485 A.D.), whose valuable works lie mostly untranslated, understood this point, writing in the course of Chapter 29, Book II of his *Platonic Theology*:

> Only the uniting with a higher consciousness bestows the successful completion of processes of the spirit that go beyond reasoning, and the accompanying power of symbols which are verbally inexpressible. Such higher processes are not worked by discursive thought and we cannot bring them into activity by mere intellectual

> processes. The divine characters or symbols [which could be mandalas or yantras, pictures, models, symbols, or numbers] do much more in this regard, in that we are not then (consciously) thinking. Such means unite our normal consciousness with one more divine; for the hidden divine powers on which such symbols draw recognize therein their own representations (without the necessity that we do so by any conscious thought or effort).

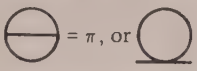
Thus in Lao-tse and Plato, the entire point was that ineffability due to the limitations of words was not an absolute basis, but could be transcended by non-conscious powers and processes of mind. Since Schopenhauer, Freud and Jung we have all become aware of the ubiquity and power of the unconscious mind, and the endless prolixity of the paradox-worshipers with the self-contradictory scorning of words becomes the inconsequential thing it is. Paradoxes are merely a reflection of human ignorance. To worship them and, worse, to use them to stop others from understanding, is even a less defensible ignorance.

In Lao-tse "unnamable" reads in Chinese "un-tao-able," that is, unable to be reached by any method, road or definition, i.e. not able to be defined, or limited by any finite sequence (= road or *tao*) of symbols. To the ancient China of Lao-tse's inspiration, *tao* as a verb (as in the second use of the character in the first sentence of the *Tao Te Ching*) meant "to define by following a sequence, path or road of meaningful symbols." Thus the *tao* that can be named means the meaning that can be explicitly and wholly given in a finite sequence of symbols. The eternal Tao, on the contrary, is not so definable, but requires an infinite or unending sequence, and hence its meaning can never be contained, and its potential meaning is infinitely greater than any amount of its expressible meaning in any finite sequence of symbols however extended.

Related to the ancient Chinese etymology pertaining to ineffability is the 26th oracle of Zoroaster (in the order of the earliest recension) which reads:

> Know that what is apprehended by the Higher Self cannot be grasped by the discursive mind.

The oracle refers to the conscious mind finding higher awareness inexpressible in its terms. But since we are also our transconscious or ultraconscious selves, *we can* understand what cannot be discursively expressed, just as the number π can never be completely expressed by any finite, explicit series of numbers, but can be shown symbolically as the ratio of the length of a whole circumference to that of its diameter:



which was the ancient Egyptian hieroglyph for eternity.

The twenty-sixth oracle of Zoroaster calls attention to the inadequacy of reasoning according to reductive premises, or reasoning insufficiently or incorrectly from sufficient premises. This statement, although it first appears in hellenized Magian doctrine, undoubtedly records a far older oral teaching. Quite aside from its history, the passage importantly clarifies the meaning of ineffability, reinforcing the conclusion that it is relative and not absolute. Depending upon the degree to which a man has developed higher, more inclusive faculties of perception, which in turn lead to more powerful means of expression, what was previously "ineffable" is so no longer. In much the same manner, what is inexpressible or ineffable for, say, a dog is perfectly expressible and utterable by a man.

It is appropriate to note that such higher faculties might arise temporarily, either spontaneously or as the result of conscious practices akin to classical Hindu yoga, only to subside again, much as a singer cannot indefinitely sustain a high note. The essence of such practices was that they should be noetic in effect, that is, should alter the state of normal consciousness. Thus the Byzantine scholar Georgios Gemistheos Plethon, who persuaded Cosmo di Medici to start the Italian Renaissance, in his rendition of the first oracle of Zoroaster (Johannes Opsopeus' edition, *Oracula Magica Zoroastris,* Paris, 1607) remarks that through such consciousness-altering ("magical") words and practices a man can raise himself to his presently lost and formerly higher state, in which the use of such faculties was a normal event.

In chapter twenty-nine of his second book on Plato's theology, the great hellenistic scholar-mystic, Proclus, throws additional light on the matter. He concludes in this chapter that the successful outcome of all practices going beyond ordinary reason and stemming from the powers of finitely inexpressible symbols depends upon a unification of the human operator with a higher level of consciousness that appears god-like to ordinary consciousness. Proclus termed such a unification "theurgic," or "possessed of divine energy." In such processes, Proclus goes on to say, the outcome is not brought about through our limited thought or reasoning. Rather such divine symbols which focus in themselves so many powerful meanings (hence they are *syn-thēmata*) will be able, far better than any conscious thought of ours, to effect a theurgic unification, because the hidden divine powers on which such symbols draw resonate and are attracted to their appropriate symbolic depictions.

We have thus attained one further step in the description of the actual process of transforming ineffability on a lower level into understanding and utterability on a higher level of awareness.

In any case, it is now quite clear that the simplistic, black-and-white treatment of ineffability in many writers on Taoism, Zen, and on Platonism is quite inadequate and misconceived. There is no absolute ineffability in time. For time is growth, and growth is the ever-unfolding of the once unutterable into luminous expressibility. As we become able to express more more clearly, we literally become more *affable* in the sight of others, and thus the superceding of our incommunicability possesses a fundamental social dimension—another telling argument against the superficial cults of ineffability, which inevitably lapse into obscurantism, or smug arrogance, and sometimes the outright charlatanism of the emperor's new clothes, where the pretense of great secrets or great learning is masked by an insistence upon its incommunicability or the use of a deliberately obscurantist jargon, which when analyzed proves to be either trivial or what common sense had long known.

The mark of a real and deep insight is its ability to make other men clearly aware of that insight, and not to hide it from them by erecting artificial difficulties or assertions of some impassible gulf of ineffability. In this sense much of the twentieth century writing of Zen, particularly in the West, amounts to another round of the emperor's new clothes, especially in view of the fact that Zen zealots are either ignorant of or most anxious to hide the fact that Zen or Ch'an is practically an outright rewriting of Taoism with a thin and relatively inconsequential Buddhist overlay.

Ineffable also meant "unsayable," "unpronounceable" as in *orgion arrhēton,* the ineffable invocation to Bacchus, a technical term of the Mysteries that Greece admitted had come from both Egyptian and Hindu sources. We find mention of Bacchus victoriously mounted on an Indian elephant and conquering India (symbol of the Aryan conquest and its religion of Agni-Bacchus, the latter having also the epithets of Fire-Born and Egg-Born as did Brahmā-Agni). We similarly find images in Egypt of Horus-Bacchus victoriously mounted on an African elephant whose trunk holds the disc of immortal light and life.

Agni-Mitra ruled all plants and "plant" in Greek is *agnos.* The growing leaves of the plant and the curling wool of the lamb (cf. Lat. *agnus* and the Golden Fleece) were representations of the divine life-fire. The Christian Agnus Dei is thus also Deus Agni. The religion of the eternal life-fire, the immortalizing power, was *the* original religion of mankind, and *individual* immortality and the rescue or resurrection from, or regeneration of the mortal body was a prime tenet, leading to the attainment of godhood.

The *orgion arrhēton* did not mean that the invocation could not be put into words, but rather that the words were in a special language not understandable to the uninitiated, and hence not repeatable, just as the ordinary hearer of a Roman-Catholic Latin Mass is emotionally affected but cannot repeat the priest's invocations. For him the Mass is an ineffable outpouring of divine energy, an *orgion arrhēton* or *orgium ineffabile.* Note that the original root *urg* meaning "energy" (cf. *erg*) denoted anciently the noetic or consciousness energy of sacred utterance which effected changes in consciousness, i.e.

had noetic power. The ancient Egyptians called such words *hekau*, which lead to the Greek divine name *Hekate*, mistress of magic spells, which were originally chanted or sung as the words "en*chant*ment" and "in*cant*ation" still show. Such words were not repeatable by uninitiated hearers, and hence their content or meaning was called "ineffable."

With regard to Lao-tse, people who asserted that his Taoism taught absolute incommunicability were making the same mistake as those who said Plato did: stopping one sentence too soon in quoting him. In the second line of the first Chinese section of the *Tao Teh Ching* he clearly distinguishes between Tao as the nameless (because ever-receding) non-spatiotemporal *origin* of heaven and earth, and the nameable Tao as the first spatiotemporal appearance of the cosmos, from which all its differentia develop as the specialized organs do from a primordial undifferentiated zygote or embryonic cell. Since the mother of a child is always more obviously able to be related and connected physically and biologically to the child than the father, Lao-tse calls the nameable aspect of Tao the cosmic Mother. This distinction corresponds to the one we have just demonstrated in the discussion, namely the distinction between the incommunicability about what is not yet manifest to awareness, contrasted with the necessarily ever-increasing communicability characteristic of an awareness constantly growing through experience. In terms of the concise symbology of number, the "mother" is zero, and the origin, infinity.*

*Both Lao-tse and Plato, however, as well as the later Zen advocates of ineffability, all lacked sufficiently precise methods, limited by their confining themselves only to word symbols rather than number symbols as well. If their methodology had not been thus limited, they would have been able to distinguish between constructability and naming or conceiving. This the number π can be accurately named or defined by the law of the inifinte series given as

$$\pi = 4(1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}-+\ldots),$$

but no extension of terms or decimals will enable the number π to be completely constructed arithmetically, or even algebraically by means of some equation of specified degree. Infinity again enters the picture and we find that only an equation of infinite degree can express the number π, to wit,

$$x-\frac{x^3}{3!}+\frac{x^5}{5!}-\frac{x^7}{7!}+-\ldots=1$$

which yields $x = \pi n/2$ where n is any positive odd integer of the form $4k + 1$, and $7!$, for example, means the product $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7$.

The Communicable and the Infinite

The question of communicability is always contingent upon an appreciation of the necessary incommunicability of the as yet not perceived, as in the unexpressed portion of the infinite series for π, just given. Since the nature of the cosmos recedes into infinite orders of infinitesimals or infinites on all sides, there is an ever-present component of ineffability which denotes the unconstructability of the infinite. This ineffability is a hallmark of life itself, with its characteristic ever-newness. But this necessary ineffability of livingness must by no means be confused with any general or absolute limit upon communicability. For the other side of the coin of life reads that as long as man continues to experience he will be able to learn how to communicate that which previously was impossible for him to conceptualize or articulate.

We are thus assured of two things: the impossibility of communicating all that reality contains at any given moment, but the possibility of communicating this at some future moment, by which time reality would again have outstripped ability to communicate. This the goal of a *completely* explicit science is fatuous because it simply misses the point of the cosmos. The goal of science should be to understand the basic principles of how our presently perceived cosmos came into being, how it is being maintained, how it may be transformed, and how we may transform ourselves out of it—and what the world would then be like. In other words our cosmology and science, like our understanding of communicability, must be flexible and alive. There is no absolute ineffability, and there is likewise no absolute communicability at any given moment.

Indeed there are very few universally applicable, absolutely true statements that can be made. They may be reduced to three, together with all their implications or corollaries:

1. It is impossible to make any absolute break in the unity or substantial and functional interdependence of all things.
2. It is impossible in general to predict exactly or predetermine what any living thing will choose from even a finite set of choices, except that all acts are subject to (1).

3. There is an endless potential of newness, and this is the last absolute statement.

Non-technically and positively put, these three statements mean that love (the basis of the unity) and freedom (of choice and of possibility) are the only absolutes in all of reality and that even freedom is less comprehensive than love, for the nature of genuine lovingness always includes and grants freedom necessarily but to experience freedom by no means guarantees lovingness. As we all know, freedom may be abused by ruthlessness or lack of control.

Untenably trying to add to the minimal set of absolutes, the lesser followers of Plato and other exponents of philosophical and religious initiation, as well as Lao-tse and Zen, have all tended into the easy superficiality of asserting absolute ineffability and anticommunicationism—overlooking the originally much more profound teaching of their own sources. It was and is, however, much easier to say that there is no way to express something than to find a way to communicate such meanings to those who are not yet aware of them.

Thus the fallacy of absolute ineffability has always been a refuge for the superficial and incompetent to continue to remain in control of a movement. It also has been a self-defeating viewpoint, both for its followers and for itself, bringing whatever doctrines it taught into disrepute among those more intellectually honest, whose common sense told them that one of man's greatest glories lay in his ability to communicate and teach.

It is quite true that certain understandings may not be gained without the use of more compressed types of meaning than is usually found in words outside of poetry and oracles: the concentrated meanings made negotiable by means of symbolic systems involving relational patterns and the use of the number concept. But those who are unwilling to make the attempt to use, let along master these nonverbal languages, cannot then say that communication fails simply because the ineffability they experience is the obstruction precipitated by their own lack of preparation. Such relative ineffability was always a part of human life and growth; but it is an inadequacy and not an unalterable fact of nature.

The conclusion is clear: any teaching of "absolute ineffability" is not in accord with either experience, validity, or the nature of things. There will always be relative ineffability, for there always will be growth. But on the other hand there also always will be the guarantee of becoming able to give utterance to the previously unutterable. If this state of affairs is miscalled "ultimate unutterability," that is simply a superficial word-play denoting nothing more negative than that man can always grow in understanding. The situation could just as well be termed ultimate utterability, since one will always, in some finite time, be able to express and communicate what at some previous moment had been ineffable.

The point is and remains that the ineffability at any developmental stage will never remain so indefinitely. Thus ineffability is never final. Its disappearance at any stage, and its perennial re-appearance, are both due to growth itself.*

The Place of Number

How does number relate to all this? Number refers to distinguishability; and its operations, to the interaction properties of distinguishable things. Hence number can *code* mind and sensorily observed nature at the same time. Further, things not yet speakable in and of themselves may still be coded and the code discovered, used and discussed by those not yet aware of its experiential reference and meaning. (Thus whilst *both* effability and ineffability are relative, effability always increases.) Number can code all reality, whether experienced or not, in such nonarbitrary fashion as to reveal objective insights

*Psychology professor Charles T. Tart, in his unpublished paper, "On the Scientific Study of States of Consciousness"—received by us after this chapter had already been set in printed form—independently confirms our conclusions. Tart points out that many phenomena now considered "ineffable" may not be so, and that no phenomenon should be considered ineffable in principle. He recognizes also that in non-ordinary states of consciousness, ineffability or inexpressibility may be "a major problem" for communication of results, but he goes on to conclude, agreeing with us in the light of his own psychological observations, that such problems need never be insurmountable. See also Chapter 6.

into the nature of that reality even before direct conscious experience with it.

We now have the answer to our question, Can the deepest truths be told? All that is experienced may finally be told, and others may also be told how to gain that experience. Moreover, the experienceable may be projected from nonarbitrary codes, and even before being directly experienced can begin to be understood. The master code among such codes is the nature of number.

Thus things we do not and even cannot yet know may still be *coded* by number. Knowing this, however, enables us to see the properties of number more consciously as a code of reality and hence decipher the nature of that reality, and arrive at an experience of it, much more quickly than without the aid of that unique code.

Nothing encodes itself. Only intelligence encodes or decodes.* Hence some intelligence has arranged the *predictive* agreement (between reality and the number code) we call science. The coding of as yet unexperienced reality in terms of experienced forms, of which numbers are the most refined, is never absent in reality. (If it were, the unity would be broken, the code could not apply, experience would become arbitrarily inconsistent and reality would self-destruct.) But knowing we have the code of something not yet known puts the unknown that much more within our grasp.

The codes that reality uses are nonarbitrary (the genetic code is a prime example). Every property of the codons or symbols reflects a property of the reality coded. Numbers are nonarbitrary codons of the highest quality. All the properties of the signatum are unambiguously mapped (coded) in properties of signum.

Number is thus the most powerful antidote to ineffability that man can use.

Let us now continue with the even more interesting project of exploring the more mature stages of the growth of man.

*A computer encodes or decodes only because it has been pre-programmed by intelligent beings to do so. Above, by "nothing" we mean "no form per se."

Insight as a Measure of Civilization

Nothing is called a science unless it has either laws or relations expressly stated in mathematical terms, or else precise knowledge of the shapes or configurations involved in the observed data; for example, the knowledge of the shapes and orientations of molecules, ions, atoms and nuclear particles in molecular biology, chemistry and physics. That is to say, a science must have either an algebra or a geometry or both. Otherwise we have simply lists, descriptions and guesses but not fundamental knowledge of the basic structures and processes involved in the observed data. Thus a natural *science* must always connect algebraic or geometrical knowledge with observed data, and usually develops from such data by way of a chain of inferences to the geometry (including topology) or algebra governing the situations, events, or objects recorded and described by the data.

Hence the insight of any civilization into the nature of the world in which it exists is measured first by the degree to which the number concept was developed by that civilization, and second, by the extent to which its mathematical development was explicitly applied to deciphering the meaning of the observations and data that civilization collected.

It is doubtful whether these two criteria have ever been historically separated, since the sophistication and greater precision of a civilization's observing techniques have always gone hand in hand with the development of new mathematics.

The proviso must be added, however, that mathematical knowledge of a civilization has always been well in advance of the known applications of that knowledge. On the other hand, new observed phenomena that are sufficiently fundamental in nature always have led to new levels of the number concept and its manipulation. Even the attempts to attain physical solutions to previously unnoticed but suddenly demanding problems have consistently led to new mathematics as well.

Alternative Route to Insight and Discovery

There is an alternative route to discovery, however, in that we may make use of the portentous fact that *mathematical knowledge of an advanced nature is more readily attainable than advanced knowledge of the nature of the world.* We may therefore to great advantage learn how to map such advanced knowledge of the nature of number *back* upon the world, so leading to new and verifiable predictions. This alternative has rarely been pursued, however, the prediction of the identity of light and electromagnetic waves made by James Clerk Maxwell on the basis of his new mathematics being a case in point, though even here the method we speak of was only half used since Maxwell's mathematics was a translation of Michael Faraday's new observations. William Rowan Hamilton's discovery by pure mathematics of the conical rotation of light is another case in point.

It is clear that the power of this alternative method of discovery we have defined is based upon the really astounding fact that mathematics, which is actually a mapping of the mind's possibilities of conception and relationship, should map also, and most exactly, the nature of the sensorily observed world. This fact is remarkable enough for one of the leading and most penetrating modern physicists, Eugene P. Wigner, to have written an entire article on what he aptly termed "the unreasonable effectiveness of mathematics" in mapping nature.

Such an effectiveness becomes reasonable, however, when it is realized that it implies that the nature of mind or consciousness is reflected in the nature of the cosmos. The ancients, even with much fewer data available to them, phrased this effectiveness in the maxim, "As above, so below; as within, so without". This summary was supposed to have been inscribed by Thoth,* the Egyptian divinity presiding over wisdom, on a tablet of emerald,

*The Egyptian form of Thoth's name is *Tehuti* (from *tekh*, weight), the Weigher of all Questions. His consort was *Maat*, She Who Measures All Things. She measures all that has extension, as *Tehuti* reckons all nonextended things, like force, weight or awareness. *Maat* is the measurer of deeds and *Tehuti* of intentions, reflecting his judgment in adjusting the balance scale in which the consciousness (heart) of every soul was weighed after passing out of the physical body.

the legend of which was common knowledge in the high days of the great library of Alexandria, and which was transmitted to Europe during the early Renaissance, though it had been well known in Islamic civilization long before, having been handed on with the heritage that passed from Egypt through Greece and then Rome.

Thus Wigner has perceptively restated an old truth which has all the more been reconfirmed by the tremendous scope and penetration of twentieth century physics and mathematics.

The Heart of Clear Understanding

We have explained the basis of a new method of discovery. It is equally clear that its power can be increased even more, the more deeply we venture into the governing core of mathematical knowledge. The ruling concept in mathematics is that of the nature of Number.

Even in projective geometry, where metric number or distance is no longer explicitly used, we still must use *angular* extent and ratios. In topology, where even angles no longer matter, and we only have connectedness or unconnectedness, there is still number. Not only must the connections be enumerated and classified by number (for example, the number called the *genus* of a surface), but also unconnectedness or lack of relationship is like 0 and connectedness or unification like 1, the two digits of the binary number system used, for instance, in modern computers.

By combinations of 0's and 1's we can write any number in this system—called "binary" or "of base 2"—our ordinary numbers being written in the base 10 and possessing 10 digits. We cannot go below the base 2 and still have distinction. Topologically put, if we try to eliminate the possibility of connectedness, then unconnectedness can no longer be defined, for it implies that possibility within its own definition, the nature of choice being dual.

Thus *distinguishability*, a prime characteristic of mind, is intimately connected with the nature of number, since numbers

both clarify and codify or encode distinctions. Their ability to do so is unlimited. They also essentially and uniquely *unite* conceptions, discovering identifications as well as distinctions.*

Hypernumbers as Transforming Powers and Operators

For long centuries men had believed there was only one kind of number: that which distinguishes sizes or magnitudes, whether of collections, lengths, or angles (orientations) as on a clock dial (or compass). Though it had been encountered in medieval India and Renaissance Europe, $\sqrt{-1}$ (a hypernumber) was not realized to be a perfectly existent and useful alternative kind of number until the seventeenth and eighteenth centuries. In the nineteenth century a whole vast extension of the theory of functions or number relationships was made possible through $\sqrt{-1}$ and is called the theory of functions of a complex variable. Without it all electromagnetic wave theory and quantum theory could not be written.

Thus the comparatively simple expedient of one new *kind* of number more than doubled the entire mathematical power of all the previous centuries, and became intimately related to the new physical discoveries in electronics, atomic theory and twentieth century chemistry. It can only be imagined what the adjunction of further new kinds of number will achieve, for the kinds of number comprise the core of mathematics itself, creating whole new algebras and function spaces.

Hypernumbers and Hypermind

The question now is, How many kinds of number are there? It is clear that each new kind of number will multiply all algebraic, geometric and topological knowledge, providing new realms for

*The other prime characteristic of mind is unifiability. Comprehension or understanding employs both characteristics; and the highest or deepest understanding attains an insight which does justice to both infinite variety and infinite unitedness. The unity that makes that unitedness possible is one of spirit and consciousness rather than of form—one of Love.

new types of connectivity and functions, pointing the way to thereby related, even though still undiscovered natural phenomena. Our investigations have shown that there are seven kinds of number beyond $\sqrt{-1}$, all possessing unique and powerful properties. We call them ϵ, p, Ω, m, w, v and σ, or respectively, u_3, u_4, u_5, u_6, u_7, u_8, and u_9.*

But those findings, important as they are, are subsidiary to the conscious grasp of the *method* that we are here describing; namely, the reversion or back-mapping of these hypernumber findings upon the nature of both the observed world and the observer.

By this method, one cannot hesitate to conclude, great advances into the nature of consciousness itself and its relations to matter and energy are possible, since in the noetic domain (*cf.* Teilhard de Chardin's "noösphere")** the hypernumbers can uniquely lead the way to new and soundly based experimental paths and experiential realities. Without the guidance and use of the nature of number as a master map and method, such realities would have lain hidden and unsuspected in the profound obscurity of man's unconscious mind, and in a side of nature he did not see.

The contemplation and use of hypernumber forms and properties* will prove and already has proved by both self-experience and teaching to be a most efficacious and irreplaceable method of evolving into conscious access the powers and capabilities of our superconscious selves. And that way man's future lies.

*Again see Chapter 26 and its appendix. The number of kinds of hypernumbers is finite. That this should be so is most easily seen by considering the fact that the number of rules governing the arithmetic of ordinary numbers is finite, and that the arithmetics of the hypernumbers successively abrogate the rules of the arithmetic of ordinary numbers. Indeed, the hypernumbers are distinguished from each other by their different abrogations of the rules of the arithmetic of ordinary numbers. Since the number of those rules is finite, the number of distinct kinds of hypernumbers must also be finite. This fact in turn defines the limits of mathematics itself.

**Teilhard, however, failed to see individuality as the evolutionary glory it is, and lumped all men together in a kind of giant amoebid he called "Man."

The Place of Consciousness in Modern Physics

9

Eugene P. Wigner

The author (Ph.D.) is a Nobel prize winner and one of the leading physicists of our times. The Wigner expansion in quantum perturbation theory was a fundamental contribution, as was Dr. Wigner's work in the relation of group theory to quantum physics. In this connection his studies in fundamental symmetries in nature bring the pioneering work of Herman Weyl to new frontiers. This chapter, compiled from his papers, collects in one place his important thinking on consciousness.

> Modern physics is now in the process of attenuating [in favor of the observer] the separation which it itself once made between object and observer . . . in this effort it teaches us very important things.—Charles de Montet, M.D. *L'Evolution vers l'Essentiel,* Lausanne, Switzerland, 1950.

Until not many years ago, the "existence" of a mind or soul would have been passionately denied by most physical scientists. The brilliant successes of mechanistic and, more generally, macroscopic physics and of chemistry overshadowed the obvious fact that thoughts, desires, and emotions are not made of matter, and it was nearly universally accepted among physical scientists that there is nothing besides matter. The epitome of this belief was the conviction that, if we knew the positions and velocities of all atoms at one instant of time, we could compute the fate of the universe for all future [time]. Even today, there are adherents to this view though fewer

among the physicists than—ironically enough—among biochemists . . . .

It is, at first, also surprising that biologists are more prone to succumb to the error of disregarding the obvious than are physicists. The explanation for this may be [that] . . .as a result of the less advanced stage of their discipline, they are so concerned with establishing *some* regularities in their own field that the temptation is great to turn their minds away from the more difficult and profound problems which need, for their solution, techniques not yet available. Yet, it is not difficult to provoke an admission of the reality of the "I" from even a convinced materialist if he is willing to answer a few questions, [e.g.] "If all that exists are some complicated chemical processes in your brain, why do you *care* what those processes are?" . . .

There are several reasons for the return, on the part of most physical scientists, to the spirit of Descartes's *"Cogito ergo sum,"* which recognizes the thought, that is, the mind, as primary. First, the brilliant successes of mechanics not only faded into the past; they were also recognized as partial successes, relating to a narrow range of phenomena, all in the macroscopic domain. When the province of physical theory was extended to encompass microscopic phenomena, through the creation of quantum mechanics, the concept of consciousness came to the fore again: it was not possible to formulate the laws of quantum mechanics in a fully consistent way without reference to the consciousness. All that quantum mechanics purports to provide are probability connections between subsequent impressions (also called "apperceptions") of the consciousness, and even though the dividing line between the observer, whose consciousness is being affected, and the observed physical object can be shifted towards the one or the other to a considerable degree, it cannot be eliminated.* It may

*J. von Neumann, *Mathematische Grundlagen der Quantenmechanik* (Berlin: Julius Springer, 1932), Chapter VI; English translation (Princeton, N.J.: Princeton University Press, 1955). Also F. London and E. Bauer, *La Théorie de l'observation en mécanique quantique* (Paris: Hermann and Co., 1939). The last authors observe (page 41), "Remarquons le rôle essential que joue la conscience de l'observateur . . . ." ("Let us note the essential role that the consciousness of the observer plays . . . .")

be premature to believe that the present philosophy of quantum mechanics will remain a permanent feature of future physical theories; it will remain remarkable, in whatever way our future concepts may develop, that the very study of the external world led to the conclusion that the content of the consciousness is an ultimate reality . . . .

The property of observations to increase our ability for foreseeing the future follows from the fact that all knowledge of wave functions [the basic tool of quantum physics] is based, in the last analysis, on the "impressions" we receive. In fact, the wave function is only a suitable language for describing the body of knowledge—gained by observations—which is relevant for predicting the future behavior of the system. For this reason, the interactions which may create one or another sensation in us are also called observations, or measurements. One realizes that *all* the information which the laws of physics provide consists of probability connections between subsequent impressions that a system makes on one if one interacts with it repeatedly, i.e., if one makes repeated measurements on it . . . .

The important point is that the impression which one gains at an interaction may, and in general does, modify the probabilities with which one gains the various possible impressions at later interactions. In other words, the impression which one gains at an interaction, called also *the result of an observation*, modifies the wave function [that is, the wave forms describing the fluctuating probability of its being observed] of the system. The modified wave function is, furthermore, in general unpredictable before the impression gained at the interaction has entered our consciousness: it is the entering of an impression into our consciousness which alters the wave function because it modifies our appraisal of the probabilities for different impressions which we expect to receive in the future. It is at this point that the consciousness enters the theory unavoidably and unalterably. If one speaks in terms of the wave function, its changes are coupled with the entering of impressions into our consciousness.* If one formulates the laws of quantum me-

*And the consequent expectations (i.e. of future impressions) that they generate in interaction with consciousness. *Eds.*

chanics in terms of probabilities of impressions, these are *ipso facto* the primary concepts with which one deals . . . the quantum description of objects is influenced by impressions entering my consciousness . . . .

The fact that the first kind of reality [i.e. consciousness] is absolute* and . . . that we discuss the realities of the second kind [perceived objects] much more, may lead to the impression that the first kind of reality is something very simple. We all know that this is not the case. On the contrary, the content of the consciousness is something very complicated and it is my impression that not even the psychologists can give a truly adequate picture of it . . . . The nature of the first kind of reality is already quite complex and the inadequacy of our appreciation of its properties may be one of the most potent barriers against establishing the nature of universal realities at the present time.

[The author then explains in more technical language that the interaction between *two* (or more) conscious entities is not expressible in terms of present physical theory, however advanced; for the equations then attain a new depth of complexity not explainable on the basis of known concepts, i.e. they become in mathematical parlance "nonlinear", whereas our most advanced physical theories can assume only linear equations.]

It follows that the being with a consciousness must have a different role in quantum mechanics than the inanimate measuring device: the atom considered above. In particular, the quantum mechanical equations of motion cannot be linear [i.e. must be more complicated] . . . in fact they are grossly nonlinear if conscious beings enter the picture . . . .

[The only alternative, Dr. Wigner points out, is for each observer to deny meaning to the consciousness of all others, which, as he also points out, is "unnatural"—and, we may add, totally unwarranted in view of the valid pooling of results of different observers: something we do and rely on successfully every day.]

Measurement is not completed until its result enters our

*In that it is presupposed in any assertion about anything else. *Eds.*

consciousness [after going through some physical stages or instruments]. This last step occurs when a correlation is established between the state of the last measuring apparatus and something which directly affects our consciousness. This last step is, at the present state of our knowledge, shrouded in mystery and no explanation has been given for it so far in terms of quantum mechanics, or in terms of any other theory . . . . *

The second argument to support the existence of an influence of the consciousness on the physical world is based on the observation that we do not know of any phenomenon in which one subject is influenced by another without exerting an influence thereupon. This appears convincing to this writer. It is true that under the usual conditions of experimental physics or biology, the influence of any consciousness is certainly very small. "We do not need the assumption that there is such an effect." It is good to recall, however, that the same may be said of the relation of light to mechanical objects. Mechanical objects influence light—otherwise we could not see them—but experiments to demonstrate the effect of light on the motion of mechanical bodies are difficult. It is unlikely that the effect would have been detected had theoretical considerations not suggested its existence and its manifestation in the phenomenon of light pressure . . . .

Let us [now] specify the question which is outside the province of physics and chemistry but is an obviously meaningful (because operationally defined) question: Given the most complete description of my body (admitting that the concepts used in this description change as physics develops), what are my sensations? . . . This is clearly a valid and important question which refers to a concept—sensations—which does not exist in present-day physics or chemistry. Whether the question will eventually become a problem of physics or psychology, or

*It should be noted that some definite basis for such forthcoming explanation appears to lie in hypernumber theory, which, in terms of the two simplest hypernumbers, $\sqrt{-1}$ and $\sqrt{+1}$, has already proved indispensable to quantum theory. Wigner rightly wrote (p. 224 of his *Symmetries and Reflections*) that the "mathematician fully, almost ruthlessly, exploits the domain of permissible reasoning and skirts the impermissible." The nature of our mysterious cosmos demands nothing less. *C.M.*

another science, will depend on the development of these disciplines . . . . *

It will not be possible to use [the concept of universal reality] meaningfully without being able to give an account of the phenomena of the mind, which is much deeper than our present notions admit. This is a consequence of the fact that, clearly, from a non-personal point of view, other people's sensations are just as real as my own. In all our present scientific thinking, either sensations play no role at all—this is the extreme materialistic point of view which is clearly absurd *and,* as mentioned before, is also in conflict with the tenets of quantum mechanics—or my own sensations play an entirely different role from those of others. It follows that before we can usefully speak of universal reality, a much closer integration of our understanding of physical and mental phenomena will be necessary than we can even dream of at present. This writer sees no cogent reason to doubt the possibility of such an integration . . . .

What I am saying is that . . . from the point of view of quantum mechanics, the faculty [of self-awareness] is completely unexplained.

It may be useful to give the reason for the increased interest of the contemporary physicist in problems of epistemology and ontology. The reason is, in a nutshell, that physicists have found it impossible to give a satisfactory description of atomic phenomena without reference to the consciousness. This had little to do with the oft rehashed problem of wave and particle duality and refers, rather, to the process called the "reduction of the wave packet." This takes place whenever the result of an observation enters the consciousness of the observer—or, to be even more painfully precise, my own consciousness, since I am the only observer, all other people being only subjects of my observations. Alternatively; one could say that quantum mechanics provides only probability connections between the results of my observations as I perceive them. Whichever

*The Journal for the Study of Consciousness (vol. 1, no. 2; 1968 and in a note, p. 92, of vol. 2, no. 2; 1969) presented some of the theorems that begin to answer Professor Wigner's profound question. *Eds.*

formulation one adopts, the consciousness evidently plays an indispensable role.*

There is, apparently, a correlation between each consciousness and the physico-chemical structure of which it is a captive, which has no [known] analogue in the inanimate world. Evidently, there are enormous gradations between consciousnesses, depending on the elaborate or primitive nature of the structure on which they can lean: the sets of impressions which an ant or a microscopic animal or a plant receives surely show much less variety than the sets of impressions which man can receive. However, we can, at present, at best, guess at these impressions. Even our knowledge of the consciousness of other men is derived only through analogy and some innate knowledge . . .

It follows that there are only two avenues through which experimentation can proceed to obtain information about [the nature of mind]: observation of infants where we may be able to sense the progress of the awakening of consciousness, and by discovering phenomena . . . in which the consciousness modifies the usual laws of physics. The first type of observation is constantly carried out by millions of families, but perhaps with too little purposefulness. Only very crude observations of the second type have been undertaken in the past, and all these antedate modern experimental methods. So far as it is known, all of them have been unsuccessful. However, every phenomenon is unexpected and most unlikely until it has been discovered—and some of them remain unreasonable for a long time after they have been discovered . . . . It seems more likely . . . that living matter is actually influenced by what it clearly influences: consciousness. The description of this phenomenon clearly needs incorporation of concepts into our laws of nature which are foreign to the present laws of physics. Perhaps the relation of consciousness to matter is not too dissimilar to the relation of light to matter, as it was known in the last century: matter clearly influenced the motion of light but no phenomenon such as the Compton effect was known at

*The fact was pointed out with full clarity first by von Neumann. [See first footnote of this chapter.]

that time which would have shown that light can directly influence the motion of matter. Nevertheless, the "reality" of light was never doubted . . . .

Our penetration into new fields of knowledge will unquestionably give us new powers, powers which affect the mind more directly than the physical conditions which we now can alter. Poincaré and Hadamard have recognized that, unlike most thinking which goes on in the upper consciousness, the really relevant mathematical thinking is not done in words. In fact, it happens somewhere so deep in the subconscious that the thinker is usually not even aware of what is going on inside of him.

It is my opinion that the role of subconscious thinking is equally important in other sciences, that it is decisive even in the solution of apparently trivial technical details. An experimentalist friend once told me (this was some twenty years ago) that if he could not find the leak in his vacuum system he usually felt like going for a walk, and very often, when he returned from the walk, he knew exactly where the leak was.

There are two basic concepts in quantum mechanics: states and observables. The states are vectors in Hilbert space; the observables, self-adjoint operators on these vectors. The possible values of the operators—but we had better stop here lest we engage in a listing of the mathematical concepts developed in the theory of linear operators . . . .

The enormous usefulness of mathematics in the natural sciences is something bordering on the mysterious and there is no rational explanation for it . . . this uncanny usefulness of mathematical concepts. The principal emphasis [in mathematics] is on the invention of concepts.* Mathematics would soon be running out of interesting theorems if these had to be formulated in terms of the concepts which already appear in the axioms. Furthermore, whereas it is unquestionably true that the

*In cordial agreement with the author's brilliant insights, we would prefer "*discovery* of concepts" here. Techniques can be invented—but not the laws of thought, as partially reflected in concepts or axioms, any more than laws of physics. The nature of things, both within and without, is discovered, but not invented by man. That this is so is the chief and ultimate guarantee of the universality of any scientific law, whether that science or knowing be physical or psychological. *C.M.*

concepts of elementary mathematics and particularly elementary geometry were formulated to describe entities which are directly suggested by the actual world, the same does not seem to be true of the more advanced concepts, in particular, the concepts which play such an important role in physics.

The complex numbers provide a particularly striking example of the foregoing. Certainly, nothing in our experience suggests the introduction of these quantities . . . . Let us not forget that the Hilbert space of quantum mechanics is the complex Hilbert space [i.e. including $i \equiv \sqrt{-1}$], with a Hermitian scalar product. Surely to the unpreoccupied mind, complex numbers . . . cannot be suggested by physical observations. Furthermore, the use of complex numbers in this case is not a calculational trick of applied mathematics, but comes close to being a necessity in the formulation of the laws of quantum mechanics. Finally, it now begins to appear that not only complex numbers but analytic functions* are destined to play a decisive role in the formulation of quantum theory. I am referring to the rapidly developing theory of dispersion relations. It is difficult to avoid the impression that a miracle confronts us here [i.e. in the agreement between the properties of the hypernumber $\sqrt{-1}$ and those of the natural world].

A much more difficult and confusing situation [than modern physics presents] would arise if we could, some day, establish a theory of the phenomena of consciousness, or of biology, which would be as coherent and convincing as our present theories of the inanimate world. Mendel's laws of inheritance and the subsequent work on genes may well form the beginning of such a theory as far as biology is concerned.

In fact, many feel nowadays that the life sciences and the science of the minds of both animals and men have already been neglected too long. Our picture of the world would surely be more rounded if we knew more about the minds of men and animals, their customs and habits. The second type of shift may mean, however, the acknowledgment that we are unable to arrive at the full understanding of even the inanimate world,

*The two being closely linked in the theory of the functions of a complex variable. *C.M.*

just as, a few centuries ago, man came to the conclusion that he has no very good chance to foresee what will happen to his soul after the death of his body. We all continue to feel a frustration because of our inability to foresee our soul's ultimate fate. Although we do not speak about it, we all know that the objectives of our science are, from a general human point of view, much more modest than the objectives of, say, the Greek science were; that our science is more successful in giving us power than in giving us knowledge of truly human interest.

Both physics and psychology claim to be all-embracing disciplines: the first because it endeavors to describe all nature; the second because it deals with all mental phenomena, and nature exists for us only because we have cognizance of it . . . . Both disciplines may yet be united into a common discipline without overtaxing our mind's capacity for abstraction.

Awareness in Plants

10

J. C. Bose

Sir Jagadis C. Bose (D. Sc.), founder of the Bose Institute of plant research in Calcutta, was one of the great pioneers of the psychophysiology of all organisms, and not simply of man or mammal. His work has yet to be tapped for all its wealth of suggestive results showing a continuum of consciousness through all organic life.

The Nerve of Plants

When the tip of one's finger is gently scratched, an impulse is created which is perceived in the brain as sensation. The message is transmitted along a nerve-thread, which is the definite channel for the conduction of impulse; when the nerve is injured in any way there is an end of all sensation. The scratch and the resulting sensation appear to be simultaneous, but in reality a short time is required for the impulse to travel from the finger-tip to the brain. The speed of the nervous impulse may be found somewhat as follows: the person on whom the experiment is made gives a signal when he feels the sensation of the scratch on his toe. The interval between the scratch and the signal enables us to calculate the speed of the impulse through the length of the nerve.

If the nerve terminates in a muscle, then the arrival of the impulse is signalled by the twitch of the muscle. Experiments

on nervous impulse are usually carried out with a piece of nerve and muscle of the frog, which may be detached and kept alive for several hours. If now a distant point of the nerve be stimulated by an electric shock, an impulse is transmitted along the nerve to the terminal muscle which is attached to a recording lever. The record is taken on a moving drum, on which time-marks are inscribed by chronograph. The speed of the impulse is found from the length of the nerve and the time recorded for transmission.

In the nervous circuit of the animal three different parts may be distinguished. The first is the 'receptor,' which receives the shock from outside; the second is the 'conductor,' the 'nerve,' by which excitation is carried to a distance, though no visible change occurs in this conducting tissue during the transmission of an impulse. Finally, the impulse impinges on the terminal responding organ, the 'effector,' which may be a muscle; the response is then visibly manifested by movement.

The beginnings of such a nerve and muscle system are seen in animals as low as the sea-anemone, where stimulation of its tentacles causes a motile reaction at a distant part, there being no movement in the intermediate region. The receptor and the effector are thus at a distance from each other, the connecting link being the nerve.

This mode of transmission of excitation, where the effect of a stimulus applied at a point is manifested by a movement at a distance, would appear to be not unlike what occurs in the [touch-] sensitive plant *Mimosa pudica*. Here also the application of stimulus, say of an electric shock, to one of the subpetioles, gives rise to an impulse which, travelling onwards along the leaf-stalk, reaches its motile organ, the pulvinus, the contraction of which produces the sudden fall of the leaf. Though the effects produced in the plant and in the animal are so similar, yet the prevalent opinion has been that impulse travels in the plant in a manner quite different from that in the animal nerve. .

Let us consider on what experimental fact this conclusion is based. Pfeffer gave a knife-stab to the plant to stimulate it and observe how the plant answered under such brutal treatment.

Imagine expecting a man to give any rational answer when the stimulus employed is a knife-thrust; so far from giving any coherent response, he would be thrown into convulsions! After the knife thrust into the plant, Pfeffer noticed the escape of sap from the wound . . . .

[His] hydro-mechanical theory and [another] theory of hormone-transport by ascent of sap are both based on the supposition that a wound is necessary to produce a mechanical disturbance or the secretion of an irritant causing stimulation. They stand condemned if it can be shown that an excitatory impulse is generated and conducted in the plant by a feeble stimulus and without any wound.

The plant is highly excitable, and a very feeble stimulus [as the author's experiments show] is sufficient to start an impulse. The only excuse for using a knife-thrust as a stimulus is the erroneous supposition that plants are very much less sensitive than animals, and must therefore be goaded into activity by violence. This is a gratuitous and totally unfounded assumption, for, as previously stated, I discovered that Mimosa can be excited by an electric shock of one-tenth of the intensity of that which evokes human sensation. No wound is produced, yet the excitation is transmitted to a considerable distance. This result alone is sufficient to show the totally unfounded character of both the hydro-mechanical and hormone-ascent theories . . . . Other crucial experiments . . . completely disprove them . . . .

The velocity of transmission of excitation is appropriately modified according to the vital condition of the plant. It is greater in summer than in winter. Another curious fact observed is that while a stout specimen responds in a leisurely manner, a thin specimen attains its acme of excitation in an incredibly short time. Such a difference is not unknown even in the human species. In a thin leaf-stalk of Mimosa the speed may be as high as 400 mm. per second, or 24,000 mm. per minute. While the velocity of impulse in Mimosa is lower than in the higher animals, it is considerably greater than in the lower animals, such as Anodon. The velocity in the plant may therefore be regarded as halfway between the two. The velocity of trans-

mission in both Mimosa and in animal nerve is increased, within limits, by rise of temperature and diminished by a fall. In Mimosa a rise of temperature of about 9° nearly doubles the velocity . . . .

Inasmuch as excitation is initiated in both animal and plant at cathode-make and at anode-break, and since the impulse in both cases is arrested by intense cold, by the application of poison, and by an electrotonic block, the inevitable conclusion is that transmission is essentially the same physiological process in both; if it be called 'nervous' in the case of the animal, there is equal reason for applying to it the same term in the case of the plant . . . .

> [We now know that secretory organs, i.e. "glands," and neurons have the same primordial physiological structure, and that the difference between hormone—or enzyme—production and nerve conduction is one of degree. Bose, the great pioneer of plant psychophysiology, thus also implied this concept. *C.M.*]

Localization of the Nerve

Having ascertained that there is nervous conduction in the plant, the next thing is to find out where and what the conducting tissue is. The passage of an impulse along a nerve does not produce any visible change; we can, in fact, only detect its passage by the negative electric change that accompanies it. The nerve imbedded in a non-conducting tissue may be likened to an electric cable sheathed in non-conducting gutta-percha. There may be a single conductor in the cable, or there may be two conductors. We can pick up messages going through the cable if we thrust in a metallic pin suitably connected with a galvanometer. No messages can be picked up until the pin just touches the conductor; the extent of intrusion of the pin tells us the depth at which the conducting strand is situated.

Acting on this principle, I have been successful in localizing the nerve imbedded in non-nervous tissue by making use of the

electric probe . . . . In this way it is possible to localize the conducting tissue within the hundredth part of an inch. These observations show that conduction of excitation is confined to a definite tissue, which may therefore be termed a *nerve*.

We then cut a section of the leaf-stalk at the line of the passage of the probe in order to find out at what point the probe picked up the messages. The epidermis had given none; the cortex again was plainly a non-conducting wrapping; strong messages had been picked up when the probe entered the phloem. As it passed to the xylem or wood, the messages ceased, but they recommenced at the next layer. The second conducting tissue thus detected is a second, internal phloem until now unsuspected by the plant-physiologist. We have thus localized not only one nervous layer, but two. The significance of this double system of nerves, one external and the other internal, will be explained later.

If we can discover a stain that picks out the nerve-strands already identified as the vehicle for nervous impulse, then the nerve distribution in the plant can be clearly made out. In this way it would be possible to distinguish two neighboring systems of tissue having different functions, or to establish the similar functions of two tissues which happen to be separated from each other. The application of haematoxylin and saffranin stained the nervous tissue a deep violet and made it stand out prominently from other tissues. This test confirmed the results reached by the indications of the electric probe; the outer and inner phloems were similarly stained, which indicates that they are, in fact, two separate nerves. In the petiole there are four such double strands, each pair starting from each sub-petiole and ending in the pulvinus.

In the stem of Mimosa itself there are two opposite main vascular bundles, each of which contains a double strand of nerves. These give off lateral branches to the leaves, thereby assuring conducting continuity between stem and leaves. An impulse initiated by stimulation of the stem can thus be sent in an outward direction to the leaves; an impulse generated in the leaves can, on the other hand, travel inwards to the stem and be

then conducted up and down to the other leaves and may even cause their fall . . . .

The two main strands of conducting phloem converge and meet at the apex of the stem. This explains how it is that under moderately strong stimulus applied on one side of the stem, the ascending impulse crosses over at the top and becomes a descending impulse on the opposite side.

The phloem-strand in the vascular bundle of Mimosa is thus shown to be a nerve conducting excitation. It is impossible to pull this out from Mimosa without tearing it to pieces; I however succeeded in isolating the nerve from the leaf-stalk of a Fern. The hard casing of the leaf-stalk was broken carefully, and on pulling it apart the vascular nerve- strands were isolated; they are soft, and white in color, remarkably similar in appearance to animal nerve.

We will now apply the tests generally employed by animal physiologists on the nerve of the frog, to the isolated nerve of the Fern. The experiments on the frog's nerve are carried out with the help of a galvanometer which records the electric change induced by the nervous impulse. The electric records of the plant-nerve under varied conditions are found to be in every way similar to those of the animal nerve . . . .

Memory and Death

I have been able to form [molecular] impressions on a metallic plate of which no sign whatever can be detected, and yet when the plate is subjected to diffuse stimulation, the invisible images are readily seen.

Similarly all the impressions made on our sensory surface remain dormant as latent memory images, which become revived under the impact of the internal stimulus of will. The revival of memory, then, is the result of a strong stimulation being thrown on the impressioned surface, so as to wake up the dormant images. Now we have seen that during the struggle of death [of any organism] an electrical spasm sweeps through

every part of the organism and this strong and diffuse stimulation—now involuntary—may be expected to crowd into one brief flash a panoramic succession of all the memory images latent in the organism.

The various symptoms of death in ordinary plants, such as drooping, withering, and discoloration, do not manifest themselves exactly at the moment of death, but at a later period. Even after a plant has been subjected to a temperature in excess of the fatal degree it may continue for a time to appear fresh and living. How, then, can it be possible to distinguish a living from a dead plant, and how to find the exact moment of transition?

Such discrimination is possible by watching for the disappearance of some reaction characteristic of the living condition. The ideally perfect method, however, would be the discovery of a reaction which, at the moment of death, underwent a sudden reversal to its opposite. There would then be not even that minor degree of uncertainty which is inseparable from the determination of the vanishing point of a waning effect. Such a perfect method I have been able to render practicable by the discovery of the death-spasm in plants analogous to the death-throe of the animal.

In securing the record of the onset of death in plants, two different methods have been found suitable. The first is to subject the plant to a continuous rise of temperature, until the fatal degree is reached. The second method, not so perfect as the first, is to apply a dose of dilute poison which proves fatal after a shorter or longer period, depending on the dose and the virulence of the poison.

I have succeeded in devising a death-recorder by which the dying [plant] organism, by means of a continuous script, records its exact death-point. The recording apparatus is of an oscillating type; the smoked glass plate is made to oscillate to and fro by an electro-magnetic contrivance, thus producing a series of dots at every degree of rising temperature . . . [At death, the recording lever is] jerked up with convulsive violence . . . .

Continuity Between Life and Death

Certain considerations seem to show that the phenomena of life and death are not entirely antithetic, but that there is a continuity which bridges over the chasm. After each shock [physical or chemical] the organism becomes irresponsive or dazed for a time, after which it gradually recovers. The duration of insensibility is prolonged with the intensity of the shock. Sensibility and insensibility—tokens of life and death—thus alternate. Our life is, in reality, a succession of incipient deaths! From a moderate stimulation there is a quick restoration, but after an excessively intense shock there is no recovery. Death is an extreme case of stimulation.

In records of response of Mimosa taken under moderate, strong, and excessive stimulation, we find certain characteristic differences. In the first case, the recovery is completed in the course of fifteen minutes . . . the curve of recovery reaching the axis or base-line [of the graph of shock printed by the electro-recorder]. With a still stronger stimulus, the recovery is prolonged for an hour, the recovery-curve meeting the axis at a still greater distance. Up to this time, there is possibility of restoration. But the shock may be so strong as to prove fatal, and the violent spasmodic contraction proves to be the spasm of death. The line of recovery is now parallel to the axis, and never meets it.

Let us examine the suggestive case of a real image of an object formed by a concave mirror. The reflected rays cross and meet at the axis, forming a real image. As the object is brought nearer and nearer, the image, like the line of recovery under stronger stimulation, is projected to a greater distance. A time comes when the reflected rays never meet and no image can be formed on this side of the surface of the mirror. Has it then completely disappeared? Not so, for the phantom is now transferred to the other side of the mirror! And after the supreme shock of death, though there is no restoration of life on this side of the Great Mirror by which we see Nature reflected, is it possible that there may be a restoration and renewal on the other side that is hidden from us?

These, our mute companions, silently growing beside our door, have now told us the tale of their life-tremulousness and their death-spasm in a script that we can read. May it not be said that their story has a pathos of its own beyond any that we have conceived?

In realizing this unity of life, is our final sense of mystery deepened or lessened? Is our sense of wonder diminished when we realize in the infinite expanse of life that is silent and voiceless, the foreshadowing of more wonderful complexities?

Consciousness and Cosmology

11

Arthur M. Young

Cosmology ("the science of the fundamental causes and processes in things"—Webster) as interpreted by cosmologists of the present time suffers from the omission of a term corresponding to consciousness. To describe consciousness as an anthropormorphic attribute alone is totally inadequate. Consciousness is, rather, an ingredient which must be inherent in whatever we employ as descriptive of a universe, be this dimension matter, space, or time. It is a basic ingredient. Because we have a knowledge of consciousness at least as certain as our knowledge of time or space or mass; it must be given recognition. Since no scientific observation can be made without consciousness, the latter cannot be accounted for as a compound of lesser ingredients; since it is thus basic, our cosmology must be revised to include it.

But how? We should find a way to describe consciousness by a method such as that of dimension or one related to dimension, for it is this method that has made science possible. The "measure formulae" of science make it possible to express all the variables to which science gives attention in terms of mass, length and time. These should be our guide, even if an additional term must be added. Such a term will of necessity be an undefined term, just as mass, length and time are undefined, and may even be unpredictable, but it must lend itself to formulation.

But if consciousness is a basic part of cosmology, how can science have come so far while neglecting it? One suspects that

somehow science must have given it recognition, but obviously not under its own name. No natural science has any reference to it.* Academic psychology, including depth psychology, does not attempt to trace consciousness to its ontological roots.

Let us re-examine science for some clue. Let us scrutinize its dramatis personae, as it were, for something that could be consciousness in disguise. The most obvious suspect is that recent science of cybernetics, or more generally, self-regulation and control, achieved through the sensing devices which measure the position of a vehicle or the condition of an environment, and on this basis make suitable adjustments to correct or regulate the vehicle or the environment. Thus, a thermostat mechanically senses the temperature of a room and turns a furnace on and off accordingly as the temperature is below or above a prescribed setting.

This example, crude as it is—its deficiency we examine below—throws the problem into a different focus. Since the thermostat not only senses temperature, but *acts* to change it, it brings in the added factor of control. Do we want "consciousness" to mean only awareness, or do we want to include control, the capacity to act with awareness? It is apparent that our quest should include the latter capability because it is the more inclusive.

The example is deficient in that consciousness implies an ability not possessed by the thermostat, that is, consciousness *may* imply *self*-engendered goals. The thermostat is set by the person who lives in the house. It is a slave device, or servomechanism, something that can be regulated, whereas when we introduce consciousness as an attribute of human beings, we imply some kind of self-regulation that is at the disposal of a will, ideally a free will. This suggests that "consciousness" is linked to the activity of will, whose disposition is not, like the thermostat, determined by another agent but is self-determined. This, in turn, suggests that the "recipe for a cosmos" must

*Standard works on biological evolution (since the 1950s) have made reference to consciousness only to derive it as an epiphenomenon, or as an assumed result of inanimate ingredients.

contain an active term as well as a reflexive term. It must have "sum" as well as "cogito."

The former is missing from the thermostat unless we were to find some expression for the householder who regulates it. Here the temptation is to find exterior causes which regulate the householder, so that we can dispense with the elusive idea of choice and the uncertainty as to what temperature he will elect to set the thermostat. Conceivably, the manufacturer, to save costs might issue the thermostats set to a predetermined temperature (as is the case with the thermostat on a car). But this escape is not for us. We must deal with a universe in which choice is possible, even if it is not used, because the challenge is to express the all, not the part. And a universe that permits free will is more comprehensive than one that doesn't.*

An example that deals more thoroughly than the thermostat with the ingredients we usually find missing in a scientific description of a universe would be a guided missile. This contains within itself a much more complete range of target objectives (missions) than the thermostat. It may contain sensing devices which tell its position and orientation with respect to a target. And the target is completely optional. The missile can be aimed to strike anywhere (within some limit, of course—say 3000 miles). But in the missile we still have not included the factor of an operator who *chooses* the target.

How may we do so? Let us note, first, that when we say the missile is released or even aimed by a gunner, we can't stop here. The gunner, as gunner, is part of an organization and responds to orders from above, ultimately to the general, and he to the president who has declared war. What regulates the president? Note that our parade of agents from the gunner through the organizational structure to the president has brought us no nearer the true answer. The organization of the army is merely a means for extending the will of the president

*Here we must not permit ourselves to be distracted or delayed by the supposed opinion of science that free will or even consciousness is not possible in the physical universe, because it is this presumed view that is in question. We are to re-examine the scientific universe to see if it does, in fact, deny consciousness. We think not.

to the hardware in the field. It does not tell us about the ultimate or final cause of the firing of the missile, which is the president's *choice*.

We must recognize therefore that the technique by which we find in mechanical devices antecedents to given events (as pulling the trigger releases the hammer, which detonates the cap, which explodes the shell, which propels the bullet) does not suffice to account for the *first* link of the causal chain which is of a nature that it *initiates*; it is the first member of a chain of causation. It is by nature *ideal*, not only because we have difficulties with giving all absolutes physical expression—absolute beginnings included—but because if it were objective (as contrasted with ideal) it would automatically not be a first cause since any object (*ob . . . ject*) is secondary to the throw, or *ject*; that it *ob*structs.

We may, therefore, generalize our difficulty with the statement that what we may call *first cause* or *choice*—that is, consciousness—is involved; and that such choice is characterized by the description of *not* having an anetcedent.

Of course, the question of antecedents is of major importance. The explanations of science are in terms of antecedents. A scientific inquiry sets out to discover the *cause* of whatever comprises the phenomena it examines. But when it comes to *first cause*, that which has no antecedent, science avers there is nothing to be said. When Pasteur discovered bacteria to be the *cause* of food decay, he disposed of the naive explanation that such decay was caused by spontaneous generation. This result has been misread to discredit generally the office of first cause, which now suffers a kind of banishment from legitimate scientific inquiry.

But first cause comes through the back door, sneaks back in under various disguises. The Lemaitre Big Bang theory of the origin of the universe is a curious example.* Again, we have Hoyle proposing continuous creation. Other instances include

*Curious because the Big Bang theory differs from the spontaneous generation of maggots only in being colossal instead of minute.

mutation of chromosomes by cosmic rays as a cause of evolution. So, despite averring its lack of concern with first cause, science has to give it recognition.

But this doesn't solve the problem. Let us return to the task of describing consciousness.

Our problem is formal description of choice, or, even better, what can be called the causal antecedent to decisive action. Once action is taken, once the button is pressed, we can follow the chain of effects by usual scientific procedures, for the effects occur in the physical universe.

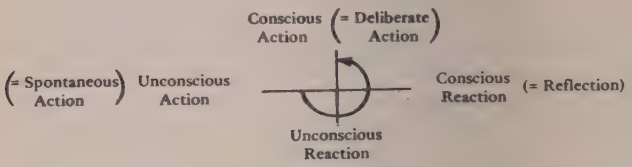
What precedes pressing the button cannot be directly observed; it happens internally. While we cannot measure consciousness, we can deduce its existence by the kind of action or decision emanating from it. Thus, an act is thoughtless or deliberate, it is foolhardy or wise. We may thus distinguish degree or maturity of consciousness irrespective of its specific content.

This takes us to the learning cycle, the process or sequence by which something is learned or taught. The learning cycle begins with *spontaneous acts or action*; for example, an infant reaching out and touching things. This continues until there occurs some painful encounter, such as touching a hot stove, whereupon there is a *reaction*, the hand is withdrawn. There then follows *conscious reflection* (an internal event), the pain is associated with the stove. Further explorations *deliberately avoid* the hot stove, until finally, normal spontaneity is resumed, and avoidance of the stove becomes instinctual.

The cycle may, of course, go round many times and the experience gained is not lost. This implies a progressive spiral rather than a circle. We are here concerned only with one cycle of this spiral.

The reason this is a cycle is that it returns to the instinctual or spontaneous starting point, and each cycle goes through the same "phases." We may note that the conscious reflection occurs after the unconscious reaction and before the deliberate

action. This suggests that we can reduce the descriptive words for the kinds of actions to permutations of the words 'conscious' and 'action' and their opposites.



This device emphasizes the essential independence of the two axes and makes it explicit—that is, it insures each "quarter" differs from the others unambiguously. It also permits us to represent the independence by the mathematical convention of a right angle, and affirms the circularity of the cycle, since the four right angles make up a 360° rotation. We will henceforth refer to this whole circle, which describes the reacting cycle, as 2π (following the mathematical convention based on the fact that a radius fits into the circumference of a circle 2π times).

Let us apply the cycle of action concept to our problem of how to describe consciousness and assume that the causal antecedent of a decisive action arises from some phase of the cycle of action. It will therefore be one of the following types:

1. Spontaneous (thoughtless)
2. Reactive (reaction to something)
3. Conscious reaction (inactive—that is, reflective)
4. Conscious action (deliberate act)

We may dismiss the first two as not leading to anything that cannot be explained by the usual scientific procedures. The first is the activity that characterizes the world known to science: stones fall, fire burns, animals breed, etc. The second covers reactions to prior causes: burns are caused by hot stoves, stomach aches by green apples, etc.

The third, which is awareness only, cannot be observed by science.

The fourth, deliberate action, is the most mature point of the cycle of action, and because it can produce effects that cannot be predicted, is important for systems in general. This is true on any scale, including cosmology. It definitely contributes an element of uncertainty to prediction which has to be formally represented.

How may this formal representation be achieved?

Note that it is the ¾ point of the cycle of action. The whole cycle is a *circle,* whose measure is 360°, or 2π. The ¾ point, conscious action, then is ¾ of 2π or $3\pi/2$.

This factor, $3\pi/2$, formulates the contribution of consciousness.

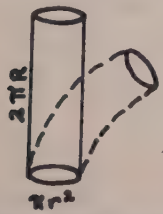
Since the physical universe can also be formulated, we should be able to combine their formulations into one, much as, when we combine the dimension of volume with that of density, we obtain mass.

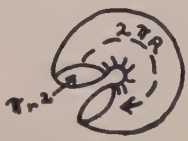
The "physical universe" can be represented as a sphere, the volume of a sphere being $(4\pi/3)R^3$. If we multiply by $3\pi/2$, we obtain:

$$2\pi^2 R^3$$

This is the volume of a torus (or doughnut shape).*

This can be seen topographically if we rotate a circle (area πR^2) around a point on its circumference, thus creating a bent cylinder (length = $2\pi R$).





This is highly significant because the torus is quite different topologically from the sphere. Our introduction of conscious intercession into the physical universe would ordinarily be said

*But with a vanishingly small hole. We have called it (1964) the "umbilicoid." *C.M.*

to have introduced a "new dimension." But we see that this is not the case. Rather, we have changed its shape from a sphere to a torus; we have changed the *topology*.

What does changing the topology mean? Two figures are said to be topologically equivalent if one can be deformed into the other. Thus, a triangle is topologically equivalent to a circle, a plane is topologically equivalent to a sphere (since a rubber sheet can be stretched to cover a sphere). But a sphere cannot be deformed into the "inner tube" shape of a torus. "Topological properties," as Courant says, "are in a sense the deepest and most fundamental of all geometrical properties since they persist under drastic changes of shape."* But when we change from one topological type to another, we deal with even more profound transformations that transcend geometry.

Rather than burden the reader with technicalities of a subject which experts have often made incomprehensible, let us single out one topological fact that I consider significant. This has to do with what is known as the *connectivity* of a surface. To illustrate:

Comparing the surface of the sphere (the first figure) with that of the torus (the second), it is clear that the two surfaces differ in a fundamental way. On the sphere, as on the plane, a circular cut C separates a piece containing the point P from the rest of the sphere. On the torus, one can make a cut D which still leaves the point P connected with the rest.

The implication for cosmology is that in a toroidal universe a

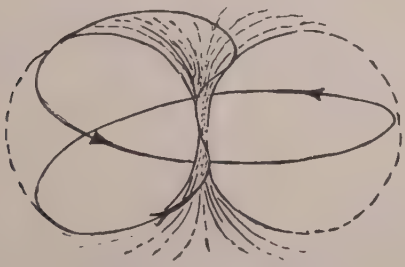
*R. Courant and H. Robbins, *What Is Mathematics?* Oxford, 1951, p. 243.

part can be seemingly separate and yet connected with the rest. Thinking of the cut as separating inner and outer, the torus provides a paradigm that permits us to see a self as both a separate entity (in that there is a boundary between itself and otherness) and connected (through the core) with everything else.

We may in fact have many cores, one for each self. What is important is the added circularity of the hole, which enables us to represent an inner space, perhaps that referred to by mystics, and which popular imagination often refers to as an added "dimension."

This hole is the added circularity that is introduced when we multiply the π of the cycle of action, which has to do with timing, by the π that belongs to the sphere, which has to do with the spatial extension of the universe.

While there are a number of reasons that the universe does indeed have the shape of a torus (the magnetic field, the vortex, the tornado all have a toroidal form), reasons which include the fact that the vortex is the only manner in which a fluid can move on itself, we should here direct our attention to the attributes that the torus has that make it suitable for a universe in which consciousness is possible.



Vortex

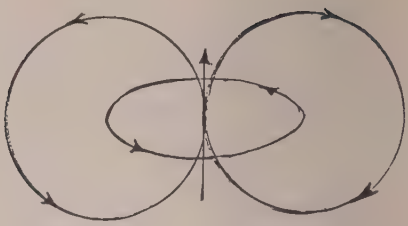


Diagram of the Separate Motions of the Vortex

We may think of this figure (or vortex) as a fountain that is both jetting upward and rotating. In addition, the drops are gathered back toward center as they fall, and again sweep up and out.

This implies that this figure reaches out and then tucks itself back in a cumulative cycling that contrasts sharply with the purely dissipative action of an exploding sphere. Or, if you like, this is a sphere that expands and contracts, the contraction accumulating the proceeds of the explosion.

This is, in fact, just what the learning cycle implies. It could not operate if it did not remember, and we see that despite the impressive grandure of a universe subject to law (represented by the sphere), the contribution of consciousness, whether large or small, is crucial, for it makes possible the universe's rebirth and self-renewal.

Afterword

In the hope that my argument can stand on its own, I have so far refrained from quoting authority; but having made my point, there are some references which, perhaps indirectly, are significant.

The formula:

$$2\pi^2 R^3$$

has considerable sanction for cosmology since it happens to be the volume of the universe as recognized by relativity, the so-called Einstein-Eddington hypersphere.*

Eddington, in his *Fundamental Theory*,** deals with the same hyperspherical volume in a most provocative way, and I would refer my reader to this work which, though difficult and obscure, is of exceptional interest.

Chapter III of *Fundamental Theory* opens with the statement (par. 2, line 4):

> Having got what we want out of it . . . space curvature no longer interests us. We turn to flat space to pursue the specialized development of microscopic theory. The scale of uncertainty, instead of being disguised as a curvature, will be taken into account openly . . . .

This is a statement of tremendous import. It will be recalled that throughout his scientific life Eddington had been a leading exponent of relativity theory. Here in his posthumous work he makes a remarkable leap beyond even his previous conclusions and recognizes that the space-time curvature of relativity is one and the same thing as the uncertainty of quantum theory, and that the latter is the clearer or less "disguised" concept (see previous quotation).

This view not only helps resolve the long-standing problem of reconciling the continuum of relativity and the discreteness of quantum theory, but, by making the amount of curvature (the total scale uncertainty, which we may interpret as an angle) independent of size or radius, it makes the world commensurate with the creature whose world it is:

*This formula for the volume of the universe is given by Eddington in *Mathematical Theory of Relativity*, Cambridge, 1924, p. 156. Its derivation is also given by McVittie, *General Relativity and Cosmology*, University of Illinois Press, 1962.

**A.S. Eddington, *Fundamental Theory*, Cambridge, 1953.

> I could be bounded in a nut shell
> and count myself a king of infinite space.
> (*Hamlet* II,2)

This view of indeterminacy as self-determination is born out in remarks at the top of the second page of Eddington's chapter III (lines 2-6):

> Now that each particle or small system has its own scale variate, a new field of phenomena is opened to theoretical investigation, which is suppressed in the molar treatment of scale as an averaged characteristic. As remarked in section 23 the comparison particle to be introduced into a microscopic object-system *is an individual* (italics mine).

The treatment of scale uncertainty by Eddington impressed me as equivalent to the formulation I had found (and will shortly explain) for the cycle of action—and his bold step of multiplying together the angular uncertainty and the volume of a sphere resolved for me the question of how to inject conscious action into the physical universe.

Thus, Eddington's discussion, whether or not I correctly interpreted it, enabled me to bridge a gap in my own theory. Let me now attempt to explain how his provocative words affected me.

Eddington says that scale uncertainty has two conjugate variates, scale and phase. The latter is measured as an angle, and "the feature of an angular coordinate is that 'infinite uncertainty' is a uniform probability distribution between zero and 2π" (that is, our uncertainty of where the ball in roulette will go is an angle of 2π or 360°). This means that individual particles and subsystems are endowed with an angular freedom of 2π in the phase dimension. This to me seemed equivalent to the 2π implied by the cycle of action,* essentially a freedom of timing.

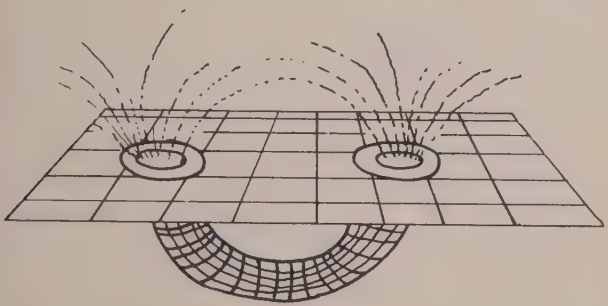
*It has always been my assumption that in measuring frequency we do so by counting "beats" or oscillations per second, and there is in such measure an uncertainty as to fractions of a beat. Since fractions of a beat are fractions of a whole cycle and a whole cycle is 2π, the indeterminacy must involve 2π. Measurements of the photon must therefore involve an uncertainty of 2π. This to me was suggested by

To this he adds a second factor of ¾, which he attributes to what he calls "stabilizing the scale." This term I do not understand, but it suggests the act of self-limitation that occurs in a situation when one deliberately decides to act on the available information and not get further involved. It suggests, in fact, the ¾ point of the cycle of action—conscious action.

In any case, Eddington does multiply the physical sphere by $3/2\pi$ and thus obtains the expression $2\pi^2 R^3$, which I had been trying to confirm.

Why does Eddington not recognize that $2\pi^2 R^3$ is a torus? In *Mathematical Theory of Relativity*, he derives this figure for the volume of space and comments on its different *connectivity*!

There remains one further reference to be noted here. This is Wheeler's worm hole theory.* Wheeler's contribution is very



the possibility of dividing Planck's constant of action h by 2π as is done in the definition of the quantum unit of angular momentum, $\hbar = h/2\pi$. Musès (1963, 1965) independently provided corroboration by a rigorous proof that 2π is inherent in Planck's constant itself, expressible as $h = 2\pi mc\sqrt{ar}$, where m, c, a, and r are respectively the electron's rest mass, the speed of light *in vacuo*, the radius of the first electron orbit, and the classical radius of the electron itself—hence showing that 2π is an exact factor of Planck's constant of *action*, here used in the sense of modern physics to mean the product of mass, velocity and distance. (See also *Journal for the Study of Consciousness*, vol. 4, no. 1, p. 90.)

*John A. Wheeler, "Dynamics of Space-Time," *International Science and Technology*, December 1963. See also John A. Wheeler, *Geometrodynamics*, Academic Press, 1961.

important, for he shows guidelines for the reconciliation of relativity theory (with its continuum) and quantum theory (with its singularities). Wheeler's solution is the worm hole, which, as is well known, has the same topology as the torus.

Wheeler's independent discovery of the need for toroidal topology reads against the objection that the hypersphere, despite its having the formula of a torus, might somehow have some other shape.

We therefore feel, in view of Wheeler, that the hypersphere is a torus.

As for consciousness, its acceptance as a contributing ingredient of "the" universe may seem strange, but it is long overdue, and I would suggest that its omission from the vocabulary of science is not the virtue that is often claimed, but a handicap that has delayed the development of important sciences, notably biology and other sciences dealing with life.

Life, however defined, is not implied by the laws of mechanical matter. Indeed, if we include the second law of thermodynamics as a law (its status is empirical, rather than deductive), life, which builds order and is characteristically negentropic, is actually a violation of, or exception to, that law, and hence demanding a better law.

I am fully aware of the opposition the above statement will meet.* I have encountered it frequently, and it cannot be answered because it is based on an emotional reflex, the conviction that the sanctity of the scientific law is under attack.

This fear, I would point out, is not grounded, any more than the curvature of space-time constitutes an attack on the sanctity of geometry. Life is a fact. It is perhaps the most dramatic and important expression of the universe. Also, it is not implied by the billiard ball paradigm. *Ergo*, we need a new paradigm.

*Although most authorities agree that life is negentropic.

Meaning and Matter

12

Alfred Taylor

The author (Ph.D., M.A.), a fellow of the American Association for the Advancement of Science, was head of cancer research at the Biochemical Institute of the University of Texas from 1940 to 1965. Dr. Taylor has authored over eighty-five research publications and maintains active interests in science and philosophy.

Man's approach to truth through science during the last few centuries has been, as we all know, a spectacular success. The way of scientific research now overshadows all other methods of obtaining knowledge of man and the universe.

It is difficult to estimate the full extent of what science has accomplished in the relatively brief period it has grown to dominate society. Knowledge has been obtained that gives man a measure of control over his environment. Bodies, thoughts and things are moved with great speed over the surface of the earth and into the stratosphere. Manpower has been multiplied by machine power. We are able to produce more food, more habitations, more health than ever before. The average life span has been greatly extended. In every aspect of material welfare, science has been a source of accomplishment.

Yet we must admit, too, that along with positive values, serious problems have arisen because of the misuse of scientific knowledge. Chemical research, for example, enables man to synthesize myriads of new chemical compounds, but some of these compounds in the form of certain pesticides, detergents and other products have brought about serious ecological disturbances, poisoning, among other things, the birds of the air

and the fishes of the sea. Scientific achievement has resulted, on the one hand, in great benefits for mankind, and on the other hand, in conditions that now menace human welfare and survival. It is said that every good thing can become a bad thing in the hands of those who proceed with selfish interests and ignorance.

The theme of this paper is concerned with a misuse of scientific knowledge not usually recognized. Modern man has peppered the landscape with chemicals that are not only anti-pest, but also anti-life, and in many other ways misapplied the fruits of the scientific method. However, the "crowning" achievement, in this regard, may be the way he has darkened the human mind with the delusion of materialism. The idea that matter, in the sense that this word is used in physical science, is the source of all values, including human intelligence, has become as much of a dogma as any of those charged to religious thought. The materialistic hypothesis, though beginning to be challenged, is often considered to be beyond discussion. Scientists, so free and mentally independent in most respects, are, with outstanding exceptions, generally emotionally committed to a materialistically oriented line of thought. No paper has the slightest chance of being accepted for publication in a recognized scientific journal that deviates from orthodox materialism and its corollary, "randomization"—the notion that blind chance lies at the heart of things.

We would assume that such dedicated devotion to an idea by scientists must be based on weighty and compelling evidence. Yet a careful consideration of scientific data discloses not only no support for the materialistic concept, but reveals it to be incompatible with the findings of science and with ordinary human experience.

Why then has the materialistic hypothesis become so widely accepted among scientists? The answer to this question is not simple. A number of factors are involved. Scientists in their laboratory research must be careful to have clear-cut criteria and objective representations of their results. Where quantities and their relationships are concerned, the data must be free of subjective influences. Another element contributing to mate

rialism is man's over-emphasis of sensory data. (This tendency is just as evident, but in a different way, among the followers of religion as it is with the workers in science.)

At present, due to the success of scientific research, the speculations of scientists are given special weight by the public. Accordingly, what might be called a scientifically flavored materialism has become a most potent influence in human affairs. The scientist who accepts the materialistic hypothesis prides himself on being most realistic. He tends to be skeptical of philosophic values and casts metaphysics into outer darkness.

Yet scientific research itself is based on an assumption that cannot be reconciled with the materialistic concept. The research scientist *assumes* an intelligently ordered world. Otherwise research would be impossible. As he progresses, he discovers nature to be made up of complexes of energy systems, actions and reactions, and changing forms of a degree of complication only slightly within the understanding of the human mind at its present evolutionary stage. In a living form, for every second of time, trillions of linked events occur, forming patterns necessary for the organism to proceed in the normal sequences of its life cycle. Any break in the rhythm of these ordered operations means the death of the body. But materialism—the notion that life is merely the collocation of inanimate individual units—cannot account for the incredible organization it assumes, and indeed finds.

The cult of materialism appears to arise because of a confusion of the values existing in all forms. For example, a book is obviously made up of physical materials such as paper and ink. But no one would suggest that the primary value of the book is in its physical form. We know that the material aspect of a book serves to transmit a message, and the message is the book's reason for existence. If we observe all man's productions from this viewpoint, we discover, as in the case of the book, a combination of plan, design, meaning, or message, communicated by materials. An automobile has its source in human thinking and can be summarized in a set of blueprints. The plan contained in the blueprints, when embodied in suitable materials, provides us with a car. It follows from this, that all man's

productions, whether a machine, a cathedral or a symphony always manifest a duality—meaning (or mind) and matter.

Further, the material aspect of a book or a machine is in dimensional space and time, and so wears out or ages, while the meaning or mind element, not in physical dimensional space or time, is not affected by the passage of the years. It is obvious that if we remove the ideation or mind from any human creation—take away its organization—a pile of materials with no sign of human intervention remains.

As far as human artifacts are concerned, then, the duality of meaning and matter is beyond question. But does this principle of meaning and matter, which all will agree characterizes human constructions, apply to the forms and systems of nature?

The materialist accepts the fact of human intelligence, even though he considers it to be a product of nerve cell physiology and so would admit that ideation or mind is the primary value in the matter of human activity. But he considers naturally occurring forms to be in a *different* category. However, as we study this issue, we note that the same characteristics prevail in the works of man and those of nature. Actually, we would expect this to be so since the advance of science has revealed a cosmos unified in law and basic principles. In any case, there is no evidence that meaningful forms of human creation involve laws or principles that do not apply to those of naturally occurring bodies.

We will all agree that living forms are the most complex of any known to us in nature. There is, as we know, unthinkably more meaning, more information, more of the qualities which in human experience arise only through the intelligent manipulations of materials, in a plant or animal body than is present in any human fabrication. Yet all this intricate organization comes from a tiny cell that contains no obvious trace of what will develop from it. The only reasonable assumption is that a germ cell is analogous to the blueprint of a machine. A microfilmed blueprint for a jet liner is as to the giant machine that can emerge from it as an acorn is to an oak tree. If we dissect either the acorn or the blueprints, no part of what the

produce is discovered, because they contain meanings not yet materialized.

Taking the argument a step further, we can draw on an analogy between the evolution of the automobile and the evolution of plants and animals. The first primitive models of cars appeared around the beginning of this century. They were the embodiment of the "car ideation" of that time. As a result of experience, plans were modified and reembodied in new cars. In this manner, car ideation has been passed through millions of car bodies. And so, cars have evolved from the early stage to today's sophisticated models. An automobile wears out and is scrapped, but the information necessary to produce a new car remains separate and independent of any particular machine, and so new cars are manufactured. But in nature the body of an organism is propogated by germ cells before it ages and dies.

Everything points to the idea that evolution is a process of the accumulation of meaning. In embryological development we note the rapid expression of the qualities evolved through eons of time. A chick germ cell develops so rapidly that in twenty-one days, the yolk and white of the egg has been transformed into a lively, active animal of such complexity as to be far beyond the understanding of the human mind. The chicken has taken millenia, however, to evolve to this point. Analogous to this is the rapid production of a present-day automobile, which has taken some seventy years to evolve. The point is that meaning is cumulative and grows through experience. The scientist accepts the law of the conservation of energy-matter. Conservation of experience or learning is also an obvious and necessary postulate that arises from scientific data. This conservation is expressed in evolutionary change.

In biology, there is the principle that ontogeny recapitulates phylogeny. In other words, in embryological development the embryo goes through past stages of evolution. Thus, biological memory, as it has been called, is in evidence as the organized form (DNA-coded in the germ cell) comes into manifestation. This phenomenon is direct evidence for the conservation of the meanings that have been evolved in past ages. (It seems to be a

reasonable assumption that not only the biological forms bu
also the minerals carry with them traces of their past history
otherwise, evolution from lighter to heavier chemical element
would be impossible. It is known that the heavier nuclei wer
formed later.)

Animals and plants evolve in a similar manner. The reptil
type, for example, has evolved from the small-brained lumbe
ing forms of the dinosaur age to the relatively improved model
of today. In all this evolution, reptile ideation, as contained i
the germ cells, has been the source of countless generations o
reptilian bodies. Gradually through the ages, relatively bette
forms emerge, marked particularly by greatly increased brai
size.

The materialist will admit the presence of information in th
germ cells, but also postulates it as a secondary product o
biochemical processes. Also, it is assumed that the evolution o
plant and animal forms results from random mutations an
natural selection. Is this so?

Actually natural laws are limiting, but not determining. Th
principle of natural selection eliminates the unfit, but it is quit
evident that it cannot determine whether a man or an elephan
emerges from an evolutionary sequence. Man constructs a
edifice. In doing so, he must conform to such limiting laws a
gravity and proportion in the building operation. But certainl
these laws do not decide whether a house or a cathedral come
forth from the work. The same is true where the principle o
mathematical probability is concerned.

The materialist assumes that values or ideation not present i
a situation can arise as a result of random actions and reaction
Bertrand Russell speaks of man as having evolved from th
"accidental collocations of atoms." Now, it is true that wher
the potentiality for various meanings or organisms exists in a
evolving matter-energy complex, the process of natural selectio
will determine which of the various possibilities will be realize
But this does not mean that any degree of random manipul
tions of matter and energy could create meaningful forms no
present potentially from the beginning. It is obvious that
particular organism evolves in a manner analogous to th

development of a germ cell. There must be the requisite information or plan and intelligent utilization of matter and energy in bringing the plan or meaning into objective manifestation.

The whole basis of the materialistic hypothesis rests on the assumption that ordered sequences can evolve out of materials, solely by random play of forces. We need no special knowledge to realize the unreality of such a belief. It is as if a group of monkeys, through mindless play with a pile of bricks and other building materials, could build a house or some other meaningful structure. (Actually, random forces not only do *not* construct forms of value, but they destroy those already in existence, or, as it is more technically said, increase the entropy of a system.)

The relationship of meaning to matter is brought out very clearly through the principles set forth first by Maxwell and Lorentz and then developed in the quantum physics launched by Max Planck at the turn of the century and developed by Einstein and others. One of these principles especially pertinent to this discussion is the demonstration that the basis of matter is light or electromagnetic energy. All that we perceive has its roots in invisible, imperceptible energy that can be contacted only indirectly through the use of suitable apparatus. We do directly sense light, but visible light is not ultimate energy. Light (as has been predicted already by Newton-Maxwellian theories) responds to gravitational fields. The same is true for other frequencies of radiation known to be associated with certain of the elementary particles of atomic physics. Energy free of differentiation, or pure energy, cannot be contacted by scientists since there is no way to bring it into observable manifestation. In other words, undifferentiated energy could not affect a Geiger counter or any such apparatus. The assumed existence of energy, unassociated with manifestation, is based on the fact that the elementary particles can be transformed from one type into another. They are therefore transitory phenomena. Hence, back of the elementary particles—and this means the constituents of the physical world—it is necessary to

postulate an ultimate basic reality about which nothing is known directly. This hypothetical substance is termed "energy" or "vacuum" or "electromagnetic wave medium"—a conclusion generally accepted by atomic physicists, and indeed mandatory in modern quantum physics, pioneered by Dirac.

A consequence of the principle that all manifestation, all matter, whether in the category of minerals or as the tissues and organs of living creatures, is derived from a common source substance leads directly to the notion that the quality of meaning—or noumenon, consciousness as such—is as the basis of phenomenon. Since all forms have their origin in one source, we are forced to the conclusion that *organization* is the determining factor, whether energy appears as hydrogen or lead, as a daisy or a man. Something must distinguish one from the other and that something is organization, meaning, consciousness.

Just as the pen's scratches in a written letter must be arranged so as to convey the message in the mind of the writer, so matter evolves in formations and relationships that convey meaning to an intelligent observer. It is this element of organization that is too neglected in the theoretical speculations of scientists. The reason for this neglect is due apparently to the fact that organization, in human experience—and what other experience can we utilize?—is associated with intelligence. And the materialist has no place for the principle of intelligence in his evaluations of evolution.

When organization is considered, it is mostly to attempt to reduce it to random forces. (As mentioned earlier, organization or meaning, is not in either physical space or clock time. Consequently, on the basis of the assumption that there is nothing in the universe other than matter-energy, organization or meaning must be dogmatized to be a product of matter.) We are asked to accept then, that by *random* action and reaction over a sufficient period of time, light, with its energy of 186,000 miles per second, could be condensed and precisely organized into the state of matter designated as hydrogen. In like manner, so it is maintained, the higher elements came into existence, followed by the tremendous complexity of the organic compounds associated with the kingdoms of life. The

strained logic of the materialistic position is emphasized by the idea that all this could come about by chance.

We can, however, look at the relation of meaning to matter from another aspect. A human body, which represents the highest level of evolution on this planet earth, contains more information, meaning or organization, than any other matter known to man. And in this body, the cerebral cortex of a human being represents matter in its most organized or meaningful state. When such highly organized matter is subjected to a certain concentration of heat, all the values resulting from human evolution are destroyed. The tissues and organs are reduced to mineral matter. If a sufficiently high temperature could be maintained long enough, the mineral matter itself would be reduced to electromagnetic energy (radiation) and finally to unmanifest energy. In this process, there would be no change in the *quantity* of energy present before the body was subjected to these disintegrating temperatures. But the degree of organization would decrease sharply. The organization is therefore demonstrated to have a nonquantitative relationship to the matter-energy that made up the living body.

It is a striking fact, though techniques are not yet available to accomplish it fully, that a human or any other form, by the removal of its organization, is transformed into the completely mysterious, imperceptible state of no-thingness, or energy. The very quality that is given so little attention by the materialist as he speculates about the beginning of the world—life and evolution—is the factor without which there cannot be a beginning to anything.

Organization, as noted already, is not in the three-dimensional space of the world we perceive directly or indirectly through the sense organs. The quantity of mass-energy in relation to the weight of a form is unaffected by the concentration of information it contains. Matter-energy itself is, however, deeply related to organization or meaning, both as we have seen and as follows.

According to the relativity theory, the total energy of the steady-state universe is constant and is measured in terms of the speed of light. Some of this energy is potentially present in the

chemical elements and all the forms arising from them as given in the equation, $E = MC^2$, where E is energy, M the mass of matter, and C^2 the square of the speed of light.* At any particular moment in the evolving of the universe there is an equilibrium between free energy as light or electromagnetic energy and energy organized into denser matter. Only as the energy of radiation or light is *ordered* into particular energy points and systems does it become reduced to gas, liquid and solids. Thus all manifestation is centered, not in matter or energy, but in meaning. Just as the message of a book is not in the paper and printing itself, but is in the way the printing is organized to express meaning. Matter-energy is essential in order to communicate or objectify meaning, as the physical book is necessary to convey the author's ideation.

Further evidence for the primary value of meaning in material forms is available through studies on the turn-over of matter in living tissues of man and animals.** It has been discovered that the material basis of tissues is constantly changing. This appears to occur as a normal accompaniment of living. By the use of radioactive isotopes, or "tagged" atoms, it is possible to learn how long elements remain in tissues, and so obtain data on the flow of matter through a living body. The turn-over of matter goes on at a higher rate in healthy, young individuals as compared with older persons. Since the matter aspect of the body is constantly changing, this fact alone discredits the idea that matter is the primary value, since something clearly controls the matter and its changes. The turn-over of materials is such that the total matter of the body changes many times during a normal life span. How then can consciousness or intelligence be a mere product of the functioning of the nervous system, when this system is compounded of transitory materials? The *meaning* of the form transcends

*This equation is derivable from Maxwell's non-relativistic electromagnetic field theory, using simply the electromagnetic energy and momentum vectors (the Poincaré and Poynting vectors), i.e. using retarded potentials. *C.M.*

**Meaning, in modern scientific thinking, is closely linked with what is called "negative entropy", a characteristic of living forms. *C.M.*

matter-changes. The same being continues, but not the same materials.

It is interesting to note that in the Einsteinian relativity concept, the concern is with mass in *relative* motion and time. Absolute motion and time are assumed to be nonexistent. Motion and time are viewed as free from any organized body or system. But it is obvious that organisms, or meaningful forms and systems, are the realities of the universe. It is possible to consider physical phenomena below the level of form or systems, but in doing so, we are concerned with abstractions that leave out the essential values of nature. The universe, according to scientific data, is an organized system. This is true whether applied to a galaxy, such as the Milky Way, the solar system, the planet earth, or the various kingdoms of nature. All around us are ordered dynamic systems of matter and energy evolving towards more meaning, more information, or ever-increasing complexity of organization.* The principle of progressive increase in meaning is evident in both organic and mineral evolution.

Thus, the world as an ecological organism necessitates, in contrast to Einstein's concept, some absolute time and motion. For example, time in relation to a developing form, such as the body of a child, is not the clock-time of relativity, but biological time. It is absolute in that it is tied to an individual form that has no exact counterpart in the universe. The same is true with the motion or dynamics of the developing organism. Obviously the same principle applies to the evolution of all forms and systems. Each individual group in its evolvement has its own time and motion, and these cannot be relative to time and motion of other evolutions. Mineral and rock formation time, for example, is enormously slower than plant or animal time, and motion or energy of mineral forms is just as decidedly greater. Motion and time serve to communicate the meaning that emerges from a germ cell in embryological development or through evolution. To neglect absolute time and motion, as is

*It is a characteristic of living forms that this complexity is *hierarchical* in nature. This fact imposes even greater organization on the structure. *C.M.*

done in present-day theories, is to neglect the true source of reality in man and nature. This concept is expressed by Goethe:

> Thus at the roaring loom of time I ply,
> And weave for God the garment thou see'st Him by.

Another factor contributes to the quality of uniqueness in forms and systems. The solar system or galaxy constitutes an organized or systemic entity. Similarly each evolving form, by virtue of position in its space and time, must occupy a particular and individual relationship to the forces of the universe. If we think of a living form or any organized whole, it is self-evident that points in it must have a certain uniqueness. In a dynamic, developing organization, points in time must also be individual. In our solar system, it is obvious that the complex of gravitational and magnetic forces, radiations and possibly undiscovered energies, must be such that points in solar space and time cannot be duplicated. Each entity evolves in conditions that are original or unique to some degree. No two leaves on the trees are identical and, in the mineral world, a study of thousands of snowflakes has failed to discover two exactly alike. A world made up of random elements and forces would not be characterized by such design relationship.

To accept meaning, intelligence or information as the reality in beings and things would not at all negate the objectivity of the scientific approach to truth. Rather, the strange, unrealistic idea that meaning can emerge from chaos by random changes of matter and energy would be exchanged for a concept in accord with reason and experience. Research workers are very much concerned with meaning and order in all their investigations. Physics is necessarily becoming more metaphysical as its research progresses. Chemistry is based on elaborate theoretical organizations of chemical elements and associated energies. And the life sciences are primarily involved with the quality of organization. The materialistic hypothesis certainly does not add to the objectivity of scientific research, but rather brings to it a quality more weird than a tale from the Arabian Nights.

There can be no deterioration of research standards as a result of accepting things as they are. On the contrary.

In this connection, it is well to remind ourselves that the seemingly realistic world we contact through our sense organs is not a primary experience. All forms are the result of organization or meaning, and so can be perceived only by mind, not sense organs. We look at a rose and are under the illusion that the idea of it in our minds is what we receive through the sense of physical sight. But, of course, this is not so. A rose is a meaning, a value, that can be appreciated only by an intelligent observer. Our eyes bring to us only different qualities of brightness and color. No sense organ can possibly react to meaning or significance, since these qualities are not in physical space or time. In verbal communication with each other, we know the message is carried by the vocal sounds, and so, we do not make the mistake of thinking our sense of *hearing* interprets the sound vibrations. But animals, plants, houses, scenery, and so forth, seem to be actually brought to us as they are by the sense of sight. We are not so clearly aware that just as much interpretation is going on here.

It is now evident that as we view the world through the sense organs our minds respond to the meaning qualities implied in the sensory data we perceive. The sense organs bring to us appearances by means of sounds, odors, tastes, and sights; and as intelligences we decipher the meanings those data convey. Man is an intelligent being, first and foremost. Even emotions or feelings are forms of intelligence, since they have the quality of meaning. We are centered in intelligence and can contact only ordered, organized, meaningful situations. This fact in itself irreparably discredits the whole basis of the materialistic hypothesis.

Scientific knowledge has revealed a universe of meaning, plan, ideation, intelligence. The more that scientists are able to translate the book of nature, the more astounding is the wisdom revealed. We can be confident that the previous emphasis on materialism will soon be discarded. Further, it will in fact be through even better science that the strange aberration of

materialism will be removed from human affairs, leaving ma that much more able to develop his intelligence in ways fa beyond our present scope.

Editorial note. *Relevant to the theme of this chapte Chief Justice of the Arizona Supreme Court, Fred C. Struckmeyer Jr rendered an interesting decision on January 19, 1971, in which he uphel the will of James Kidd, and affirmed "a belief . . . in a transcendent Go and in human survival of bodily death" as "more satisfying to the intelle and more enriching to the human personality than its etiolated substitut scientific humanism, the pursuit of which has led to materialism and th lack of moral responsibility."*

This was the final decision in the strange case of the Arizona miner prospector James Kidd, who disappeared in 1949, leaving almost thre hundred thousand dollars by handwritten will found only in 196 eighteen years after he wrote and left it in a safe-deposit box in Phoeni Kidd stipulated that the money was to be used for research into the natu of "a soul of the human body which leaves at death." The Supreme Cou of Arizona agreed with him and denied two lower court decisions whic would have diverted the funds into ordinary neurological research base on the (unproven) denial of an individual soul's survival of bodily death.

See also Chapter 15, p. 234, ff.

The Possible Meaning of Imaginary Numbers

13

Arthur Paul

The present chapter, although it is presented in fairly simple fashion—thus incidentally making it possible for the interested general reader to approach it—touches on several profound questions. One of the abiding aims of mathematics is to furnish the most elementary demonstrations possible of the most recondite ideas.

This essay was written extra-curricularly in 1956 for Professor Morris Kline of the Courant Institute of Mathematics at New York University, where the author was studying. Since then, despite his official duties (see introductory note to Chapter 1), the author has maintained active interests in abstract thought and mathematics.

Professor Kline, a moving force in the design of college mathematics curricula, a knowledgeable writer on the history of mathematics, and Director of the Division of Electromagnetic Research at the Courant Institute, commented extensively on the paper. We are here printing his remarks, followed by the initials M.K., *complete and verbatim, as part of the text, together with some additional editorial comments, designated by the initials* C.M.

Dr. Kline's comments published here by his kind permission—show a conscientious and stimulating teacher. But they show more. The fact that the author's short essay moved a professor of such substantial background to comment extensively and in depth shows how the nerve of key issues was exposed.

According to the accepted definition, "complex" numbers are ordered pairs of real numbers which, when added or multiplied, follow certain agreed-upon rules. These rules stem from the adoption of some conventions which are based on the use of the unit, i, as a qualifying factor of the second part of the ordered

pair of real numbers; and i is, of course, a symbol for the "imaginary" quantity, $\sqrt{-1}$, the square root of minus one. [The "real" number -1, then, is given by $i \times i$ or i^2.]

For triples of real numbers (vectors) and for quaternions three "qualitative" units, i, j and k, are needed and these symbols are defined by rules which, initially, appear to be somewhat arbitrary or contrived. However, algebraic manipulations, carried out in accordance with these rules, have produced results which have been spectacular in terms of technical usefulness. The extent to which complex and hypercomplex numbers can be used to reflect or to predict by abstract calculation many aspects of natural phenomena is amazing. Concepts involving both magnitude and direction, such as velocity, force and acceleration, are readily dealt with by the employment of complex numbers which are also of great use in calculations pertaining to alternating currents. The physical concept of "moment of force" can be handled mathematically by using three dimensional vectors. By means of higher complex numbers techniques have been devised which apply to situations involving four dimensional space. This has enabled mathematicians to deal with various developments in thermodynamics associated with the principle of relativity. In still higher forms of algebra the range of possible application has been extended to n-dimensions and the use of these techniques [of complex vector spaces] in connection with the most advanced concepts of physics has produced startling results.

These triumphs could hardly have been achieved without the use of complex and hypercomplex numbers which depend on qualitative units such as i; i, j and k; or i, j, k, . . . n. Yet even the simplest of the qualitative units, i, is something which itself, does not seem to be properly related to human experience. Its use has been directed in such a way as to keep intact a close relationship with the physical world, but just what it is we are using has not been made clear in a fully satisfactory manner.

Positive whole numbers, resting as they do on the solid foundation of the process of counting physical objects (or, if preferred, elements or things of any sort) are accepted

intuitively with almost no sense of strangeness whatsoever. Positive rational numbers (associated with parts of things) are likewise accepted with little effort. But starting with negative numbers, the *direct* association with objects (or elements) is weakened. The negative number in its simplest form seems to represent the "lack" or "absence" of things.

Of course, neither of these verbally expressed relationships, that of "parts of things" to rational numbers or the relationship of "lack of things" to negative numbers, is a necessary concept for the formal building of the number system. Both rationals and negatives can be constructed by definitions and theorems that depend for their validity solely on those previously established concepts used in connection with the whole numbers. So, in a sense, it is only incidental that the verbal relationships cited above are pertinent. But it is a very happy set of coincidences because the relationships fit in so well with our experiences and we can, therefore, accept the abstract reasoning very easily. Even in the case of the negative numbers, although we have encountered an implied negative qualitative factor (-1), we feel that we know something about that factor especially after we have applied the thought of associating negative numbers with the "lack of things".

A different kind of relationship problem arises with the notion of irrational numbers. The concept symbolized by $\sqrt{2}$ can be precisely and beautifully set forth by definitions that use only the concepts and logical rules that had been previously accepted for rational numbers. The new symbols for real numbers can then be dealt with abstractly and in accordance with a suitable set of new rules. But in the case of many of these real numbers, in fact most, we can't quite pin down their positive real numbers. However, the representation of some of these numbers as hypotenuses of right triangles is a great help; a segment of a line is there to see, even though it cannot be measured exactly by any ordinary units of length.

Transcendental numbers such as π or e are more difficult, but real trouble of a new and much different sort is encountered with the imaginary part of the complex number.

The bringing into use of the square root of a negative number,

a concept seemingly so far removed from direct association with experience, at first frightened many mathematicians, and although a suitable geometrical representation was eventually found for it, basically it still mystifies the neophyte. Great efforts have been made to eliminate this rather normal reaction of mystification but lingering misgivings are apt to continue to crop up in the minds of those who instinctively try to carry forward as far as possible a clear relationship or direct association between the basic tools or symbols used in mathematics and the ordinary experiences of life. It is, of course, possible to perform prodigious labors with a powerful tool without fully understanding the nature of the tool itself. But the greatest artisans (and artists, too) enhance their craftsmanship by acquiring a complete mastery of their tools and this is not achieved without a full understanding of the nature of each tool, the materials with which it is made, its full capacity for use and its limitations.

Granting a strictly formalistic approach there is, of course, little room for mystification. All numbers are abstractions conceptualized by man and defined in such a way as to behave in conformity with certain specified patterns—

> *Very important; yet interestingly enough we are led to complex numbers by [formally] solving quadratics. Of course we could take the position adopted in the Renaissance and earlier that quadratics leading to complex roots have no solution. Nevertheless the suggestion to make something out of these "meaningless" roots does hit us in this way, i.e., through work on quadratics.* M.K.

> *The simplest such quadratic equation is* $x^2 + 1 = 0$ *which yields* $x = \pm\sqrt{-1}$. *Note that* x *can be neither plus nor minus unity for either* $(+1)^2$ *or* $(-1)^2$ *is* $+1$, *whereas the equation demands that* x^2 *be* (-1). C.M.

the scheme having been set up with a view to producing the most useful results. With increasing familiarity with complex numbers and under the spell of successful results, the remnants of early misgivings are apt to be submerged by a growing admiration for the creative ingenuity and the gigantic mental

efforts of those who have contributed to the building of the present structure of mathematics, a structure which enables to-day's mathematical artisans to create abstract but accurate representations of the most complicated and otherwise unreachable processes of nature. Certainly, the line of least resistance is to accept as basic a symbol as i without further questioning, and to go along with the prevailing opinion that the imaginary numbers are no more imaginary than the real numbers and that the real numbers are just as unreal as the imaginaries. Nevertheless, the fact remains that in using complex numbers—forgetting for the time being the added complications of vectors, quaternions and n-tuples—we are dealing with a symbol, i, which is troublesome to the kind of mind that prefers to carry along as far as it can some vestige of a *feeling* of relationship between the basic symbols that it employs and its recollections of living experiences. Goethe expressed this thought in a much better phrase when he said, "the mathematician is only complete in so far as he feels himself the beauty of the true".

The more accustomed one becomes to formal abstractions the less troublesome is this gap between symbol and experience. Hardened formalists insist that there is no longer any problem. Everything has been satisfactorily taken care of by carefully worded definitions and postulates that have been devised in such a way as to be remarkably successful, and the logic of the structure is compulsive in carrying forward each step. But let us look into the matter a little more closely with a view to determining whether, perhaps, the formalist approach could be supplemented by some intuitional thoughts that might make the basic symbolism more "complete", in the organic sense in which Goethe may have used the word, without disturbing the superstructure.

Returning to the standard definition of a complex number referred to in the first paragraph and amplifying it a bit, we can describe the ordinary complex number as a linear combination, $x \cdot 1$ plus $y \cdot i$, which is formed by two different units, 1 and i, by means of real parameters, x and y*. Now usually we all feel

*See Felix Klein, *Elementary Mathematics from an Advanced Standpoint* vol. 1, p. 58.

that we know enough about the integer 1 to be able to cope with it without suffering from any lack of "completeness", but with the other unit, i, it is different and when we get to i, j, and k, as used in the formation of vectors and quaternions, although everything is formally admissible and everything comes out all right as far as the establishment of new relationships to observable phenomena is concerned, nevertheless we are apt to go through a difficult period before we decide to go ahead even though we may not yet have a sufficiently valid *feeling* in regard to the nature of the symbolic tools that we are using.

We should also note that a new adjective has cropped up in the language used in discussing numbers that are outside of the real number system. The i, j and k of the quaternionic units are referred to as "qualitative" units by some writers. But they are *qualitative* units the nature of whose *qualities* is unknown to us. Another point to be noted is the abandonment of the concept of ordering in the field of complex numbers which itself implies a basic difference in the characteristics of the numbers. Recognition of the importance of this difference has brought forth the suggestion that the phrase "complex quantities"* should be substituted for "complex numbers". There seems to be a concerted effort to get as far away as possible from the word "imaginary". One proposal is to adopt the "healthier sounding" phrase "normal numbers" which it is hoped "will divest these perfectly innocent numbers of the awe-inspiring mysteriousness which has always clung to them."** But one senses an undercurrent of over-zealousness in these efforts to justify the conclusion that because the results are useful and successful there is nothing more to say about the basic symbols. In fact sometimes one is tempted to reply to some of these comments by pointing out that the author "doth protest too much, methinks"

*Edward V. Huntington, "Fundamental Propositions of Algebra," in *Monographs on Topics of Modern Mathematics*, p. 200n.

**A. Dresden, *Invitation to Mathematics*, p. 85.

The words imaginary and complex are bad in any case; they are kept for historical reasons. The word number is not so bad if we take into account that the word is now used in an extended sense. M.K.

It is this increasingly deepened use of the word number that by all evidence points the way to the evolution of mathematics itself. Poncelet deepened projective geometry immeasurably by the use of imaginary quantities, and these same hypernumbers enabled Cayley to unify metric and projective geometry. They are also indispensable to physical theory as Dr. Wigner in his chapter has already made clear. Indeed, hypernumbers even beyond $\sqrt{-1}$ *are fundamental in the description of particle and radiation interactions, where they usually appear as matrices. But their hypernumber form is frequently simpler as our 1970 lecture at NASA's Ames Research Center showed (see also the related portions of Chapters 8 and 26). Each kind of hypernumber adds a metadimension to mathematics itself, as well as a whole new algebra and theory of functions. In all this development the simple fact remains that a number is always an entity that is susceptible, in some definable fashion consistent with all previous arithmetic, of the operations of adding, subtracting, multiplying or dividing two numbers of specified magnitude.* C.M.

In spite of slight signs here and there of reservations about the basic nature of complex numbers, most mathematicians seem to be fully satisfied with the situation. The justification usually cited for this satisfaction is Gauss' development of the geometrical interpretation of complex numbers. This seems to have added a touch of "completeness" to the concept. For Gauss, himself, the right to operate with complex numbers was fully justified by his geometric interpretation of the operations.* The prevailing opinion today is that Gauss succeeded in taking the "imaginary" out of the complex number and put an "image" in its place.**

*See Felix Klein, *Elementary Mathematics from an Advanced Standpoint*, vol. 1, p. 58.

**Lee T. Dantzig, *Number, the Language of Science.*, p. 202.

Gauss was not really satisfied until he got the definition in terms of couples of real numbers. Then he had an arithmetic definition of complex numbers and he also realized that the concept of number was being extended to a non-intuitive but useful concept. M.K.

It was William Rowan Hamilton who in the mid-nineteenth centu firmly established the notion of a complex number as a pair of real numb s. What Hamilton and those who followed his lead did not sufficiently stress, however, was that so-called "ordinary real numbers" in their co s did not obey the laws of arithmetic for ordinary or real numbers. W at is being done in such a scheme is writing down a pair of coefficie which multiply respectively and in order the numbers 1 and $\sqrt{-1}$, *th ter—not a "real" or ordinary number—being the distinguishing c cteristic of all imaginary numbers. The device of couples of coeffi ts is thus merely a semantic device and in no way "reduces"—as is sometimes said—the arithmetic of imaginary numbers to that of real nu s. The fact remains that* $\sqrt{-1}$ *generates an infinite array of numbe negative and positive, none of which lies among the infinitude o inary numbers, and all of which obey fundamentally different arithm laws.* C.M.

The graphi presentation of complex numbers on the Gauss-Argand gram is, of course, a great help in clarifying the nature of perations with these numbers. It furnishes pictures that n be looked at and which can be directly associated with e operations as set forth in the definitions. By constructing pa llelograms, by rotating sides of angles or the axes themselves, by extending the modulii, all kinds of representations of operational results of the agreed-upon rules of calculation n be graphically represented. Geometrical pictures can a be drawn to represent the algebraic symbols used in dealing with three dimensional vectors. But that is just about as far as graphical representation can go. For higher complex numbers we must rely on algebraic symbols alone, which, from a formalistic point of view, are just as satisfactory. In fact the que tion remains whether the Argand diagram really did add anything of a fundamental nature to the clarification of the significanc f the new unit, *i*. In the place of the symbol, *i*, has been substituted a segment of *y*-axis line.

It is worth while to observe here that the idea that the imaginary axis is the same as the ordinary Cartesian y-axis causes confusion which has not been sufficiently guarded against in our curricula. If the x-axis is considered as the axis of real numbers, its points indeed behave as the ordinary Cartesian x-axis. But the y-axis considered as the axis of imaginary numbers no longer can be identified with the Cartesian y-axis, and should properly be called the iy-axis, since the squares of all coordinate points on it are coordinate points on the negative x-axis. This is not the case for the squares of coordinate points on the ordinary or Cartesian y-axis. It must be thoroughly realized that the complex coordinate plane formed by the x-axis and the iy-axis has very different properties from the Cartesian coordinate plane formed by the x- and y-axes. The two planes (x, y and x, iy) must be carefully distinguished and are actually perpendicular to each other in complex space. C.M.

Now the unit segments of the x-axis which are to the right of the point representing zero stand for sets of objects, or elements, otherwise represented by positive integral numbers. To the left of zero the unit segments stand for the negative numbers which we have associated with the "absence" of these objects, or the "lack" of them. In accepting this interpretation we have already extended our intuitional approach more than abstract symbolism requires but this extension need not detract from the rigor of the formal structure. Actually it bolsters it because it fits in so well with our experience. We are all familiar with the absence of things, particularly those which are related to our basic needs for living.

But when we get to the other units of the Diagram, those above and below the zero point on the y-axis, we seem to have dropped some links in the chain of instinctive association of our symbols with living experiences. We pick up pieces of the chain again when we find that properly defined algebraic manipulations with vector quantities do represent accurately the behavior of forces or alternating currents or acceleration and we soon become content to move on without bothering to expend the time and effort necessary to fill this gap in our intuitional background.

The geometrical interpretation does *seem* to make the complex field a more natural and intuitive development.

Actually all it does is substitute geometric for algebraic symbols and from a strictly formalistic viewpoint even this was unnecessary and is perhaps a waste of time.

The geometric interpretation may be seen to do more, for it introduces an angle defining the relative orientation of two numbers. Ordinary numbers are all oriented in a single direction or its opposite, whereas complex numbers may be separated by angles other than zero. Algebra does not show this as clearly or easily as geometry. C.M.

What then could be a greater waste of time than trying to find some way of relating the unit, i, more directly to living experience? Even though the unit has frightened some people, mystified others and seems to have bedazzled as great a genius as Liebnitz, it works and is therefore useful and its use fits in with the observable patterns of nature, so why knock one's head against a stone wall by worrying about it any longer?

Nevertheless, as long as we have had the temerity to raise the question at all, let us be truly foolhardy and rush in to places where rigorously modern angels would fear to tread.

First we shall examine the genesis of the analytical representation that is reported to have been used by Wessel and Argand before Gauss adopted it and rounded it out to become the accepted geometrical interpretation of complex numbers.*

In elementary geometry there is an easily provable theorem which shows that when a perpendicular line is dropped from the apex of a right angle to the hypotenuse of right triangle, then the perpendicular line is the mean proportional between the segments into which it divides the hypotenuse or as illustrated by the figure at the top of page 189.

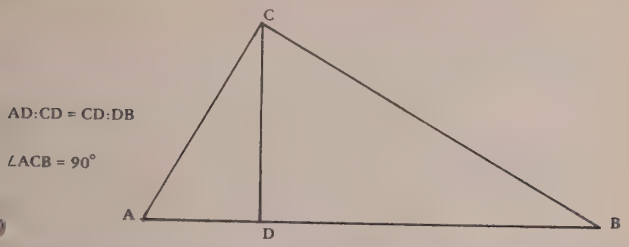
Performing a simple operation on this equality we get

$$CD^2 = AD \cdot DB$$

or

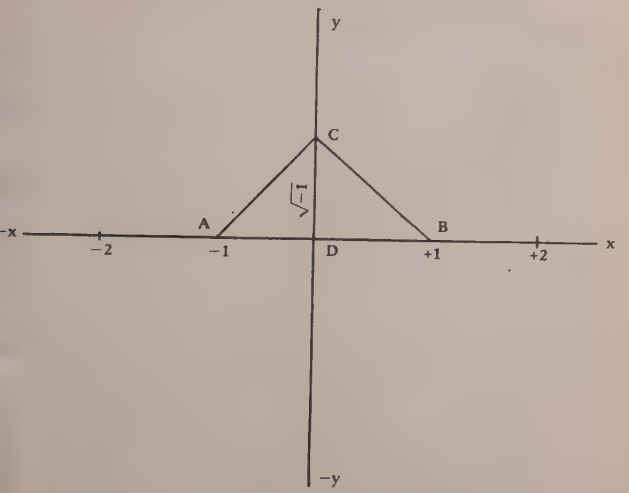
$$CD = \sqrt{AD \cdot DB}$$

*See Kasner and Newman, *Mathematics and the Imagination*, p. 100.



CD (the perpendicular to the hypotenuse) is known as the "geometrical mean" between the segments AD and DB.

Based on the above theorem the following relationships can be shown to exist in the plane set up by the ordinary Cartesian axes of analytical geometry which have been borrowed by the users of the Argand Diagram.



In the right triangle ABC, CD is a perpendicular dropped from a right angle to the hypotenuse AB and therefore:

$$CD = \sqrt{AD \cdot DB}$$

But, on the diagram AD represents minus one and DB represents plus one.

It might be somewhat clearer to say that the line DA *represents minus one, and DB, plus one, since the point D represents zero, and negative units are measured from zero in a direction opposite to that of positive units.* C.M.

Therefore, substituting, we get:

$$\text{CD equals } \sqrt{\text{plus 1} \times \text{minus 1}}$$

and

$$\text{CD equals } \sqrt{\text{minus 1}}$$

or i which establishes a relationship between the unit factor of the y-axis and that of the x-axis. In geometrical terms the relationship is that of a geometrical mean between the unit factor (minus 1) of the negative side of the x-axis and the unit factor (plus 1) of the positive side.

Plotting complex numbers on the Diagram has been a very satisfying way of *picturing* vectors and what they stand for. But does it really tell us what the unit i represents? No, it doesn't but what it does seem to indicate is this: assuming, for example, that the units to the right of the origin on the x-axis to be related to a set of physical objects and the units to the left to the absence of the objects, then the units running up the y-axis would have a kind of relationship to the other two, the clue to which is found in the concept of the geometrical mean. Even if we make the whole analogy more abstract and substitute "elements" for the "physical objects" represented by the positive side of the x-axis and use "lack of elements" for the negative side we would still find a relationship which would be based on the proportion:

$$-1 : \sqrt{-1} \qquad \text{as} \qquad \sqrt{-1} : \text{plus 1}$$

Putting the relationship illustrated by the symbols into words we get: *lack of an element* is to *something* (symbolized by $\sqrt{-1}$) as that *something* is to the *element*.

Perhaps we have not searched carefully enough to try to find out what this *something* is. Certainly Leibniz must have been thinking along these lines when, in his oft-quoted remarks about the imaginary root of a negative number he referred to it as: "that amphibian between being and non-being"* (and in some translations of this quotation the word "mean" appears instead of "amphibian").**

The problem now becomes one of finding some concept that can be put into words which we might be able to *feel* instinctively to be represented by the geometrical mean between an object and the lack of an object (or between being and non-being).

One suggestion that has been advanced† is that the *something* that we are looking for is the *idea* of the object (or the element, or the thing). In other words, the concept of a single thing (or a single element) is properly represented by the symbol $\sqrt{-1}$ which, using geometrical symbolism is a segment on the y-axis and carries with it the relationship of a geometrical mean between the positive and negative unit segments on the x-axis.

I do not believe this suggestion is helpful. M.K.

This point interestingly raises the entire question of the interpretation or meaning of mathematical concepts. The usual viewpoint is that any such interpretation should have application or use in natural scientific theory or practice. Quite aside from agreeing or disagreeing here, the foregoing paragraph leaves room for the interpretation of mathematical notions and symbols on a level not necessarily restricted to the physical sciences but embracing psychology as well.

*See T. Dantzig, *Number, the Language of Science*, p. 204.

**See Dubisch, *The Nature of Number*, p. 85.

†By Arthur M. Young, in an unpublished paper. [Mr. Young's essay "The Geometry of Meaning" sprang from this leading idea. *C.M.*]

The first definite suggestion of this sort was made in 1912 by the mathematician and chemist H. Stanley Redgrove when he was assistant lecturer in mathematics at the Polytechnic, London, his previous scientific work having been on the calculation of thermochemical constants. Redgrove suggested then that: "Just as 'real' numbers may be used symbolically to express the various things of the physical world, so, in a similar manner 'imaginary' quantities may be used symbolically to express the various things of the metaphysical or spiritual world . . . whereby we may . . . employ mathematical methods in the elucidation of metaphysical problems . . . . If some 'real' number be regarded as representing a certain material thing, then the corresponding 'imaginary' quantity, i.e., the product of this real number and i, *may be regarded as representing the ideal prototype of this thing."*

One of the outstanding mathematicians of our century, G. H. Hardy, reindorses such an approach, observing that "a man who could give a convincing account of mathematical reality would have solved many of the most difficult problems of metaphysics." (A Mathematician's Apology, *p. 22)*

In our investigations of hypernumbers we have found in general that the further we go beyond i *or* $\sqrt{-1}$, *the more the mathematics has significance in terms of the nature of consciousness rather than in terms of the properties of mass and energy, to which the lower hypernumbers and the so-called real numbers principally refer.* C. M.

This would lead to the further suggestion that the negative unit of the *y*-axis represents the "idea of the lack of the element". To pursue the matter much further opens up fields of semantics, metaphysics and logic that are far beyond the scope of this exposition; but as an example of some of the points to be examined, the following question should be considered: Is it too far fetched to think of a 90° rotation as changing (by an operation) some symbols representing elements (or objects) into symbols representing the concept of those elements (or objects)? Wasn't something like that done when negative numbers were introduced (as a result of an operation) and came to be thought of as the *lack* or *absence* of things.

The germ of some thinking, somewhat along these lines is perhaps contained in the following quotation from the mathe-

matician Philip E. B. Jourdain* "The truth is that i is not uninterpretable. It represents an operation, just as the negative numbers do, but is of a different kind." The question is, What does the operation, the transformation based on a 90° rotation, really stand for?

[Instead of "stand for" I suggest] "do".

Jourdain's idea is not Young's [or Redgrove's, but that] complex numbers can be used to represent rotations where this representation is useful, as in alternating current theory. M.K.

The notion of "use" so interestingly introduced here need not, as pointed out in a previous comment, be restricted to the physical sciences. The fact, however, that the lower hypernumbers, including complex numbers, do have not only use but necessary and fundamental application to electromagnetic and particle theory is extremely important. This fact establishes that all forms of the number concept, however unfamiliar, play a role in the nature of the cosmos.

As Ch. 7, 8, 9 and 11 show, the nature of consciousness cannot validly be separated from the nature of the cosmos. This important conclusion reinforces our previous observation that the higher hypernumbers find their applications principally in the nature of consciousness. C.M.

No doubt thoughts such as those expressed here were far from the mind of the author just quoted, but if we can think through the nature of more familiar operations such as those leading to negative numbers and describe what they stand for in words as well as symbols, why should we shrink from the task of interpreting i, not just as an abstract operation but as a factor which creates a change in our basic symbolic representation for which a satisfactory meaning might be found.

The suggestion of searching for an intuitively acceptable meaning for the unit i is put forth not only because its achievement might possibly contribute toward "completeness" in the sense already used but also in the hope that the proper

*See the "Nature of Mathematics" in vol. 1 of Newman's *The World of Mathematics*, p. 30.

answer might suggest new relationships whereby mathematics could be applied to fields in which its techniques are not yet established.

Before concluding we should call attention to another phrase used by Leibniz in the same passage from which we have already quoted.

This additional phrase foreshadows the thought that what is represented by the "imaginary" root of the symbol which stands for the *lack* of a thing may be the *concept* of the thing. In referring to the square root of a negative number, Leibniz, in addition to speaking of it as the amphibian between being and non-being, describes *i* as "that portent of the ideal world" Stretching the phrase "ideal world" as used here to mean "world of ideas" the thought expressed by the phrase would fit in nicely with the suggestion that an operation performed by the unit *i* can turn a real number, which is the symbolic representation of an object into an "imaginary" number, which is the symbolic representation of the idea or the concept of the object.

I believe that your main point is good and important, namely, that where mathematics gets to negative, irrational, and complex numbers it departs radically from concepts which are intuitively familiar and readily understandable. But I do not believe that one can profitably pursue the idea that complex numbers are the ideas of real numbers. The correct view is one you also mention. As one proceeds to more advanced concepts in mathematics he must get to appreciate that he is getting to man-made concepts which, though lacking in intuitive appeal, can be used to represent physical phenomena and to reason about physical phenomena. Thus complex numbers can be used to represent and reason about forces, alternating current, etc. But this fact is also involved in other mathematical creations which seem to bother people less. An example is a matrix. On the other side, when mathematics uses a four-dimensional space as in relativity, trouble again arises because intuition is lacking.*

Ultimately one must acquire the more sophisticated view of mathematics

*Rather, man-discovered. As G. H. Hardy wrote: "the theorems which we prove and which we describe grandiloquently as our 'creations', are simply the notes of our observations." (pp. 123-124, *A Mathematician's Apology*, Cambridge University Press, 1967). *C.M.*

which I have mentioned. Mathematics rises above simple intuitions and employs concepts which are non-intuitive, or formal if you like, and yet these concepts are useful.

A pursuit of this whole matter really should involve the question: What is really intuitive? When we say that the whole numbers and fractions are intuitive I believe we mean intuitive for people with certain experiences which are common to modern Western man. But there are and were primitive societies which never got to understand large numbers or operations with fractions. These societies would balk at the statement that large whole numbers and fractions are intuitive [i.e. self-evident]. Hence perhaps what we should recognize is that intuition is the product of experience and education and one can reach a level where the complex number is intuitively acceptable. M.K.

This last thought of Dr. Kline's is extremely interesting and suggestive. It also implies that by a more significant and meaningful educational process, a society could produce, by teaching important ideas early and clearly enough, what less enlightened and cultivated societies would call a very high percentage of genius. Such a development would demand a very clear understanding of the fact that all algebras possess geometric and topological meaning and non-arbitrary representation. This understanding would then prepare the way for isomorphic models of profound ideas -thus conveying those ideas and their relationships into young minds with minimal burdens of terminology and verbiage. The most intelligent children then would not be intellectually deformed as so many now are into facile word jugglers. Rather they would be able to develop the ability to grasp ideas themselves and to think genuinely with imagination joined to logic.

We have found by actual pedagogy that the analytic geometry of hypernumber spaces, orbits and forms, together with studies and models in the geometry of three and more dimensions, provide the readiest and the most attractive and powerful means of promoting such an educational development. Education in this sense is actually the acceleration of human evolution. That acceleration in turn is a noetic process since man's special characteristic is his quality of mind. Things urgently needed often come to pass. Let it be so with such a program for advancement of insight for our children who, without considerably deeper understanding than the human past has shown, will scarcely be able to negotiate the crises—ecological, political and psychological—now facing the human race and, by conservative projections, due to climax by the end of the decade. C.M.

COMMUNICATIONAL CONTEXTS FOR MAN

III

Introduction

The following chapters highlight the key role of consciousness or awareness in the process of communication which, like friendship, is also a two-way street. As Nicole Maxwell shows us in her psychological and human art that conceals art, to be truly *aware* of another culture is the golden door to real communication with its members. Such human communication is based on that insightful seeing of the other fellow to which the more formal, preceptual, and often too fearful word "respect" does not do noetic justice. The quality and warmth of consciousness is the key to communication. *What* we say then, surprisingly enough, is of secondary importance. Through the channel of the *atmosphere* established by such resonant understanding, any program within reason may be communicated without the usual losses in energy and meaning due to bad faith, rancor, stiffness or fear. There is little doubt that the tongue follows the heart. If the consciousness that is established be good, so will the talking and its results.

Communication depends also on a *continuity* of meaningfulness, intent and appropriateness—hence on a close continuity of awareness. With too sharp jumps in either of these three factors, communication breakdowns tend to occur. In this sense, the sustaining of the meaningfulness of life for the individual, through a conscious survival after the dissolution of the physical body, is a side of the communication-as-consciousness theme that vitally engages all of us. Helping to make this communicational bridge understandable to those of us here at one foot of it—as do Professor William Hocking and Dr. Charles de Montet so well—is part of the meaning of that theme.

Another part is the noetic analysis of human language, a fascinating excursion into which realm is expertly led by Dr. Joel Elkes. Sometimes, to paraphrase Lao-tse, the best communication is not to talk. Thus the communication of health in an epidemic lies in *stopping* the communication of the disease.

The criminal-rehabilitation problem, on the other hand, is ameliorated always by more rather than less communication. Here quarantine (imprisonment) exacerbates the disease—for criminal behavior arises from a pathologically intense feeling of isolation from others and their concerns, and hence an indifference to their welfare.

There is also the more subtle problem that the definition of what is criminal for a given government or régime may be simply a reflection of the tyranny and paranoia of the ruling group of that régime. In that case, the communicational lifeline of good faith between a people and their government is eroded into nonexistence. To prevent that decay of vital communicative awareness is part of the key function, in terms of consciousness, of the criminal defense lawyer, who above all symbolizes society's awareness of the importance of the individual. Another part of his function is the ability to understand, to communicate with the criminal, and to empathize with his problem even when not endorsing his conclusions. (Empathy is not endorsement, and the distinction is vital.) Phillip Becker shows us how communication with the criminal not only throws light on pathological behavior, but how it also prevents the level of social consciousness from descending into the misery of tyranny.

In the communicational-consciousness picture, the future of the large-scale state of affairs—the theme of chapter 19—is of most interest at the present crucial period in world history. Of equal interest is the fact that more *awareness* of what is at stake can uniquely help direct that future—ecology-awareness, manifested as a constructive dialogue between man and the natural environment. Louis Clapper and George St. George guide us here, in what is fast becoming an historic issue of the late twentieth century—one that will ultimately be decided by the level of consciousness that man can gain in the next few critical years.

Here the prophetic words of the great social thinker James Greaves, born almost two hundred years ago, can help us. Greaves' conversation was compared favorably with Coleridge's, and he exerted a deep influence upon a circle of contemporaries

by his life and personality. He was a friend and long-time correspondent of Amos Bronson Alcott (father of Louisa May Alcott), through whom his influence probably spread to Emerson, and to Thoreau. The words we are talking about are from a letter Greaves wrote on June 24, 1841 (*Letters*, London, 1845):

> All that we are asking for society, as society, we must ask for man, and far more. Suppose all given to society that we ask for, all going on as progressed, yet man would not be satisfied . . . . Man wants what society did not deprive him of, and far more . . . . Man did not lose a system, nor any systematic advantages, he lost a nature . . . .
>
> We sadly mislead man when we offer him success [in the world] and not the nature he needs . . . . Before society can be reorganized, it is necessary to reorganize the elements with which it is composed. Now, men, women, and children are these elements . . . . Love will realize man as harmony, provided he seeks to be associated with it. . .
>
> Each individual must for himself seek this reconciler . . . . This is not a social or a societarian measure, it is of the will of each. There is no mode of social union that can be a substitute for this individual union.

Finally, as to social and technological "progress" without individual human dignity, Henry Thoreau asks, "Why should we be in such haste to succeed in such desperate enterprises?" [e.g. polluting the earth] and then supplies a beautiful alternative:

> If one man does not keep step with his companions it is perhaps because he hears a different drummer. Let him step to the music he hears, however measured or far off.

C.M.

Search for Miracle Drugs Among the Indians of the Amazon

14

Nicole Maxwell

The author is the remarkable explorer and member of the Royal Geographical Society who traveled deep into the Peruvian jungles of the tributaries of the Amazon searching for medicinal plants used by the Indians from time immemorial. This chapter is an account of her journey, compiled especially for this book.

During Mrs. Maxwell's ten-month jungle journey, she encountered triumph and frustration in her quest for the ancient miracle drugs. She returned bringing many plants vouched for by the witch doctors—to treat burns and abscessed teeth, to ensure fertility, and even to prevent conception. "The pill" was long in the Mato Grosso country. Mrs. Maxwell's adventures are exciting, often amusing and always delightfully human. See also her book Witch Doctor's Apprentice *(Houghton Mifflin).*

Since the following material consists of appropriate selections, there are a number of breaks in the continuity that will be obvious as such.

I was interested in the Witotos, possibly because I had had a chance some years before to spend a few days among them and knew that they had a considerable knowledge of jungle medicines. They are a big nation which originally resided between the Putumayo and Oaqueta Rivers in Colombia. During the days of the rubber boom, the great rubber combines pressed thousands of them into service as *siringueros*, rubber gatherers. Now they are scattered, some in Colombia and some in Peru, and although almost all the groups have had some contact with civilization, the majority of them cling to ancient tribal customs and beliefs. They still live in the vast communal houses that are

Maina children listening to radio, Rio Macusare, Peru. *Photograph by author.*

hor-Explorer Nicole Maxwell with baby coati mundi converses with Saucali, Maina an chief, in the region of the Amazon tributary Rio Macusari.

thatched to the ground, use palm-fiber hammocks for beds, favor polygamy, and at evening meetings of the men's secret societies teach the wisdom of their ancestors to the younger tribesmen. And some still practice *couvade,* an obstetrical system with a reverse twist common to many of the tribes of the Amazon Basin. When an Indian woman feels her baby is about to be born, she simply has it. As soon as she has washed herself and her baby, the child's father takes to his hammock and remains there from three days to two weeks, depending on which tribe he belongs to. It is the mother's job to care for him tenderly, in addition to doing her regular work and nursing her new baby. The Amazon is a man's world.

In the old days, Witotos didn't bother with clothing. They used only paint and bracelets of fiber and seeds for adornment. The men wore only G-strings and on festive occasions added feather crowns and weird masks. Ritual cannibalism was practiced only when an enemy of great strength and courage had been killed. Then his brain was removed and ground to a pulp with various herbs and spices. The mixture was eaten in a solemn ceremony by the chief of the victorious tribe. Later he regurgitated it.

I had heard that although the Witotos in Peru had given up warfare and their more savage customs, there was still one small group in Colombia, not far from the Putumayo River, who still lived exactly as their ancestors did and forcibly repulsed any contact with whites or even civilized Indians of their own language group. These were the Witotos I wanted most to meet. Not so much because I thought it would be easier to get plant secrets from them, but just because I've always wanted to meet a cannibal. Especially one who wouldn't eat me. These boys wouldn't. I'm no strong, brave warrior.

I got through that part of the interview smoothly but began to founder when Pancho asked me about the religion and legends of the Witotos. They have a vague concept of an evolutionary process in the development of both men and plant life. I had been present at the Witoto festival of the pineapple in which the men chant its history. In the beginning, according to their litany, a hard, bitter-tasting, pineapple-shaped plant grew

on the barks of trees. The ancestors of the tribe cut this away and planted it in the earth where it made roots. Every year they selected seeds from the largest plants and put them back into the earth. As the fruit grew larger its flavor improved, until finally, by selective planting, they had evolved the pineapple.

The story of animal evolution I had got secondhand from a man who had lived many years with the tribes and who admitted his interpretation might be erroneous. The Witotos have a separate language for religious concepts, and although they were apparently willing to teach it to him, they couldn't. They had no Spanish and everyday Witoto has no words to express abstractions. However, for what it was worth, I tried to explain it as I had heard it to Pancho and his whirling, nervous tape recorder. In the beginning, the world had been a molten mass. It cooled and solidified and then the first animal life broke through the crusty surface in the shape of a little, wiggling tadpole. At that point I boggled. I couldn't think of the Spanish for tadpole. I asked Pancho in English. After all, though he speaks several languages perfectly, Spanish is his native tongue. But Pancho couldn't think of it either, so we just burbled for a while. Finally, we compromised on "infant frog, before it has legs" and then I went on to explain that this was the first animal which later developed, in the Witoto belief, into all other animals. But man, I had heard, came differently—in a whirlwind, spiraling down from heaven . . . .

To me the striking difference between the consciousness of Amazonian tribes and "civilized" people is the former's awareness of and respect for the forces of nature. Until we get at them they have a curiously heightened sensibility. And they do not believe that consciousness is characteristic only of higher forms of animal life. The Backster effect* suggests a small part of the things they have always taken for granted . . . I have only listened; I've never attempted any analysis. . . .

*I.e., Cleve Backster's report of telepathic plant responses, to be compared with the much earlier work in plant sensations described in chapter 10, by Sir Jagadis C. Bose. The above paragraph was written by Mrs. Maxwell in a letter to us of February 1971. *Eds.*

"They say you no tie it up," Antonio, the hereditary chief answered. "You wear loose like Witoto women. Look more good."

I said it was too hot that way. He translated and everybody nodded. They were all in a good mood, so I decided that if they could show such interest in my coiffure, I could be personal, too, and ask them why the older Witotos have such magnificent teeth while few of the younger ones do. The women, especially. By the time they are the young-married set, most of them have nothing but gaps in front. Everybody started to talk at once, but Antonio stopped them. The secret was *yanamuco,* he explained. Yanamuco is a tree and if you chew its leaves, now and then, your teeth will never decay.

Washing my hair was a new way to get a specimen, I thought, trying to repress my excitement. "Just what I need," I exclaimed, and showing off, I turned to two little naked, brown boys and said, *"Una yanamuco, ho. Guya cadi cooey. Una yanamuco. Makarita."* That means, "Bring me a yanamuco, you. I want to eat. Bring yanamuco. Get going!" It was almost half my Witoto vocabulary and I was proud of it. The boys understood, too. They let out a hoot and ran off giggling. Everybody was laughing, but they always laughed when I tried to speak their language. Only this time the laughter didn't stop when I stopped talking. It got worse. Men stamped their feet and slapped their thighs. Women hugged themselves and rocked, shrieking.

In a moment, the boys were back again. When they handed me some branches with shiny green leaves, the laughter reached its peak. A couple of men collapsed with laughing, and rolled on the ground. Even Antonio was too far gone to speak. He grabbed the leaves out of my hand, making negative gestures.

I was puzzled. Must have a horrible taste, I thought. That's why the younger generation can't take it. I'll show them the *gringa's* no sissy! I stripped off a handful of leaves from one of the branches. Before I could get them to my mouth, Antonio gasped, "No, señora, no, no! Wait!" He took a deep breath and got himself well enough in hand to explain.

The leaves really do prevent caries, but a short time after you have chewed them, your teeth turn as black as shoe polish and stay that way for at least a week. Then the black slowly begins to wear off, and after a lengthy speckled period, the teeth are whiter than ever. Black teeth were fashionable in the old days, but the younger generation refuses to chew yanamuco.

What a joke on the Señora! Everybody started bellowing again. Me too this time. I knew something they did not know. I have two porcelain caps right in front, and yanamuco might not have affected them. Black teeth would be funny enough—but black and white? So I ran upstairs and put the branches in my press. If they could only isolate the anti-caries factor! I was feeling pretty excited.

After that, we knew each other better. They no longer hovered outside in the darkness when I played my little portable radio at night, or perched, half hidden, in the branches of nearby trees. Now they settled on the steps, or came up to sit on the porch. And my plant collection began to grow in direct proportion to their confidence in me. By the time we left to go up the Napo to the Tamboryuco, they had brought me a half-dozen plants, all with unpronounceable names. The root to cure rheumatism had already been studied and the nettles to be rubbed on the site of any muscular pain didn't seem very appealing. It was the old histamine-forming principle, only more so. The nettles make a terrible rash. Personally, I think itching is as bad as aching. Anyway, every drugstore is stocked with histamine-promoting unguents whose action is sufficiently controlled to cause no irritation.

Antonio brought me one of the plants one evening when we were sitting on the wide veranda. I saw him beckoning and went down the stairs. He had a little tuft of pale green leaves which he handed me as though it were something very valuable. This he explained, had saved his son José when he was only two. The boy had upset a full gasoline lantern, which exploded, burning his head and upper chest. Antonio's uncle, the great witch doctor, had run out into the woods and brought back the plant. When he put a poultice of the pounded leaves on the burned area, the child stopped crying and went to sleep. The burns

healed with astonishing speed and the child grew up with never a scar. "You see him. Look good, no? Without my uncle's leaves, he now ugly, maybe dead."

I said yes, José was a handsome boy. The leaves must have much power. I thanked him effusively. But when I put them in my press, I was rather dubious. Sure, the boy was fine-looking. He had no scars. But he was fifteen now. It seemed very likely that the injury had been greaty exaggerated.

I should have known better. I should have known that anything Antonio offered would be exactly what he said it was. But it wasn't until a month or more later, on the Putumayo, that I realized the value of this specimen.

I showed the contents of my press to a mission-educated Ocaina woman named Maria, hoping to infect her with the collecting fever. When we came to Antonio's plant, her face lit up. "That leaf," she said, "that save me!" She told me that about eighteen months before, she had upset a pot of boiling stew, scalding her legs horribly. For a month, she'd been confined to bed. When an Indian woman stays in bed, it's serious. .

One day an old woman from a neighboring clan came to visit. When she saw poor Maria's condition, she said she could cure her. The woman went off into the brush and was gone until after dark, returning with a basketful of the leaves. As soon as the poultice was applied, Maria told me, the pain stopped. "Next day I walk," she said, beaming. "Now you look."

She showed me where her legs had been burned, from knee to instep. I couldn't see anything except smooth, brown skin, but we were sitting in her house where it was rather dark. I made her come out into the sun, put on my glasses, and examined the legs carefully. There were no traces of the accident. The skin was as smooth, as golden brown in one place as in another. No sign of a scar. I felt I owed Antonio an apology . . . .

Now, for the first time, I got definite instructions on how to locate a medicinal plant I had heard about in the Ecuadorian jungle years before. Whenever I had gone back to the wilderness I'd ask about it, but it was little known, and it sounded so very

too-good-to-be-true that I had just about decided it was another rumor until I met Corporal Blas of the Peruvian Police in Iquitos. The plant was a do-it-yourself tooth extractor.

When I asked the Corporal if he'd heard of it in his long years as a jungle cop, he said, "Sure, look!" He opened his mouth wide and pointed to the place where a large molar should have been. Eight years before, he and another policeman had been tracking a criminal through the forest. It was a case of abduction. The husband of the Indian woman who had been carried off had come along to help the police. In the middle of the first afternoon, the Corporal got a terrible toothache. He didn't say anything about it until it was almost dark and they stopped to make camp. When he complained, the Indian said he could fix it so it would give him no more trouble. Borrowing a flashlight, he went off into the brush. When he came back, he brought a leaf in which he had put a gob of some brownish, sticky stuff and a few wisps of kapok. He told Blas to put a little of the brown goo on a bit of the kapok and wad it into the cavity of the tooth that hurt. But he warned him repeatedly not to let the resin touch another tooth.

Blas followed instructions. The minute the substance hit the exposed nerve, the pain stopped. "It just felt very, very cold," Blas told me. "But it never hurt again." The Indian told him to leave the application in place for twenty-four hours, then he could take it out.

Soon after that, the tooth began to break up. Tiny bits of it kept working out of his gum for the next month. There was never any discomfort, swelling or inflammation. The Corporal thought all the root must have come out, all right. Some of the pieces looked like root canal—and if it hadn't been removed, he thought it would have made trouble before eight years had passed, wouldn't it? I thought so, too. Again, he opened his mouth, and again I peered. It looked just exactly like any perfectly healed extraction.

The Witotos had known nothing of such a plant, but one of their visitors one afternoon showed me the site of two extractions made with it. He had had no trouble afterwards, either. But I was disappointed when I asked where he had

gotten the medicine. He said it was from a tree that grew up on the Ucayali. That was a big river far south of the areas I would visit on this trip.

But I wasn't going to give up too easily. I asked everyone I met about the tooth plant. The question was routine in my interview. So now, chatting with the hunters, I asked them. Two of them opened their mouths and pointed. One had got rid of two bad molars that way. The other, one bad one and the good one next to it, because he'd been careless in applying the medication.

"And where did you get the medicine?" I asked, having shoved a flashlight down their throats. They said from Coto Indians just a couple of days below the trail on Río Algodón . . .

I asked Nelida to have someone hang my hammock.

"First a drink, a bath and dry clothes. Then I'll cure your shoulder," she said. She poured me a drink of my emergency pisco while one of the men fetched water in my collapsible canvas bucket. When I was clean and dry and agreeably anesthetized by another big slug of the brandy, Nelida made me sit on the floor while she kneaded my neck, my spinal column, and very gently my shoulder. It grew less sensitive under her hands.

Nelida's massage was much different from the usual; it was slower and went much deeper. While she worked, I asked her where she had learned it. "Oh, most women know how," she said, "otherwise, what would they do when their men get hurt? Even Indians know how to *sobar* injuries. They know it better than anyone. My mother learned from an Indian when my father hurt his back."

That reminded me of Hilario's sniffles. I called him over and gave him a couple more of the cold tablets. He said they were no good, so I gave him a drink of pisco. He liked that fine, but he was gloomier than ever and it was obvious that his respect for the gringos had taken a series of blows. Later that afternoon, I finished it off.

Barton and some of the men had gone hunting to get meat for dinner, so I started questioning Hilario about the Coto

treatment for toothache. My first questions were tentative, but so were Hilario's answers. He knew about the plant [for causing bad teeth to fall out painlessly], obviously, but it took all my persuasion and the promise of another drink of pisco before he was willing to go after it.

He was away nearly an hour. I sat and castigated myself. I had waited so long for the toothache plant, why couldn't I have waited a little longer? Had I been previous again? Only witch doctors usually divulge the tribe's medical secrets, and they do so reluctantly. I had not been able to learn who was the Coto witch doctor, or how to get in touch with him. Had Hilario gone to him and reported that there was a snoopy *gringa* in the jungle?

But when he returned, triumphantly, he brought a small branch from the tree, for I had asked for leaves in order to identify the plant easily. However, he had only about a quarter of a teaspoon of the brown, sticky resin in the little bottle I had given him.

"I need more than that," I said. "I told you to fill the bottle."

"Is plenty," he answered, and the corners of his mouth turned down even further. "How many toothache you got? Is enough for all teeth."

Patiently, I explained that I did not now have a toothache. But I might get one later, and I wanted enough of the medicine with me for any emergencies. I also wanted enough to take back to my country for a large family which I invented to serve the moment's need.

Hilario was so surprised he stopped looking sour. "In your country is not this medicine?"

I said no, in my country is not.

His knobby brow wrinkled as he thought it over for a moment. Then he asked, "How they cure toothache?"

I said a doctor pulled the tooth out with pliers.

Hilario's mouth opened, and his eyes widened for the first time. "No hurt? No come down much blood?"

I said yes, much hurt. Much blood come down.

Hilario stared at me. Then he shook his head. "*Qué barbaros! Qué malos!*"

What barbarians! What evil people! I'm sure he thought our doctors were pure sadists. He was so sorry for me that he went off and filled the whole bottle with his civilized medicine. Later, he gave me the tooth of a jaguar. He had never felt so sorry for anyone in his life.

I swallowed my country's pride easily, joyfully. What if I were a barbarian? I had my plant at last, and I could afford to be humble in front of Hilario . . . .

A girl of eight or nine edged through the door of a back room and stood blinking at me with inflamed eyelids while she tugged at her faded, outgrown dress. I said, "Good evening." She disappeared wordlessly to emerge carrying her little brother who might have been two or three. Behind her, she dragged by the hand a little boy about five. The larger boy's eyelids, like his sister's, were red and a bit swollen, but it was the baby who was really in bad shape. His lashes were matted with pus, and he howled as he rubbed his swollen lids.

I went to work on the girl first because I knew she wouldn't cry and frighten the others into thinking the application of an antibiotic ointment a painful operation. In jungle, I always carry a good stock of ophthalmic ointment because eye infections are the most common ailments. They have the advantage of being easiest to treat, too, for they are usually simple types that proper medication clears up dramatically. Only the baby screamed and fought. His father [Yori] held him, but his sister had to grab his hands. He was such a strong little rascal that he almost gave me a black eye.

Yori had lit the usual jungle lamp, a butter can with a wick stuck through a cylinder of tin fixed on its top. I told him to save his kerosene, who knew when he would be able to get more? I had been able to get candles at the mission store, so I lit one now and stuck it in the end of one of the two benches which were the only furniture. The family squatted on the floor

We'd finished lunch, so he led me to the top of the cliff over the river and showed me a gnarled old lime tree whose thorny branches were so heavy with fruit that they had to be propped up with poles.

"Story is that the old geezer decided it would be convenient to have a tree that gave fruit all year round instead of only in season like all the others. That was back in the days before the police were here. When we moved in, the Indians went downstream. But old Monje told me about it. Seems the witch doctor and the other men of the tribe danced around the tree and sang songs to it. Then they sacrificed some sort of jungle animal and bathed the roots in its blood and God knows what else. But it's a funny thing. Look at that tree now! It's been constantly full of fruit, just like that, all the fourteen months I've been here, even when limes are supposed to be out of season and there's not another tree bearing anywhere on the whole river. They say it's always been like that, ever since they magicked it."

I stood there admiring the tree and slapping gnats. . . .

The day after our lunch at Ayala's, Teresa came to visit me. I entertained her with a conducted tour through my belongings. She enjoyed it more than most tourists enjoy most sightseeing tours. For more than an hour, she happily fingered clothing, tried on necklaces, marveled at such mysterious, esoteric instruments as my hairbrush. I presented her with a lipstick and she was overjoyed. After every bag had been opened, camera cases and footlocker explored, she pointed to my plant press. "And what is that, señora?"

I almost said, "That, my pet, is what I've been waiting a long, hot hour and a half for you to ask!" Instead, I put on my best spider-to-fly manner and told her that my people, in the great country I lived in, wanted to learn from her people. We had many good medicines. We had sent many to her people, no? But every people has its own wisdom. We realized that her people knew many things my people did not know. My people had sent me to the Putumayo and other rivers in search of some of her people's wisdom.

"Already, I have learned much," I bragged. "Mostly from my friends the Witotos. They call themselves the wisest of all the

tribes. Do the Ocainas know as much as the Witotos? Look, I will show you the things they gave me, they and the other Indians."

She pored over the specimens I had pressed with such care. I was proud of the way they looked. It showed how much I respected the native lore. I said, "I know that the agents, most of them, laugh at your medicine. But that is because they are people of little learning. Warriors are not necessarily wise men. Now the big chiefs in my country are different. They are learned men. And so they respect the wisdom of other learned men."

It seemed to be going over. Suddenly Teresa smiled. "This one, my people know it, too," she said, proudly pointing to the gall-bladder remedy Yori had given to me. "The brother of my mother's father knew much medicine. But he is dead."

I said that obviously the Ocainas had much knowledge and that I would love to take back some of their plants to my people. Teresa promised to bring me a couple of plants the next morning.

I waited eagerly. When she came, she brought some odd, wide dark-green leaves. "This one I know myself," she told me. "Is very good, señora. We take some leaf ground up in alcohol before the fiesta. You take this leaf and then drink and drink. You can get as drunk as you like, but the next day you will not be sick. You drink and not take the leaf first, you sick."

A hangover remedy! It wasn't quite what I'd expected of the demure young girl, but if it worked it should be worth a fortune! And I would be popular with all my friends back home.

Then she produced some rather spindly-looking weeds. "And this very good for baby. You give a little bit of mashed leaves, put them in baby's mouth as soon as he is born. That child no die. Will not die even when bigger. My mother, she had twelve children. Nobody ever die because she give us this when we born. All twelve now healthy. These two plants I know. Always we use."

I asked her if she knew any more. She shook her head sadly. "No, my mother always take care if anybody sick."

At that moment, I blundered. "Teresa," I said, "why don't

you ask your mother? I'll bet she knows all sorts of wonderful things. Here, look at these dress lengths." I turned to the heap of calico lying on the top of my foot locker. "This is the one you admired, the white with the yellow flowers. I want you to have it. It will remind you of how grateful I am for the wonderful lunch you gave us—and for the plants. And tell your mother that I'd like to give her one, too."

Teresa was delighted with the calico, but every time I mentioned her mother, she looked uncomfortable. It took a lot of argument to get her to promise that she would enlist the old lady's help.

The next day Teresa and her mother arrived. Teresa was far less friendly, her manner seemed frightened. The old lady was polite but cool. We chatted as the etiquette required, but it was difficult because Mama knew, or pretended to know, no Spanish. Teresa interpreted nervously. Mama had little interest in viewing my possessions, so I got out the calico and told her to take her choice. She examined the cloth minutely, suspiciously for a long time, then she chose a turquoise design.

But when we got to the subjects of plants, Mama knew nothing. She flatly denied that her people used any remedies other than those they'd learned from the missionaries. When I spoke of the wonders I'd heard her uncle performed, she merely said "Witchcraft" in a tone that practically brought the conversation to an end.

Shortly after that they left, but at the door Teresa paused to whisper, "I come back, maybe tomorrow." She came several times, but always accompanied by some member of the family. They were guarding their secrets. I knew better than to get Teresa into further trouble by trying to force the issue . . . .

About five we reached the mouth of Río Yaguas. A rectangular clearing had been hacked out of virgin jungle and in it stood a neat line of thatched houses on tall stilts connected by a stilted boardwalk. A larger building, bright with strong blue paint, stood in the center of the row behind a tall flagpole where the red-and-white flag of Peru hung limp in the muggy

air. As we neared the shore, Don Onemio told me that this was a Peruvian police post. Then I saw the big shield of the Guardia Civil with its motto "Honor" over the door of the big building, the Comandancia.

The two policemen who came aboard wore uniforms of the same greenish-gray cotton as the Colombian police, but they did not wear hoods or towels over their heads though we were still in the gnat zone. These men had the look of old jungle hands. It is a rather special look. It's not just a matter of being lean and weather-beaten, but rather the relaxed alertness of a man whose sharpened senses keep watch for him, subconsciously noting the meaning of the flick of a wing, a ripple showing where a fish has jumped, a rustle in the brush or one leaf disturbed among a sea of leaves . . . it is a look of muscles in complete repose but ready for instant, effortless movement . . . .

Ema talked freely of many tribal matters, but it was a long time before she knew me well enough to admit that there were certain leaves women took to avoid having babies. These are given to most Witoto girls when they reach puberty, she told me. The effects of a single dose last from six to eight years and it is considered a wise precaution against the girls' becoming pregnant before they are mature enough to be mothers. One night, when we sat late in the dark talking of many things, she promised that in the morning she would bring me a sample of the leaves.

When morning came, I had a hard time controlling my eagerness. Ema knew how much I wanted those plants. I had been bringing up the subject for days and when at last she offered to get them for me I had not hidden my delight. But Ema is not the sort of person whose sleeve you can twitch every few minutes. I waited until midmorning before going to the large, shadowy kitchen house which was her realm.

She was sitting in her hammock, her small sitting-hammock, not the long one she uses for siestas, and I knew something had gone wrong the minute I saw her hands. They were not peeling some sort of vegetable into a bowl on her lap, they were not

mending shorts or trousers, they were not even twisting palm fiber against her knee to make cord for the weaving of hammocks. They were folded in her lap.

I said good morning and she said good morning, but she didn't look at me. "Ema," I asked, "the leaves that women take so they won't have children, did you get them for me?"

Ema said, "No, señora."

I waited. After a while, she said, "Without their icaro, their magic, they will not work. You can never learn the song that makes the icaro. It is Witoto song."

Her face was as quiet as ever, but her hands were so tight that I changed the subject and told her how much I had enjoyed the armadillo she had given us for breakfast. Ema is the oldest living member of a reigning Witoto family. Her people still obey her and her responsibility to them is heavy.

That evening Ema brought me a gift, a bunch of exquisite egret plumes, carefully wrapped in a piece of fine white cloth. She had treasured them for years. Neither of us ever mentioned contraceptive plants again.

On the Tamboryacu, the Algodón, the Putumayo, it was always the same. Few Indians could be persuaded to admit that such things existed, and if they did, their eyes would slide away from mine and they would add, "But that is witchcraft." And then the curtain would come down and I'd be left outside. That curtain is something you must respect. Sometimes they lower it by going into spasms of giggles; sometimes they almost convince you that they really don't know what you are talking about; sometimes they just turn stony. But when they shut you out, it is useless to try to force an entrance. Bribery, cajolery, any kind of insistence will arouse only suspicion and hostility. And then you're in trouble.

I thought of all that while the plane droned over the monotonous tapestry of treetops. And I thought of my conversation with Guardia Vásquez Rengifo that last night on the lancha. Ideas about brother-in-law Wenceslaos' river had nagged me steadily ever since. "Some very special medicines—something about having babies." Ethnographic maps showed that area to be inhabited by Aguarunas, Jivaros, Muratos, and

Mainas if my memory was correct. Weren't some of those the very tribes reputed to know the secret of plant contraceptives?

When we left the plane in the muggy twilight of Iquitos, I was still telling myself that there was nothing I could do but go home. Nevertheless, it would do no harm to call on Vásquez Rengifo's wife the next morning. Merely a matter of courtesy, of course. After all her husband had been very kind and she would probably be happy to hear that he'd be arriving in two days. Maybe her brother Wenceslaos would be there.

Vásquez Rengifo's wife, Luz, was a slender young woman with a gentle voice and enormous black eyes which widened with delight when I told her how soon her husband would arrive. Her brother Wenceslaos? She looked rather puzzled when I asked whether he were by any chance in town. She did not expect him to come to Iquitos for several months. When I explained my reason for asking, she insisted that I should not let his absence deter me from visiting his river. He lives on the Corrientes, she told me. That was one of the tributaries of the Rio Tigre. Many interesting tribes live on the headwaters of the streams which run into the Corrientes.

"There are only two white families on the river," Luz told me. "My brother, who went there a few years ago, and the Guimets who have been there for a long time. One of the Guimet boys, Ernesto, is living in Iquitos now. He could tell you all about the Indians. Perhaps he could take you up there in his boat. He loves the river and it would not be a long trip, not much over a month to go there and return. We can go to see Señor Guimet now if you wish, señora. His house isn't far from here."

Don Ernesto Guimet wasn't home, but his wife, Doña Conchita, said she thought he might like to make the trip with me. He had taken her up there once and she had been greatly amused by the Indians. I gathered they lived very much as they had in ancient days. I managed to bring the conversation around to their medicines.

Doña Conchita said they had one which made it impossible for a woman to conceive. Some sort of root, she thought. An Indian woman who worked in the kitchen of her father-in-law's

We went to talk it over with his wife. I liked Doña Ana at sight. She was a small, quiet woman with long curling eyelashes and long curling hair, and she seemed competent and sweet-tempered. She said she would enjoy the trip. She liked to travel on rivers and it would give her a chance to see her brother who lived near the mouth of the Corrientes.

García didn't know how soon he would be able to get away. He had some business to attend to before he could leave, but he would call at the hotel that evening to discuss the matter further.

On my way back to the hotel, I consulted Luz. She did not know the Garcías, but she knew of Doña Ana's family. They were good, respectable people, she told me. As for García, Ernesto wouldn't have sent him unless he considered him reliable. The price, Luz assured me, was really very reasonable.

That evening I advanced García the money to buy the new part for the motor. It would take several days' work to get the boat in good running order and he would need a few days to finish up some business. Say, ten days in all. I said that would suit me very well. I could use the intervening time gathering information, laying in supplies and trade goods, and sending that balky camera to Lima to be repaired. We shook hands and he left. But half an hour later, he was back again.

He looked worried. "Señora, we have calculated wrong. Ten days from now will be Tuesday!"

"Tuesday?" I was puzzled.

"But surely you know, señora, that to leave on a Tuesday would be most unlucky. So we must make it eleven days more."

I remembered, then, the old Spanish superstition which makes both Tuesday and Friday days of ill omen. I do not argue with people's beliefs, so I said, "Oh, of course! Wednesday will be fine."

We shook hands again. It was done! I was going! . . .

My interpreter gone, I thought all communication with Tesa must end. So I rose from my cramped position on the floor, stretched luxuriously and turned toward my hammock, expecting her to retire to the little room where her children

slept. Instead she spoke. I whirled to stare at her and she repeated it. Tesa had spoken to me in Spanish. Very bad Spanish, very slow and groping, but still intelligible. She had said, "Where your husband?"

"You know Spanish?" I gasped. She giggled and asked her question once more.

I sat down on the floor again. I explained that I no longer had a husband. No, he was not dead. But now he had another wife instead of me. No use trying to explain divorce to an Indian, I thought.

Tesa leaned forward, regarding me earnestly.

"Abandoned?" she asked, shaping the word carefully and correctly. Such a fancy word! I was so astonished I could only nod. She seemed to take that for emotion too deep for words and she tapped herself on the chest, nodding sympathetically. "Me too." Then she pointed to me. "You have sons?"

I said I had no children. We settled down to exchange confidences like any two women who have recently become friends.

Tesa's Spanish was queerly pronounced and her vocabulary extremely limited. When she couldn't find a Spanish word, she would drop back into her own language, but her gestures and expressions were so eloquent that sooner or later she would get her meaning across. Many words and phrases I used brought only an intent look of inquiry. But with gestures and pantomime we managed to understand each other surprisingly well.

I learned that Tesa, like many women of her tribe, had been given in marriage when she was still a child. Her husband was cruel and brutish. She grew up hating him. She had one child by him, her daughter Norama, and then made up her mind never to give him any more children. She confided in her stepfather, Rukas, who was very fond of her. He gave her the root of a plant. This, he told her solemnly, would prevent her from ever conceiving again. This one dose would do it. But if ever things got better and she changed her mind, he wanted her to let him know. He would give her a second root that would reverse the effect of the first.

Tesa took the medicine and, though she lived as usual with her husband for two years more, she had no more children. Then, to her considerable relief, her husband deserted her and went to live with another group of Indians. It was a year before she was willing to consider matrimony again, but then she went to live with Arejo as his wife. Arejo was good. Arejo was kind, not only to her but also to her daughter Norama. But it was not until she had spent six happy years with him that she was quite sure that this was a good marriage and that she was willing to bear his children.

Again she consulted Rukas. He was very pleased. He liked Arejo. And he gave her another root which she chopped up and swallowed under his directions. This medicine would make any woman fertile, he assured her. Less than a year later she had given birth to the fine, strong boy who was now asleep in the next room. Tesa smiled radiantly. "Now all good. All happy."

Tesa leaned forward, stretched out a swift hand and tapped me on the knee. "Señora do also like me," she said, her voice warm with sympathy. "Then happy."

I was afraid to speak. This woman knew the plants I'd sought so desperately for months. They were that near! I almost asked her then for them. But I remembered old Ema. Ema was my friend, my good friend, but this magic was too big for her to give me. The friendship between Tesa and me was a new one, delicate, tenuous. I didn't dare ask such a gift. I didn't know what to say, so I just sat there, not even trying to keep the anxiety out of my face.

Tesa gazed at me earnestly for a moment, then she went on, "Señora have bad man. Is good no sons. Now bad man gone. Is good. Now Señora find good man. Stay with him. Much time, señora, no sons before much time." She shook her head slowly in emphasis. "Then Señora know is good man, then Señora have sons. Like me. Señora happy like me."

Was this the time to ask? I clasped my hands tightly, they were shaking. "Tesa," I said, "I feel fear. If I take man, and man is bad, and I have sons . . . or if man is good, and I have no sons . . . . "

Tesa shrugged and turned up the palm of one hand in a small,

impatient gesture. "Take medicine like me. First medicine for no have sons; then medicine for have sons."

This was it. Now I had to risk it. "But Tesa." I took a deep breath. "I cannot. That is why I am afraid. These medicines do not grow in my country."

Tesa was shocked. "Here all grows. Good medicine, all women take. Plant for have baby," she pointed out into the darkness, "by my house grows. Rukas give me. I plant. Morning I give you roots."

"Oh!" I let my breath out. "Tesa, with my heart I thank you." I longed to drag her down that ladder right now to get them in my press before I slept. But that wouldn't do at all, so I just said again, "I thank you. Tesa, you are good."

At that moment a dog barked sharply and fell silent. We heard a squelching in the mud, and a man's voice muttering. Tesa's face lit up. "Is Arejo," she said. "Arejo, drunk, drunk, drunk!" Laughing, she sprang to her feet and flew out of the house. There was only one thing on her mind now and that wasn't my future progeny.

I heard someone retching painfully while Tesa made little soothing noises. Then she helped her muddy, spattered spouse up the notched stick and into the house. She was beaming as she sat him on a bench and said, "Fall in earth, fall in river. Dirty. Come home, make clean."

Tenderly she sponged his face, neck and chest with water from an earthen bowl. She got fresh clothes from a wooden box and helped him into them. Then she combed his hair, guided him down to his canoe and sent him back to the party. She giggled as she came back into the house. "Arejo go fiesta."

In her absence, I had opened my plant press. Now I got out a dried specimen that Teresa, the Ocaina girl, had given me. "You know this plant?" I asked. She studied it, then said yes. She had seen some of it growing in a swampy spot some distance from the river. Indians remember the location of plants and herbs just as we remember the locations of grocery stores and drugstores. Tesa had seen this plant and remembered. But what was it for, she wanted to know.

I repeated what Teresa had told me. "You take a bit of this

leaf and eat it before you go to a fiesta. Then you can get very drunk, but you will never get sick and the next day you feel fine." I had packed the plant carefully. Considering the awful stuff they drank on the Putumayo, it must be a terrific detoxifying agent.

Tesa was delighted. Her people did not know about it. I gave her one of the leaves so that she would be sure to get the right plant. She thought it would be a godsend to her tribe. Little did she know that the plant she was going to give me would be a godsend to my tribe, too. A plant to combat sterility in women . . . And the other, the contraceptive?

I was afraid to refer to plants again. I waited anxiously for her to return to the subject. We talked very late. With practice, our pantomime improved. With enough arm-waving, we could put across some pretty subtle meanings. I would love to have a silent movie of that conversation. I have an idea it might prove quite intelligible. Tesa told me of her tribe and of the tribe her mother had belonged to, the mother who had known a little Spanish and had taught her daughter how to speak. Incas, she called them. I grew more tense as time wore on and still she said nothing more about my plants.

Such tension is accumulative. I was beginning to wonder how much longer I could go on without blowing a fuse when a howl came from the baby's room. Tesa sprang to her feet. "Is my son. My son from plant like I give you, morning. Now I sleep. You sleep."

Smiling, she left me without another word. Jívaros don't go in for the little ceremonies of our speech. But she couldn't have bade me a sweeter goodnight. I fell into my hammock exhausted and listened briefly to the drunken music across the river. They were really making a night of it . . . .

Jungle Indians, at least among all the tribes I have known, never steal unless they have been intimately exposed to civilization. It just isn't done. There is nothing important enough to be worth acquiring at the expense of their self-respect and the respect of their fellows. No one is willing to exchange these intangibles for something portable and perish-

able. In the humid, vermin-infested forest, everything that is not living matter sooner or later is ruined by insects or humidity. It's far more important to *be* something valuable than to *have* something of value. Status does not depend on the quality of one's possessions, but on the quality of one's self . . . .

That night the radio concert was brief. Everyone seemed surprisingly willing to go to bed early. I lay in my hammock trying to work out some way to overcome the growing antipathy I sensed. I wasn't sure of its cause. Had I been precipitate and pushing by my questions about medicines? I didn't think so. I'd been awfully careful about it. Was Garcia's attitude the cause? That seemed more likely. If his assumption of superiority annoyed me so severely, what had it done to the Mainas?

Did they resent the fact that we were friends of Rukas' tribe? Did they think we had come to spy on them for the Jívaros? That didn't make sense. The more I thought about it, the more confused I grew. I hated to admit that I was simply up against the Indian's devotion to his icaro and a firmly rooted determination to share nothing with the white race which had treated his race so cruelly. For if that was it, I was licked. I hadn't a chance.

Oh, well, I consoled myself, I'm not always a failure. I had plants from other tribes. And I had Tesa's plants to look forward to. It would do no good to lie awake all night.

I was just slipping over the edge of sleep when a soft sound startled me back to wakefulness. I listened. Against the usual obbligato of jungle nights, the house was strangely silent. Not like last night. No whimpering babies, no whispering children, no one moving about to tend the fire under the yuca-smoking rack. The sound came again, a rhythmic swish . . . swish . . . swish. Cautiously, I lifted the net and peered out. It was black dark. All fires had been extinguished and the early scrap of moon had set, leaving only dim starlight outside. The swishing paused, then came again. I tried to think what it sounded like. It reminded me of the noise native women make when they sweep the earthen floors with the little bundle of fresh leaves

they use for brooms. Leaf brooms . . . but nobody would be sweeping in the dark. Leaves . . . the rhythm grew faster. Suddenly I knew. Witch doctors' leaf fans . . . the ayawasca ritual!

Ayawasca is a vine whose sap contains a narcotic alkaloid inducing hallucinations and delirium. A number of laboratories have studied it. It wasn't a plant I wanted, but I had heard how the Indians use it in magic rituals. Sometimes the witch doctor drinks it himself to divine the future, to look into the past, to see who is responsible for a misdeed or what ails a sick man. Sometimes the witch doctor gives it to the patient. When the patient is groggy the shaman waves fans made of fresh leaves. Their rhythm is supposed to direct the movement of the soul of the unconscious man into the future or the past, or to observe something taking place at a distance . . . .

When we drew up at her clearing . . . in a few minutes Tesa had filled a basket with two kinds of plants growing in their native soil. The one like marshgrass leaves, she explained, in Spanish now, was the one which makes it possible for any woman to have babies. She looked at me earnestly. Now I must find a good man like her Arejo and marry again and have a baby. Then I would be as happy as she was.

The other, a bulb the size of an onion, was for the baby. When it was born, I must wash the bulb carefully, mash it to a pulp and make the baby swallow it. Then he would always be healthy like Tesa's children.

I thanked her fervently. I said maybe I'd find a man I could marry. But I would have to live with him for some time before I could be sure that he would make a good husband and father, wouldn't I? What a pity I couldn't get the plant that kept women from conceiving.

Tesa looked surprised. Of course. She should have thought of that. There was none near her house, but her Aunt, Rukas' sister, had some. It was her house we had just come from. "We go back. Ask. She give," Tesa told me.

Back downstream we went. Arriving, I left the plants in the boat, but I gathered up quantities of cigarettes and many more necklaces which I slung around my neck. Rukas was just putting

the final touches—black lines on a red background—to his make-up. He was splendid in a bright yellow shirt and vivid turquoise trousers. Then he tied a curious headdress around his brow. I had never seen anything quite like it before. It consisted of a headband of the narrow cotton belting with elaborate designs in color which they weave in Ecuador. From it at intervals hung more of the belting, each strip ending in a little tail of human hair tied with bright wool at the top. Over this he adjusted a feather crown like the Mainas' and similar to the one Don Wenceslaos had given me.

He was gorgeous. There was nothing fake about my admiration. Everyone watched solemnly while I took pictures of him, although I am sure they didn't know what the Nikon was doing and I'd given up forever the idea of using magazine pictures to demonstrate. Besides, I couldn't bear to wait much longer for those plants. I must not seem too eager. But surely I had let enough time elapse, taking pictures and handing out cigarettes, to avoid any appearance of unseemly haste. So I carefully kept the secret of our private language by asking Doña Ana to ask Tesa to ask her aunt.

I watched while she took Auntie aside and spoke earnestly to her. A few minutes later, Auntie went down the steps and headed purposefully across the clearing and into the jungle with a basket in her hand. She soon returned with the basket filled with earth, scraggly greens trailing down the sides. She led Doña Ana and me to a distant corner of the veranda.

"This root you see?" she asked. "You take little piece. Wash well. Chop. When you know you are to have baby, eat one spoonful morning, one spoonful night. You are cured. It come out."

Doña Ana was translating fast. She suddenly turned scarlet and paused to look around her. The men, clustered at the far end of the house, were talking. Every few minutes they would stop to laugh. I would have sworn they were swapping stories.

I looked at Auntie. "Oh . . . oh . . . no!" I stuttered. "That wasn't what I wanted."

Auntie looked puzzled. "Is good," she insisted. "We use. All women use. Good medicine."

I explained that I wanted the leaves women took so that they would not conceive. Her face cleared. Yes, she had that, too. She'd run and get me some. In a little while, she climbed back into the house with another basket of weeds in earth. This one, she explained, you take a teaspoonful just once of the root. She showed me the little bulbs. This was a sedge. Never get child again. Only get child if eat Tesa's plant.

I was aware of a sudden silence in the men's corner. A chilling silence. Slowly, they walked over to where we squatted on the floor and looked at the plants. Then Rukas and two elders retired and sat on the bench like judges while the other men grouped around them. The oldest man on the bench spoke at length. Everyone listened. Looking grave, they turned to Rukas who had an air of slight embarrassment as he made a long statement.

Then everybody talked at once. I was trying not to show how worried I was, and so was Tesa. I had been afraid something like this might happen. I knew I must not speak. Finally, Rukas motioned and everyone was silent. Then he addressed me directly. Diego, frowning anxiously, translated. "Rukas say you know plants already before you come here, no?"

"Of course I knew them," I said. "Did I not ask the women for them? Did I not even say their names when I asked for them? Can I say their names and say how they are if I do not know them?" That was going a little far, but I had been thinking this out for days. I knew Tesa would back me up as well as she could. And I had planned a way of answering any specific challenge.

Blandly, Tesa spoke at some length, lightly but earnestly, and the tension eased as she talked. When she finished, she smiled reassuringly at me. But her smile vanished when the old chief spoke up, his voice stern. Diego translated. "Please, my señora, my uncle say if it is true that you know the names of plants then you say them now that he can hear."

"Diego," I said earnestly. "You know that I do not speak your language. That is why you who speak Spanish so well must tell your uncle my words. I do not know the Jivaro names of these plants as I do not know the names of any things in your

language. But I do know their names in my own language and will say them now."

He translated at breakneck speed and turned anxiously to me again. I assumed an air of triumphant assurance. I pointed to each plant in turn and said in English, "This is an elliptical logarithm! This is a rhomboid hypotenuse! This is a trigonometrical perimeter! And this last is a nonparalleleloid isosceles!" I intoned each syllable majestically, for mathematics is to me the most mysterious of magic.

And it worked! Rukas had been watching with the judicious air of a professor listening to the recitation of a student. When I finished, he nodded as though I had every answer right!

He addressed the others at some length, his voice smug. When he finished, his eyes met mine for just a fraction of a second, then we both looked away. We understood each other perfectly. Magic for magic, we said mutely, an eye for an eye.

I told Auntie to take a necklace or two. Her husband helped her choose them. I gave everybody more cigarettes and waited nervously for somebody to make a move to go. I didn't think I ought to be in a hurry to leave. But I was burning to get the plants into the boat. Finally, one of the men said they must get going, now that the rain had stopped or they wouldn't have time to dig enough yuca to make masato. That broke up the party.

They all helped to carry the baskets to the boat. Auntie told me how to care for them, which needed more water, which might suffer from too much sun. I had no chance to tell Tesa how grateful I was, but I think she knew. Her face, the last I saw as our boat swept around the bend, looked awfully pleased. She had kept her promise, and done it with the approval of her people.

For the rest of the day I stared wonderingly at the plants. The scraggly, grasslike leaves certainly didn't look much like the most sacred magic of the jungle, but they must be, mustn t they? What else would explain that sudden chilling hostility, the flare-up of tribal distrust when the elders noticed what was going on? Now that I'd come through it successfully, I was glad that it had happened. For it seemed to me that this was the

clincher, solid evidence that I had obtained the real icaro; that I'd got the plants so often sought in vain ever since Franz Boas, the father of American anthropology, first revealed that these tribes knew botanicals which could control the fertility of women.

I could hardly believe my luck . . . .

My final report had to give not only the place of origin, general description, type of native soil and climate, but also the name of the plant. That was my difficulty, for many of the names were given to me in some outlandish tongue.

Two of the plants had been scientifically identified for me by a Peruvian botanist who spent a day or two at the hotel. They were among the more important plant medicines, I thought. The *Incira,* which Hilario considered the only decent, civilized way to remove an aching tooth, had been identified as a *Moracea, Chlorophora tinctoria L. Guad.* And the *sangre de grado*, which taken by mouth stops internal hemorrhages and applied externally disinfects and stops the bleeding of a wound, was a *Euphorbiacea, Croton salutaris; C. planostigma Klotzch.* I still had the paper the botanist had written the names on before he hurried out to keep an appointment. Unfortunately, I hadn't seen him again. As I copied the careful printing, I wondered if Hilario was as glum as ever and whether he still thought North Americans were barbarians.

I had only Indian names for most of the rest and those vary from tribe to tribe. Some were not difficult. *Yanamuco,* for example, the leaves that turn the teeth black and preserve them from caries, had to be spelled the way it sounded. So did *Aysifera,* the red-stemmed weed with the green leaves which Ema had told me the Witotos eat to prevent obesity. I thought of the way Ema had looked that morning when she said she could not give me the Witoto contraceptive plant. It had hurt her to go back on the promise which she had made too impulsively. I had been disappointed, badly, but I could not resent her refusal. Her first loyalty had to be to the tribe that respected and obeyed her. Otherwise how could they respect the last remnants of nobility left to them?

But some of those Indian names! How do you spell something between a whinny and a grunt, something which sounds different every time you hear it? There was the weed Antonio had given me. Its rather large, pale green leaves unfurled from a thick central stalk in a way that was far too pretty for what Antonio had called it. Up there, on the wide, shady veranda at Negro Urco, I had written it first in my notebook as *Mweeg.* Then he pronounced it again for me. I scratched out the first interpretation and wrote *Ameéwuh.* The third time it came out as *Uhmweébuh.* Then at the Colombian police post on the Putumayo, Teresa identified it as the plant whose leaves had so miraculously healed without scarring the terrible burns on her legs and she had called it *Hooweéyo.* That, she said, was its Ocaina name.

There were others, like the plant Yori had given me for gall-stones, that I had been unable to obtain names for . . . .

I struggled with Indian plant names until I realized that no ordinary typewriter symbols could ever represent the weird sounds Indians can make. I gave up and simply applied numbers to the more difficult ones. I hated to do it. It seemed almost as bad as calling Ema and Antonio or Tesa and Rukas "the natives." They are not just Indians. They are people of warmth and integrity, dignity and courage. They are my friends.

I finished the list late on a warm, moonlit night. The Amazon glinted past just across from the hotel. But I could not hear its whisper or the thousand tiny noises of a tropical night. They are missing in cities (in this case, Iquitos).

I strapped the plant press tightly. These plants would make the full circle from the witch doctors with feathered crowns and painted faces to the witch doctors with scrubbed hands and white coats who would assess their value in big, shiny laboratories. It would take a year or two to pile up statistical proof of the plants' medical effectiveness. I wondered what Rukas would think of *our* witch doctors. Probably about the same things that they would think of him.

The Immortality of Man

15

William Ernest Hocking

The late William Ernest Hocking (Ph.D.), who headed Harvard's philosophy department, and was well known as one of the great professors of philosophy America produced, made one of the finest summaries of his thinking in his little-known Garvin lecture for 1945 at Lancaster, Pennsylvania, now given here for the first time in book form.

If there is any such person as "the modern man," he is not one who worries much about the question whether human life continues beyond death.

For some, there is no worry because the question is closed, either for or against immortality. I have met a few human beings, not many, who profess that they have never doubted that life goes on in another world. They are not unintelligent people; they are fully conscious that they are in a minority. I regard their assurance as important, if only because it shows that such a conviction is wholly consistent with a modern mentality.

I have met others, indeed many more than in the first group, for whom the question is closed because they have completely rejected the belief, and have no inclination to re-open the problem. They do this usually on "scientific" grounds; and it is usually an acquired position—that is, it results from abandoning an earlier acceptance or at least entertainment of the hypothesis of immortality. We are certainly not born with the scientific conception of the universe. But when that view dawns on us, with its full clarity and unity, and the persuasive alliance of

human with animal life in the evolutionary series, it is likely to melt away all beliefs that appear inconsistent with it. And I can speak from my own experience in saying that immortality is one of these apparently inconsistent beliefs. As a boy I read Herbert Spencer, and was fully persuaded by him that man can have no other destiny than that of the animal series from which he comes; that in both cases, the birth, growth, decline and death of the body are paralleled in the history of the mind. Without a brain, there can be no thoughts; and when the brain dies, thought ceases. This, of course, is not a proof; it is only an analogy. But the analogy is so complete that it throws the burden of proof strongly on anyone who questions it. Hence, for many today, the question no longer exists.

But if I can estimate the position of the majority of our compatriots today, they have ceased to concern themselves about the problem of immortality not because it is settled but because it is, as they say, speculative. And they have been led to believe, first, that we cannot do anything about it in any case: it will either happen to us, or not happen, as the universe provides; if it does, we may be agreeably surprised; if it does not, we shall never know of our disappointment: the only thing we can really affect is the present scene of things—let us deal with this. They have also been led to believe that we cannot know anything about it: we can only conjecture. And where there can be no evidence, valid either in the court of science or in the court of law, wise men will refrain from judgment.

I regard it as one of the signs of shallowness in our age that this indolent and defeatist point of view is so prevalent. As long as there are some good and intelligent people who regard immortality as unquestionable and for them certain and important, it is pure laxity of mind to retreat from the search for evidence. And if it should be discovered that immortality is either actual or possible, it is again an attitude of moral abandonment to decide without inquiry that nothing can be done about it. Millions of people have believed and do now believe that everything we do in this life has an inescapable effect in a life to come; many have believed and continue to believe that this life is a sort of preparation for another life, and

has its chief meaning in that relationship. And some have believed and do believe that the manner of our living here may determine the question whether we do or do not survive the crisis of death—my own view.

If any of these people are right, there is *a great deal to be done* in the present about a future life.

This present idleness of mind on this great subject—out of which I would like to shake this generation if I could—is in extreme contrast to the preoccupation of a few generations ago with the future fate of their souls. To them the whole point of religion lay in the issue between future torment and future bliss. The imagination was so busied with this enormous gamut of hope and fear as to subtract a good deal from the attention due to present business. Karl Marx was not entirely wrong when he described this kind of religious concern as an opiate, fixing men's minds on the subjective condition of their consciences and withdrawing their energies from the social struggles in which objective rights and wrongs were contending. Through the obvious justice of such criticisms as these, religion has—for the most part—swung far in the other direction. Without surrendering its central doctrine that there is an infinitely important difference between being "saved" and being "lost," it has been inclined to teach that nothing very bad will happen in a future life to a man who fights the good fight here; and nothing very good will happen to a man, however pious, who neglects that present duty and conflict. The great thing, then, for both worlds is to be a good citizen of this one. And from this plausible position, it is but a short distance to the position that the whole duty of man is to watch the step just ahead of him and leave the rest to God.

Professor Julian Huxley, the British biologist, recently wrote as follows: "The religious fervor which used to go into theology and man's preoccupation with his salvation in the next world is now being canalized and directed towards terrestrial ends, and those ends are concerned with social reconstruction. The individual finds the escape from his own limitation . . . in the unlimited possibilities of a continuing social order. Many observers have commented on the religious ardour animating

Russian Communism, and the same fanatical ecstatic spirit is evident in Nazi Germany . . . .

"In the circumstances the only rational attitude to take, until conclusive evidence of the fact of survival is forthcoming, is to concentrate on the enrichment and amelioration of this life, in confidence that if our personalities do survive death, a sane and hopeful activity in this world is the best preparation for the next."

This is also the position of the religious humanism of today.

The difficulty with this position is that in order to fight well as a man, one must fight as if one could reasonably disregard danger and even death; and to do this, one must believe that there are things in the world more valuable and more enduring than human life itself.

To put this idea into a nutshell: It is impossible, I maintain, to make a reasonable contrast between being a good citizen of this world and having a concern for immortality, because in order to be a good citizen of this world, whether to do a good job or to fight a good fight here, *one must have an outlook beyond this world.**

Has the Belief in Immortality Any Practical Effect?

Here I think I hear a chorus of objectors. It will be pointed out that the good work and the good fighting done in this present war appear to be wholly independent of whether a man does or does not believe in immortality. It is enough to mention the armies of Soviet Russia which are officially materialist in outlook, so far as they take the Party line. There is no difficulty in getting up suicide-squads in any of the contending armies, regardless of the presence or absence of the hope of a future

I agree to all this, and yet I hold to what I have said. The immediate inspiration of men lies in the *cause* for which they are working or fighting. It belongs to the ordinary sociability of

*Cf. Schopenhauer's important statement that the present world's meaning is not wholly contained in the world. *C.M.*

the human being to be welded together strongly with his fellows whenever there is a cause—especially if the cause is under fire—which evokes common efforts and sacrifices. Working for the cause heightens fellowship; fellowship in turn heightens the devotion to the cause. Nobody reaches the summit of his capacity as a man until he has felt the experience of being lifted above himself by the power of this three-fold relationship; the self, the fellow man, the common cause. Friendship itself is comparatively empty unless it is enlarged by the presence of this comparatively impersonal third being, the object which both friends serve and both obey.

The cause need not be from our point of view a good cause, in order to produce this effect upon those who serve it. Any national cause is likely to elicit this kind of devotion; all kinds of -isms, including fascism, Nipponism, and nazism, have had their enthusiastic or fanatical adherents. It is only necessary that these adherents believe in that cause, whether through indoctrination or illusion or through some glimpse of truth under grotesque disguises. And to say that they must believe in the cause is to say that they must think of it as something better than their private point of view, their *parti pris*, that which seems to them to be good because they are born that way they must fancy themselves as getting hold of something genuinely valid and just.

And now let us take another step. Those who truly believe that their cause is valid and just, and those who mistakenly believe that their cause is valid and just, have something important in common, as against those who do not care whether their cause is valid and just or not. These first two groups believe there there is something valid and just in the universe. This belief links them with something not perishable, which is the first stage in an outlook beyond this world. And if they were to think this out—which most of them do not—they would find themselves inquiring into personal immortality. They would begin to realize that this idea was assuming for them an immense practical importance. Let me indicate briefly why this is the case.

The reason that a cause is or may be more important than a

human life is that a good cause, like just government, will continue to knit together countless human lives throughout human history, once it is achieved, or to the degree in which it is achieved. Justice is sometimes said to be a "value": that is, as an idea, it is something which rational beings recognize as a standard to be appreciated, worked for, embodied in institutions. As a logical idea, it belongs to the category of "values"; but as a working factor in the real world it is a value only if and when it is valued, when some mind takes it as a cause to be served. Destroy the minds, and justice vanishes into the status of an ineffective definition.

Hence it is that all those who serve causes assume that there will always be minds to care for them: they take for granted the continuance of the race, and the identity of the ideas the race cherishes. But suppose that some cosmic catastrophe wipes the human race out. Suppose that the planet freezes, and the last man sinks into an icy sleep. That assumed perpetuity is gone. Now nothing is valuable in fact, for there are no minds to value anything. In a dead universe nothing has any worth at all. Hitherto the death of the individual has been, in some degree, compensated by the continuance of the species. Now the species fails, and can anything compensate for its death?

The answer has to be, Nothing, unless the individual, who appeared to die, does in fact continue to live. It is the individual in the last resort that must make up for the mortality of the race; not the race that makes up for the mortality of the individual.

Nature, it has been said, cares for the species and sacrifices the individual. It lavishes its care on the resources of reproduction; it exhausts the energy of the parent in the launching of the child, but only because the child in turn will be exhausted for the sake of its child. When that is done, the hollowed shell lives on as a wraith which men may cherish but nature merely tolerates. But this picture attributes to nature too great solicitude, even for the race. In point of literal fact, nature cares for nothing; for it has no care, it has only necessity. Nor does the race care for itself, for the race has no separate consciousness. The only thing that can care is an individual.

If, then, the race is cared for, it is because individuals care for it. And if in the end those things which the race builds up in works of technical power, in works of art, in products of thought and of the ethical prowess seen in systems of law and trade—if these things have any value in the universe, it is because individual egos somewhere appreciate them.

Then what men mean when they sacrifice themselves for a cause, whether they are aware of it or not, is that the valu*ers* of the world must somehow last. The meaning of their sacrifice lies in the tacitly assumed endurance of the human soul.*

And here lies the practical value of the belief in immortality—that though men do not know that their devotion to causes is assuming that belief, when it is renounced the scheme of human values slowly becomes sick, as of a mysterious anemia. Nothing can have full dignity which has only transitory being. When all that men serve is taken as passing, life can continue its gaiety, its fervor, its energetic resolve, its constructive passion and its angers that strive to the death—but all of this has to be referred to the pattern of vital drives, because it can no longer be referred to a defensible reason. The irrational becomes the accepted excuse for human action; and activity is taken as a merit for its own sake, because no other merit can be found. A civilization that has embraced the causal scene of nature as its largest scheme of truth does not cease to operate; that is precisely what it continues—operation: the viscera generate their energies, and the limbs continue to swing, the gusto of pleasure increases—for it must fill a void, and the bravura of achievement stirs a growing pride—for what the universe cannot applaud must wait for the *banzais* of the crowd. Nothing changes but the quietly growing emptiness at the center, and the fear of rational analysis carried to the bitter end. Man can

*And once this is seen, the folly of that biological judgment becomes obvious. The individual, in his reproductive capacity, throws off a new generation as his pledge to the future. In so doing, instead of exhausting himself as an individual he matures himself; for he assumes a mental as well as a physical responsibility for the ongoing human stream, so long as it may endure. He does this from his super-abundance, and having done it he remains himself, more completely than before. He has shown that the race is contained in him, the individual.

no longer face the question, *Cui bono?*, for he knows that he has in advance made the answer impossible.

The other day I met a man who had found out what his life had to mean to him. He was manufacturer, and a successful one in the business way. He was even more successful as a reader of the distracting scene of the present human anguish. Men must suffer, he said, in order to learn; there are terrible lessons for our group life and for our personal life, and we will not learn them in ease; we tend to reject the effort to learn until terror and blood consume our best. The race is trying to unlearn its greed and its grasping for power; the exploiters have to unlearn the will to exploit, and the exploited have to unlearn their own ignorance and sloth and envy and the will to depend on public charity . . . . All have to unlearn the materialism of the flesh and the sluggishness of the spirit. But why must we learn these things? For it is just the learning that is difficult; the immensest lethargy is the lethargy of the spirit which so slowly heaves itself into the atmosphere of love. Why must we learn?

Here his answer was simple, direct, and unhesitating. Because we must continue to live. The meaning of the world is the development of the personal soul, a task unfinished in any one life. It is God's plan for us that we learn, and forever continue to learn.

With this clue, he could take what came to him; he could learn the art of learning from those who unjustly opposed him—by finding what Yeats called the "pilgrim soul" in them also. And he could hold a steady head in full view of the slaughter of men and nations in the vast catastrophe of war. For to him, the ultimate evil was not death, but the hardening of the mind against truth.

I do not say that his solution is the true one; I certainly do not say that it is final. But I say that an outlook like his which fills his life with zest, leaves him resilient against immense losses, makes him a source of strength to many other men, is of immense practical importance. So far from being disaffected from active life, he has something from which the sagging morale of this era might be rejuvenated—provided only that it were true.

But can it be true?

Here, I turn to address myself to those for whom the problem of immortality is an open question, and who feel it important enough to worry about. They feel the force of the scientific position, that is to say, the usual attitude of scientific men. But they are ready to believe that this attitude may be mistaken, provided there is any substantial ground on which an affirmation of continuance could be built. They are unwilling to resort to a will to believe; they fear, rather than court, the influence of their own wishes. Just because the continuance of personal life would be so desirable to them, and so vastly important if it were true, they resist any direct appeal to their desires as evidence of fact. On this point, perhaps more than on any other, they are resolved not to delude themselves by wishful thinking.

I very much respect this state of mind; I would even urge those for whom the matter is already settled to adopt it hypothetically, for the sake of the argument ahead of us.

I propose that we take up first certain objections to the belief in immortality from the side of science and of philosophy, because in dealing with them we shall see more clearly what positive grounds for the belief there could be.

1. The Scientific Objection.

Let me first make clear that science does not deny the possibility of immortality. The field of science is this world of nature; it knows nothing of any other world. The term "world" in this sense includes, of course, the entire universe within the single space-time continuum which is the field of our gravitational-electrical relationships. Whatever belongs to this causal system belongs to nature in this sense.

I say that science does not deny the possibility of another universe, or of other universes. It does however doubt whether the suggestion that there might be other such worlds has any assignable meaning. It calls to witness here certain newer developments of logic, or of semantics, concerned with the

meaning of "meaning," and interested in saving mankind fruitless speculative worry by marking off the realm of inquiries which have significance from those which have none. The general trend of opinion among semanticists is that metaphysical statements—among which we must include any statement about another life—are either meaningless, or else devoid of scientific meaning, however they may still have a vestige of emotional meaning.

On the basis of this doubt, science today is disposed to ignore the question of immortality as in any case beyond its jurisdiction. To our question it answers neither no nor yes. But it tends to make the proposal of survival appear increasingly improbable, and on one specific ground—that of the precise fitness between mind and body. Mind and body vary together at every point. Aristotle has the distinction of first drawing attention to the force of this fitness, as a refutation of the fancies of Plato that the soul might not alone leave the body and wander through the realms of Hades, but might also return in another body differently disposed and equipped. For Plato adopted the belief in transmigration, as well as the belief in immortality: and he thought the mind might be better off without any body at all, so far as clear vision of truth is concerned.

Aristotle very rightly observed that the mind of one man would not fit the body of another: the mind of Homer could not be transferred to the body of Solon; still less could the mind of man take up its abode in the body of a tiger, or that of a tiger in the body of a man. Transmigration, then, was an absurdity; and as Aristotle felt, the idea of a soul without any body at all was still more absurd, since what we mean by the soul is nothing more or less than the inner life of a given body, its guide in growth and behavior—in Aristotle's somewhat difficult phrase, the soul is the "form" of the body, and therefore not conceivable apart from the body requiring that particular form. Aristotle would have relished the problem dealt with in a seventeenth century Harvard thesis—Whether the speech of Baalam's ass required a temporary alteration of the animal's vocal chords!

Now this observation has been rather enforced than weakened by all the subsequent growth of our knowledge about the relation between mind and body. We have learned to associate the mental life, not with the body as a whole, but more directly with the brain and the central nervous system. And while most thoughtful men* recognize that the mind is not the same thing as the brain, nor as the physiological action of the brain, they will agree that the activities of the mind and of the brain go along so closely together as to imply an exact mathematical relationship. Just what the relation is still eludes analysis; but much hope is placed on recent inquiries which indicate that there are electrical phenomena which accompany mental action from whose shape it is possible to infer—not one's thoughts, to be sure—but the gross distinctions between sleeping and waking, effort and rest, anxiety and peace. We know infinitely more than Aristotle of the extremely sensitive response of the mental condition to variations in the chemical constitution of the blood-supply of the brain, as affected by food and drink, by drugs and vitamins, by the functioning of the glands of internal secretion. All of these items of knowledge lend a cumulative force to the supposition that when the brain ceases to function, that particular stream of consciousness ceases to exist.

It is just this conclusion, however, which requires a careful examination.

All the facts we have mentioned may be summed up as facts of co-variation: change the brain-action and you change the mind—to which there is another side also—change the mind and you change the brain-action. This fact of co-variation, or of the perfect fitting of two sets of changes, implies, of course, that we have two distinguishable sets of changes to deal with. It is the distinguishability which now becomes important.

In order to show what is at stake here, let us take another case of co-variation equally exact. A set for a movie-play is being photographed; every slight action, every shadow, every play of expression is precisely caught by the film. This film could not

*Among them the great brain anatomist and physiologist Dr. J. Eccles, and the renowned brain surgeon and theoreticist of brain function, Dr. Wilder Penfield. *C.M.*

possibly be the record of any other actors or of any other act than this one. Aristotle's exact correspondence is literally preserved. Yet if we should argue that there could be no other film-record of that set, we should be obviously wrong. Two cameras, at different points, would get numerically different records. Both records would be perfect correspondents to the action, in such wise that they could fit no other set in the universe. But no two corresponding pictures in the two films would be identical. The given mind, to draw our inference, can logically have two different bodies; and if two then more than two, so far as the mere fact of perfect co-variation is concerned. It is logically just as possible that the soul should have a plurality of bodies, each of which uniquely fits it, as that a body should have a plurality of shadows, each of which uniquely fits it, each of them unmistakably the shadow of that person and of no other in the universe.

Aristotle's argument, a good argument against the idea of a soul moving into the body of another person, or into any kind of misfit body, thus proves to be no argument at all against the idea of a soul having another body or series of bodies each of which fulfils the requirement of being a precise representation in space of that soul. And all the subsequent arguments which make the picture of fitness more precise are equally incapable of excluding the possibility of a plurality of embodiments of a given mind.

Indeed, I think we may say that we have experiences which, without amounting to anything like a proof that it is so, vividly indicate to us how this might be.

Persons who dream do not always dream of having a body. That is, they do not always, in their dreams, give attention to the fact that they have bodies. But they frequently dream of moving and acting in situations which imply a body; if one dreams of trying to escape from a pursuer, he may be desperately annoyed by sluggish and disobedient limbs; but his efforts imply that there are limbs and that they are his. And they are certainly not identical with the limbs which are quiescent in the bed. The dream body is in effect another body; yet it is uniquely the body of the dreaming person.

I conclude that this particular scientific objection to the notion of another life vanishes upon careful logical analysis.

2. The Philosophical Objection.

The scientific conviction runs deeper than this formal consideration of fitness. It would be comparatively easy for a scientist to agree that we could imagine the soul to have many bodies, just as we can imagine a given snake to have a series of skins, each of which is peculiar to that individual snake. But to believe in that possibility requires something more than to imagine it. In the case of the snake, the animal produces the skin, not the skin the animal. However, the analogy seems to fail, for in the case of the human being, the scientist feels that the body produces the soul, not the soul the body. If the body produces the soul, it would be impossible that a given soul could have any other body than the one which produces it. Only if the body is a product of the soul could there be another body for the same soul, in another sphere of existence.

The problem here is one for philosophy, and not for science. The question is, which is first in being, the body or the soul (and I am here using 'soul' and 'mind' as equivalent expressions, for the sake of simplicity).

All the appearances, or most of them, favor the idea that the body is first in existence, and the mind a later development. The process of human reproduction is biological: one would say that what is continuous from parent to child is not the mental life but rather the germ-plasm. It is a generally accepted view that the embryo must have a certain degree of development before consciousness arrives; though the moment of that arrival is not one which science is prepared to fix, since the fact of consciousness is wholly inaccessible to observation. But the signs of mind, in groping and experimental behavior, only appear as the child approaches the stage of independent bodily existence; they seem to follow from the appropriate development of the nervous system; and they seem to come when they do because the body can then make use of an organ of guidance

for its own behavior. All of this, as well as the facts we have already mentioned showing that the condition and vigor of the mind depends on its nutrition and the quality of its blood supply, seem to certify that the mind is present for the sake of the body, as one of its means of survival and guidance, and not the body for the sake of the mind. And if this is the case, when the body has run its course, its particular mind has no more to do; and as dependent on the body, it can no longer exist.

This, I believe, is the persuasive argument against the continued life of the personal consciousness. It is so obvious, and so in accord with common sense as well as with science, that in its presence the notion of immortality takes on the guise of a pleasant fancy which sober judgment, based on the patent facts, tends to dismiss.

We remember that in the platonic dialogue, the Phaedo, when Socrates in the prison observes two of his young friends consulting one another during a pause in the discussion, he surmises that they feel his plea for survival to be defective, and are hesitating to press their objections lest, in this his last day of life, they should be depriving him of at least a comforting hope. It is he, then, that takes the initiative to drive into the open the lurking doubt. Least of all does he, in that hour, wish to go forward under any illusion. In the unique moment of death, which each must face alone, the only firm companion is the truth.

Socrates had suggested that the body was like a musical instrument, the soul like the music; so that the body was for the sake of the soul, not the soul for the sake of the body. But then comes the damaging reflection, if the instrument is broken, the music also must cease. It is at this point also that our present and modern argument seems to stand, with all the fortification of the scientific demonstrations of dependence. And it is not at once clear that we can derive any light from the consideration by which Socrates revived the argument with his friends. He reminded them that there was one important difference between the instrument-music relationship and the body-soul relationship. The instrument needed some outer person to play it; the soul seemed to initiate its own music—it played itself.

That is true; but does not this simply mean, in modern terms, that the body-mind combination is able to initiate its own motions, without external help. It does not imply what we need, namely, that the mind is able to call the body into being, as in a sense the music calls the musical instrument into being.

And if the mind were able to call the body into being, would we not know it? Whereas is it not the reverse that we are aware of in our inner consciousness—that our minds are frail things, flickering with every wind of health and illness, vigor or fatigue, and when the physical basis is too disturbed, flickering out?

This, I think, is the crucial point in the philosophical enquiry into immortality. Is it true that the mind depends upon the body, and not the body on the mind? If so, immortality is excluded.

But a closer look seems to show that both things are true. Of course, we must take our food in order to keep on thinking; but also we must think in order to take our food. Of course, we may speed up our thinking if we so desire by a cup of coffee; but the body does not take the cup of coffee without the prior decision of the mind. To say in such cases that the state of the mind depends on the body is to say only half the truth; the whole truth is that the state of mind at the present moment depends on what the mind in a previous moment decided to do to itself by way of the body. The body was a necessary means for working out the mind's own wishes for its future condition. The initiative lay wholly with the mind.

And in the course of years of this submission to the mind's dictation, the body is modified, or even made over: it becomes more completely the mind's instrument. It has been said that at fifteen a woman begins to show the beauty that nature gives her; at fifty she shows the beauty that she gives herself. There is much truth in this, for at fifty the constant working of the character into the attitudes and expressions of the body tell an unmistakable story; and if this simple truth were better known by the women of America, their artificial methods of achieving beauty might give way to something far more substantial and, may one say, far more effective.

If I were to correct that statement it would only be by way of

questioning what it says about the beauty of youth and childhood; that this is what nature gives, and not the self. I would rather say that the early beauty of the human body is what the mind accepts, the later beauty is what it fashions. As I look more closely at the relation between mind and body in childhood, I would not say that the mind at that time is more at the mercy of the body. I would say that the earlier period is one of docility, the later period one of command. The child is at a stage in which nutrition is the dominant impulse and necessity; but the nutrition is both mental and physical. The child is docile toward its entire social surrounding; it is highly content to be itself; it has no quarrel to pick with its ancestry, with its race, color, shape, or condition; it desires simply to be more of the same, i.e., to grow. It has to find out what this person is it calls itself, and what it is like as compared with others; it is becoming acquainted, through the mirrors of social life, with the self which it knows at first only as an intimate and somewhat formless center of consciousness and action.

At the same time it is becoming acquainted with its visible body. The child does not at first see its body; it only feels it, as a mass of sensation, comfortable or uncomfortable, and with various possibilities of action, bringing about changes in sensation. This is as much as to say that the body, for the child, is at first a part of its conscious mind. To say that it accepts this consciously felt body, is simply to say that it accepts itself; and if that body seems to an outer observer to have beauty, that beauty is not in any exclusive sense the beauty which "Nature" has given, it is also the beauty of that inner self, in its early harmony. There is nothing in that situation which requires us to say that the body is first, and the mind a product. Both develop in complete accord. The facts would be quite as well satisfied by an hypothesis which to my mind is far nearer the truth: that the body is simply the visible symbol of the mind. And if the will has an influence over the body in later life, as it certainly has, it is probable that it has at least as much influence over the body in childhood. Only, in childhood, the influence of the will should be more completely subconscious, because, in the period of docility, the child has less capacity to criticize the sort of

being it is, and has therefore less conscious motive to make itself over.

I reach therefore this general result, that throughout life the body depends on the mind, even while the mind is dependent in other respects upon the body.

With this result we are, so to speak, half way emancipated from the notion that the mind is so far a slave of the body that if the body dies the mind must die also. We reach the point of seeing the mind as at least an equal partner in the destiny of the person. But it is only a half way emancipation. What we have is a familiar sort of interdependence; A depends on B and B depends on A. In this sort of mutuality, there is no assurance that if one of the members drops away the other can continue to exist.

It would be possible to point out that with the growth to maturity, the period of command replaces the period of docility and the body becomes increasingly subject to the will of its owner. It becomes increasingly natural for the soul to refer to "my body" and increasingly unnatural for the body to refer to "my mind"! But then it has also to be admitted that with advancing age, the mind seems to lose its ascendency, and the infirmities of the body begin to impede its own self-command.

We would do better to inquire in what respect we have to say that the mind is dependent on the body, and in what respect it is not dependent.

It is customary to think of the dependence of the mind on the body in three main ways. First, it is said we require the body to keep us informed of the outer world through sensation, especially through sight and hearing. Second, it is said we require the body to give us an active effect on the outer world through the motor nerves and the muscles: without this we would be helpless spectators of events, able to think but not to will. Third, it is said, we require the energy of the brain to supply the energy of thought.

I am not sure that any of these statements is exact.

Ordinarily we seem to see by way of our eyes; but then our eyes are one of the things we see. And if we only know of our eyes by way of our eyes, there is a chance we may be mistaken

about that necessity. We dream fairly well when our eyes are shut. And Beethoven set music before his mind long after his ears were soundless. It is not absolutely certain that we require eyes and ears for seeing and hearing; though we do require them for keeping in touch with certain sources of light and sound we call external. As for the energy of thought, it does not seem to be in any clear relation to the physical energy of the brain: the best intelligence is not the intelligence that has to strain hardest to get an idea, but the intelligence that grasps the idea without effort. Far-sightedness seems to be a function of mental balance rather than of mental strain. There is no known way of stoking the mental engines so that a slow wit will become even moderately bright, and no dosing with iodine or any other known drug will turn a moderate ability into a genius, though there are drugs which may produce the sad illusion of genius.

But allowing the body in all these matters the benefit of such doubt as there is, we may say that the body appears to be the agency of connection between one person and that "outside world" which consists primarily of another group of persons. The connective tissue between members of a community is what we call the physical world of "Nature." Nature is common property for all of us; we have the same space and time, the same earth and stars, the same geological history. We do not see one another's minds; but we see bodies which we learn to identify with the minds of others. The body is first of all the means of identification which other people use for any given person; the body symbolizes the person. Then, as that body seems to use its eyes and ears, we assume that the person symbolized by it is conscious of the same world with us, and may be apprehending the signals we issue. As the body acts, we assume that the person is using volition to effect changes in his own position, or changes in the world outside him. All this sums up in the proposition that the body is a means of communication between one person and other persons by way of a common physical world.

It is also, of course, a means of receiving communications and effects. You arrest a person by arresting his body; you fight him by fighting his body; if you injure his body you injure him; if he

demands a court hearing you grant him the use of his body, "habeas corpus."

But in all of this one thing has not been said. It has not been said that we require the body in order to exist. Until someone comes forward with an explanation of how it would be possible for a body to produce a mind, the assertion that the body develops or evolves the mind connected with it remains both unfounded and unintelligible. With all the ingenuity of scientific hypothesis, it has to be said that no advance whatever has been made since Aristotle or before in answering the question how, from a mindless universe, or a mindless organism, a mind could emerge. (I use the word 'emerge' intentionally, because I wish to include "emergent evolution" explicitly among the hypotheses which are intended to relieve the mystery, and which completely fail to do so.)

But on the opposite question, How can the body depend on the mind for its existence? there is at least one definite item of evidence. That is found in the everyday experience of decision. In the act of deciding a course of action between several alternatives, it is necessary that each alternative shall be imagined as a future possibility. We can choose between going into dairy farming or into wood cutting only if both of these occupations are available to us, and only one of them can happen. Our minds are busy with prophetic pictures; we see ourselves surrounded by our future herd, or by the grimmer scenes of the winter forest; we see the paths leading to each of these scenes. All the past momenta of nature lead up to the moment in which I now stand facing these alternatives; but they do not carry me through that moment. I halt the impetuosity of Nature until I am ready to decide. Then I insert into the causal runways of Nature the special actions which will carry me along one path or the other, to the dairy farm or to the winter forest. And when the chosen picture arrives it will be I and not Nature that made it real; and yet—and here is the point—it has become a part of Nature. And without me, and my imagination, it could never have come to pass. It is my mind, in what we call a free choice, upon which that particular bit of the physical world depends, and within it, that activity of my body which belongs

with it. Here the very existence of that phase of the bodily life depends on the prior mental act of choice.

The implications of this fact, partial as it may seem, are momentous:

If the human mind or soul is capable of what we call a free choice, it is, in that small chink of the universe, standing for a moment outside the stream of cause-and-effect and determining what nature shall contain. In principle, the body is there dependent on the mind, not the mind on the body.

And if this is the case in that small chink of the universe, we have there an insight into the way things are put together. We can see that in its own character, the physical world, which destroys the body, cannot destroy that which is free from the body.

The death of the body, if we are right, would be the cessation (or the symbol of the cessation) of a set of connections with a particular community of other persons. There would remain the possibility that the inner energy of the self, if it had attained to that self-command which would give its continuance a meaning, would enable it to make connections with other such communities. And in so doing, it would find itself with another body, exactly fitting its own individual character, identifying it in its relations with that new environment.

So far, we find that the philosophical objection to the idea of immortality does not hold good. Like the scientific objection, it leaves the field free for any ground of a more positive nature which we may have to justify a belief in that further dimension of the universe.

3. The Ground for Belief

No one, I think, is likely to come to a belief in immortality through argument. It is the work of argument to remove obstacles, not to bring positive conviction.* The argument is necessary because no one living in a scientific age can fairly

*The mathematically trained philosopher would rather say that if conviction is to be more than some form of self-hypnosis, valid reasoning must be an essential ingredient. But the author is right in that only experience brings complete conviction. *C.M.*

remain indifferent to the view of man which science suggests; he must listen to it and settle his accounts with it. But he must not expect it to provide the answer.

The answer must come directly from personal experience.

But how can there be a personal experience of immortality, that is, of something which relates to a future time, and to a time beyond the limits of human life?

This question which seems quite natural to the American mind would appear unnecessarily stupid to a Hindu or a Buddhist. The object of the Hindu's meditation is to achieve what he calls a "realization" of truth, and of one truth in particular, the truth that in his deepest self, he is identical with the source of all being, Brahman or God. To realize this is to know that the accidents of earthly existence, even the deepest of accidents, which is death, cannot destroy the self, any more than night, which is the accident of a shadow—can destroy the sun.

Any personal experience which can show us clearly how things are put together in this universe—what is superior and what is inferior, what the soul is and how it is related to its body, what death is, what it can do and what it can not do—any experience, I say, which lights up in a flash the articulation of this living world may give us even now an outlook on the future.

C. F. Andrews, friend of Gandhi, and of many others, has written of experiences of his own, in connection with the approach to death of two of his nearest friends, which led him to the conviction of immortality. "Truth" he wrote "is never wholly gained until it becomes individual and personal. An inner conviction has now come to me. There is now certainty within me that our Spirit is independent and survives all change." (*Christian Century*, Aug. 29, 1934, p. 1094.)

He had in mind one of Gandhi's fasts in which Gandhi came very near to death. "His (Gandhi's) suffering had become almost unbearable . . . . His mind also seemed under a cloud and he spoke with great difficulty . . . . I questioned him whether he was conscious inwardly of the joy in the spiritual life about which he had spoken before. His face lighted up again

immediately, and his answer in the affirmative was emphatic. . . . It came to me with a new power of understanding that the spirit of man is in some way independent of the mind, and in a real sense immortal . . . . It appears to be distinct from the mental process, which is more closely connected with the body . . . . "

At the end of his story he quotes from another remarkable Indian, Sadhu Sundar Singh, who had found during a fast of his own that "as his body became weaker his spiritual faculties became more active and alert" and had drawn the inference "that the spirit was something altogether apart from the brain. 'The brain' he said, 'is like an organ and the spirit like the organist that plays on it. Two or three notes may go wrong and produce no music. That does not however imply the absence of the organist.' "

(Here, Andrews is using the word 'spirit' for what we have called the deeper self.)

Such experiences are not uncommon. They come to us in different ways. They are likely to be such individual perceptions that they mean everything to the one who has them and little to anyone else. Some people I have known have become persuaded of immortality through the very thing which would be likely to rob them of that belief, the death of a wife or husband. I had a letter some time ago from an old friend, a skeptical and hard-headed naturalist, who had lost his wife. He said "I have never taken any stock in the notion of any one living after death. It is too contrary to everything that we biologists seem to see with our eyes. But when X died, I suddenly realized that as biologists we see nothing that touches the question at all. We see the body die; and we think of life as a property of the body. But consciousness and personality we do not see; they are not the same as organic life. I have a feeling deeper than any argument, not affected by argument, that X cannot have vanished from the universe." Such a statement can hardly be persuasive to anyone who has not gone through a similar experience, and yet it is probable that a similar revulsion against the claim of death to have conquered life explains the widespread belief in survival among all races of mankind.

More common is the experience or illusion of partial detachment from the body, in which the body appears as something semi-alien to oneself, an experience which occurs sometimes in deep revery, and sometimes in illness or convalescence. The experience is variously reported as that of being free from one's body, or of observing it as from outside. The significance of such experiences lies not in the question whether they are illusory as particular events, but in the incidental discovery that the self need not be identified with this particular body in order to be itself. In its most general meaning, it is a discovery which anyone can make at any time—that of the inner plurality of the self. For when one thinks of oneself, or observes or judges oneself, there is immediately a distinction between the self which observes and the self which is observed. Suppose one has done something of which he is afterward ashamed, and suppose him busied with the remembrance of that deed and his regret at having done it. The judged self is condemned and repudiated by the judging self, though the weakness which led to that act is still present. The self which is caught in the meshes of habit, heredity, passion is haled before the court of a self which knows what ought to be and holds that standard free from the deflections of time and circumstance. One might say perhaps that the eternal self is judging the temporal and experimental self. Both selves are required to make up the complete and humanly living self, but the self which (as Plato would put it) participates in the true standards of judgment can be seen to have a deeper lodgment in the nature of things than the self of these experimental excursions. It is more "real."

And it is interesting to observe that when the human being thinks about his own death, and of the time after his death when he will no longer be present among men—an act of reflection which men often perform, and which in all probability animals never perform—one has to imagine this reflective self as continuing to live; otherwise it could not observe the absence of the visible self from among the living. The thought of annihilation can never be completely executed, because self-consciousness must remain in order to attempt to execute it.

From such experiences and reflections, many have come to the clear personal perception that—as they would put it—the true self cannot be destroyed by the crisis of death, for its position is such that it rides above that crisis.

This conviction gives them a further answer to the question which we earlier raised, about the possibility of that free sacrifice of life for a cause, which we find so common today in the armies of materialistic societies. Indeed that willingness to die is present wherever we have human nature at its best, as in the pursuit of new paths in medicine and in other phases of science and its applications. There never have been wanting men who were ready to die for the sake of man. For, as we now see, in freely rejecting life, there is a self which is rejected and a self which rejects. In rejecting life for the sake of a higher good, the self which rejects unconsciously lays hold on that which is more valuable, and more durable, than that life itself which is rejected.

But there is a third type of experience more common, I believe, than either of these. It is the realization that there must be purpose in the universe as a whole; and that the annihilation of the spirit of man in death would by cancelling the meaning of things amount to the denial of purpose. For somehow the aspiring and questioning human soul, weak as it is, embodies all that we can see of the significance of creation. The world is vast and man is puny; but unless the vast world knows itself and its meaning, it is less real than petty man, who does know himself and his unending craving for finding the meaning of his life in space and time.

That living spark, just because it is inquiring and seeking, just because it raises the question of futility which a dead universe cannot raise, just because it is capable of suffering at the spectacle of an infinite waste of insensate matter, is more real than any such waste could be. And seeing this, one apprehends at once as by a swift flash of light that since the more real cannot be obliterated by the less real, the soul that aspires cannot be obliterated by death.

Language and the Human Psyche

16

Joel Elkes

Director, Department of Psychiatry and Behavioral Sciences, Johns Hopkins University and Medical School, Dr. Elkes (M.D.) is not only a psychiatrist and expert psychopharmacologist, but also a gifted philosophical thinker and a creative leader in medical education improvement. His article has been slightly edited for inclusion here.

Introduction: Languages and Psychiatry

Steadily, the growth of his science continues to diminish man's place in his universe. Three times in recent history he has had the chastening experience of being put in his place. Galileo, Darwin, and Freud have reduced prevailing self-deceptions, and we can be pretty sure that new insights will reduce new deceptions. Self-deceptions seem important to man; in some strange way his rites and his dreams form the germ plasm of his efforts at understanding. To paraphrase Thomas Huxley, science does not only start in knowledge, harden into dogma and end up in superstition; it has often begun in superstition, become science, and ended up in dogma. Superstition and dogma differ from science in that the last is backed by shared evidence, rather than mere shared feeling. In the old days, the evidence of the senses was enough. Experiment, however, relied increasingly on an extension of the senses and developed a complex scientific technology to observe, understand, enact, and control the phenomena of nature. Yet, to this day, feeling

states are the forces that bind and part men. No telescopes or microscopes are needed for men to know or to deny one another. Man's unaided senses are his sensors, and the detectors are carried within his skin and skull.

Not so with the natural sciences. Here, a vast array of exosomatic extensions of ourselves has created the bulk of our culture. Within a mere hundred years or so—the briefest moment in man's total existence—these inventions have totally and radically transformed man's physical environment, and firmly established the dominance of our resourceful and dangerous species on this planet. In our own age, they have made change the only constant, and excess a state of body and a state of mind. Excess, that is, of material product, coupled with a gross immorality in its distribution. Excess of people, newly born and newly preserved, coupled with excess of the power to kill, leading to nuclear overkill; an undreamt-of explosion of human inventiveness, coupled with a deep sense of loss of the person; above all, an excess of raw impulse and a poverty of feeling. We are choked by our own abundance, yet puzzled by the strange hollow ring within. We are at once more active and more passive, more connected and more separate, more interdependent and more lonely.

The products of science bind us. No Christmas Day will ever be like Apollo Day, 1968. But somehow science in the service of man has blurred the image of man. The dichotomy between natural sciences and the affairs of men still goes deep. The symbols of natural science are alien to immediate experience. They deal with universals rather than individuals; and they are often encased in special languages known to the few rather than the many. Our perceptions of ourselves and of each other, on the other hand—even of a world so radically changed by science—are still fairly direct. Feeling still enters into any act. Experience still determines expectation, and expectation induces both action and outcome. Fear, in the average person, still engenders fear, and friendliness still engenders friendliness. We still fundamentally like others in the measure we like ourselves; and yet tend to depend in our self-esteem on the

judgment of others. Intent is still related to capacity, and our range of choices depends, as always, on the symbols by which and with which we live.

Here, however, things have got very complex. For the loom of language, shuttling wildly, has woven a tangled web of threads, and the resulting cocoon now envelops us all. To speak of two cultures is to oversimplify. There are not two, but very many, cultures—cultures as varied as the languages they employ. There are, at either extreme, the day-to-day languages by which we live, and the impersonal symbolic shorthand of the natural sciences and of computer technology. There are, in between, the hosts of languages in the social, political, and psychological sciences, bearing visibly the imprint of the natural sciences on which they still unduly depend. There are the languages of the law. There are the humanities and the arts, showing, these days, the scars of a misalliance with second-hand science; and there are the languages of the mass media—homogenized, rated, quality tested—which shape so much what we are supposed to know and to believe.

In this mounting confusion, the public continues to yearn for things that are personally relevant. Responsible media, and some gifted individuals, do their best. Rightly or wrongly, however, it has fallen to the mental health professions, as to no other profession in our day, to deal with disorders of interpersonal communication and self-communication. It will be my contention, in what follows, that in areas central to our trade we have fallen prey to a universal malady. I will call it, for want of a better term, "Word Fallout," which I will define as an excess of words in places where they do not belong and where, indeed, they do great harm. I will try to characterize the symptoms of the disorder. I will argue that healthy reactions to the malady are afoot both in the profession and the culture at large. My concern, then, will be a sort of brief overview of the pathology of psychopathology, examined in terms of the evolution of languages in our science, and, also, in some pragmatic terms relating to our culture.

It has always been a profoundly moving thing to me that, to the end of his life, Freud chose to use mythological figures to

name his key concepts. Somehow that shorthand suited his purpose well; the ancient symbols marking, like no others, huge tracts of a subterranean landscape, which he set himself to explore. It always satisfies afresh to find in his language not only the ability to denote, but to communicate and express, as only great stylists can, the tensions, dynamisms, and precariously transient balances of a state of mind. In his journey into the interior, Freud had his predecessors (Johannes von Müller, Francis Galton, Fechner, von Helmholtz, W. B. Carpenter, Wundt). Towering over all were, of course, Titchener and William James, the latter of whom drew much from Benjamin Blood's "ether dreams," and whose essays "The Stream of Thought" (1890), *The Varieties of Religious Experience* (1901), and "A Pluralistic Mystic" (1912) tell their own tale.

In his preoccupations with subjective phenomena (while incidentally building the first experimental psychology laboratory at Harvard), James significantly deviated from the principal paths of nineteenth-century science. As he says in his well-known quotation (from "The Stream of Thought"): "What must be admitted is that the definite images of traditional psychology form but the smallest part of our minds as they actually live. The traditional psychology talks like one who should say a river consists of nothing but pailsful, spoonsful, quartpotsful, barrelsful and other molded forms of water. Even were the pails and pots all actually standing in the stream, still between them the free water would continue to flow. It is just this free water of consciousness that psychologists resolutely overlook. Every definite image in the mind is steeped and dyed in the free water that flows round it. With it goes the sense of its relations, near and remote, the dying echo whence it came to us, and the dawning sense whither it is to lead."

These echoes, this dawning sense of knowing, is indeed familiar in the drug-induced state, the secular transcendental state, and the religious mystical experience. The choices of James' words are significant: the metaphor, the allusion, the strange poetic precision of ambiguity. Meaning and feeling are here conveyed in a form all compact. It is well to recall that, like Galton and von Müller, James, in speaking of his stream of

thought, referred to thoroughly mundance occurrences. For, after all, waking, falling asleep, drifting, letting go, preoccupation, and possession with an idea are there for all to experience. We know what these states are like; and someone who also "knows" can share them with us. However, one is hard pressed to express and communicate these states.

In taking the historical view, we will note another development that grew in parallel to the study of subjective experience and in a fashion complementary to it. In the Introduction to his "Treatise of Insanity" (1806), Pinel states his purpose clearly: "Nothing has more contributed to the rapid improvement of modern natural history than the spirit of minute and accurate observation . . . (with this in view) . . . I therefore resolved to adopt that method of investigation which has invariably succeeded in all departments of natural history, viz., to notice successively every fact without any other object than that of collecting material for further use; and to endeavor as far as possible, to divest myself of the influence, both of my own prepossessions and the authority of others." A firm line marks the progress of this descriptive approach from Pinel to the present day. The naming and taxonomy of mental disorder thus proceeds in parallel with the exploration of subjective experience, and roughly coincides with it in time. There is overlap between the two approaches, and a searching out of subjective elements in objective presentation, and vice versa. There are shifts of emphasis; yet, basically, the two lines exemplify attitudes very much alive today.

Physics, and the Function of Language in Science

Discoveries in the general area of mental life, however, ill fitted the brash innocence of a young emergent materialist science. An age set firmly in the framework of classical physics, wedded to the meter rule, the clock, and the kilogram, secure in its concept of space, time, matter, and causality, and propelled by the idea of evolution—such an age did not readily accept introspection as a source of evidence, or behavior as a phenomenon in its own right. "Matter" was the primary reality;

and the studies of its properties—living or dead, silent or articulate—were judged the proper objectives of science. Physiology, though recognizing homeostatis and the self-regulatory properties of living systems, was wedded to chemistry and physics; and the inventiveness of the Russian schools of neurophysiology, leading to the evolution of the Pavlovian method, while providing penetrating techniques for the analysis of behavior, did not have the backing of present-day neurobiology and mathematics to enable it to realize its full yield.

Yet, as is well known in retrospect, forces of quite another kind were at work in that same age. The concept of the electromagnetic field—so new to a period preoccupied with the mechanical motion of matter—was consequent upon Michael Faraday's experiments. In 1856, Clerk Maxwell published his equations on Faraday's lines of force. It was the same Maxwell who, in his paper on "Atoms" for the *Encyclopedia Britannica* (1874), wrote: "There are thus two modes of thinking about the constitution of bodies which have had their adherents both in ancient and modern times. They correspond to two methods of regarding quantity—the arithmetical and the geometrical. To the Atomist the true method of estimating the quantity of matter in a body is to count the atoms in it. To those who identify matter with extension, the volume of space occupied by a body is the only measure of quantity in it."

Clerk Maxwell's ideas were followed by Ernst Mach's *Die Mechanik* (1897), in which Mach questioned Newton's definition of space and the concept of absolute rest. It is, incidentally, the same Ernst Mach who, in 1886, published his "Analysis of Sensations, and the Relation of the Physical to the Psychical," and who, by implication, influenced the development of gestalt psychology. What then followed has been well told by the new breed of physicists who partook of the change.

The result was that within three decades, the theory of relativity was established and quantum mechanics was in being. This meant that probability and chance had entered into the definition of the state of physical systems; and the concepts of "complementarity" of mutually exclusive states (such as particle vis-à-vis wave, position of particle vis-à-vis velocity and

momentum) were found to be a productive and substantially workable model in the description of the fine structure of matter. As Heisenberg dryly observes, "The possibility of playing with different complementary pictures has its analogy in the different transformation of the mathematical scheme; it does not lead to any difficulties." There is a profound truth in this fit of phenomenon and statement about the phenomenon.

I have dwelt briefly on these developments in turn-of-the-century physics because, in a way that, at least to me, is far from clear, they may well bear upon the evolutionary forces now at work in neurobiology and the biology of behavior. I do not mean here the mere cracking of a crust of certainty by the expanding root of doubt. The dialectics of the process go deeper. What appears significant is that while materialistic science was denying subjective observation of fluid, multiple, phenomena as a source of valid data and forcing overt behavior into a frame that fitted it ill, that same frame—rigid, formidable, buttressed by the enormity of its industrial product—underwent a loosening and expansion that, within a few brief decades, presaged a new age.

Concepts strangely familiar, yet never rigorously applied to behavior, were being quietly incorporated into mathematical statements concerning the structure of matter. What had been regarded as universal statements (such as Newtonian mechanics and Euclidian geometry) were reduced to special instances of statements of even greater validity. States regarded as mutually exclusive were assumed to "coexist." The mathematical scheme of quantum theory expanded the tenets of classical logic—the concepts of "either/or" giving way to the "also" and the "and," making classical logic a province of quantum logic. The deliberately open, probabilistic, mathematical statements were found, in the light of experiment, to provide a more precise description of reality than older and more circumscribed rules. Above all—and, from the point of view that we are considering, most important—a mathematical language for mechanics that had to serve the varied needs of the theoretician, the experimental physicist, the technician, and the engineer came into

being and its various components were treated more discretely. New symbolic inventions served the needs of fine structure of matter while older devices remained in use to run trains and to heat buildings. As with Berzelius' (1779-1848) invention of a formal shorthand for chemistry, it is the evolution of a new, appropriate language that made modern physics what it is.

I suppose that whether we like it or not we have now arrived at a crucial point in our discussion. For if behavior is to be described in a way accurate enough to predict its attributes, either in the individual or the group; if subjective experience is to be conveyed even to oneself, in terms that clearly and strongly apprehend its significance and meaning—languages are required to model and symbolize the processes with which they are concerned.

There can be little dispute of the attributes of language, even if there be discussion as to its function. Language, says Susanne Langer, is "our most faithful and indispensable picture of human experience," a heuristic, symbolic instrument shaping modes of observation and interpretation and interpenetrating deeply with experience. Phonemes and morphemes condense meaning into words, and the relation between word symbols is regulated by rules of syntax and grammar. These rules make for the smooth use of language as an instrument of social adaptation and communication. They order the relation of the fact symbols to each other and to the world they represent. In addition, conventional logic imposes a linear, sequential quality upon them. We should note that G. Hardin points out this quality poses a "threat of clarity." (*American Journal of Psychiatry*, 1958.)

There is, however, another quality in words implicit in the one just discussed. For, while carrying certain meanings in one context, words carry a totally different meaning in another; and even standing alone they may—as anyone who has traced the origin of a word in a dictionary—carry an accretion of different meanings in a sort of strange algebra and calculus of their own. This economy, this logic, this dependence on context is characteristic, as was shown by Whorf, even of the most

primitive language. Words are thus not mere labels, cards, stacked for reference in one of Broca's areas; they are states, sets, depending on relation and context; they carry multiple meaning. We should keep this characteristic of language in mind.

Carnap, in *The Logical Syntax of Language*, has examined the capacity for expression of any given linguistic system. What is remarkable in that analysis is how little our ordinary means of communication measures up to the standard of meaning that a serious philosophy of language, and hence a logic of discursive thought, demands.

It would thus seem that there are large areas in communication and in self-communication (i.e., symbol-making not exteriorized in overt behavior) that are not represented by ordinary language. For whereas grammar and speech are essentially sequential, linear, and discursive, the characteristic of these other subjective states is the multiple simultaneous presentation of internalized objects and relations. The form of the "unspeakable" is as different from the "speakable" as the structure of a dream, or even a daydream, is from the structure of deliberate action. In such symbolic forms totality is apprehended simultaneously at different levels; mutually occlusive elements coexist; time is of no consequence; and serial ordering in time, that backbone of causal reasoning, gives way to simultaneously perceived relationships.

The philosophy of language tends to dismiss this type of presentational activity as falling into the sphere of subjective experience, emotion, and feeling. As Bertrand Russell put it: "Our confidence in language is due to the fact that it shares . . . the structure of the physical world. Perhaps that is why we know so much physics and so little of anything else." (*Philosophy*, 1927.) I would submit that we know so little of that large "anything else" because, all too often, we have tried to force linear language and method on phenomena where they have no business.

We have invented all manner of instruments, which I have examined elsewhere,* to convey, to describe, to group and to

*Harvey Lecture of 1962, *Subjective and Objective Observation in Psychiatry*, Academic Press, 1963.

qualify the verbal and nonverbal transactional cues as they are emitted in soliloquy, in the dyadic transaction, and in groups. We have scaled and we have counted; and no one (such as myself) who has worked with subjective phenomena will discount the great value of scales. Nonetheless, we have codified sequential naturalistic observations and developed our favorite theoretical model for their presentation, and whole schools have emerged on the basis of particular concepts enshrined in particular words. Territorial defenses and tribal dialects have grown; and interchange has diminished. With time the languages have grown heavy with accretion and weary with abuse, much of their original meaning having been lost through repetition, habituation, and extinction. By degrees, the stigmata of sickness have appeared in communications about human communication. For the sake of simplicity, I will call these Discursiveness, Remoteness, and Pedantry.

I use the term *discursiveness* to denote a mechanization of language into a discourse of formulations that, often having started as assumptions and having blossomed into theory, have hardened into explanations without growing through the stage of evidence. The literature abounds in such formulas and formulations. The quality of *remoteness* grows out of the quality of discursiveness. For such language is, as we say, objective and impersonal. It "defuses" and renders safe the description of an involved, and perhaps painful, transactional interpersonal process. Anyone who has heard a young psychiatric resident present in monotone and in the name of objective science the case history of the day will know the phenomenon. Worse, the resident may have learned it from his elders. Things change, however, when one asks him, "And how did *you* feel at the time?" A fine history may then emerge in a flood. The ritual clinical liturgy is forgotten, and unencumbered plain English is found a perfectly serviceable language to convey many complex things about people.

The other sign of the triad is *pedantry*, variously defined as "narrowly academic," "unimaginative," "formalistic," "polysyllabic obscurant," and "ostentatiously parading one's learning." In this last, there is surely a flash of recognition. For here we all meet and are all equally to blame. When do we

communicate by letter, or by quiet conversation? When do we make time really to consider our differences in depth? Stricken by the sickness of our age, and governed by the word mill, we find ourselves to be wandering symposiasts, arguing briefly in strange hostelries, only to dissolve with the promise of a letter or reprint, which if it arrives often closes the matter rather than continuing an exchange.

The worse part, however, is that we are not alone. The sensors of our multimedia culture are alert to the things—or some of the things—we say. Topics are picked for their public appeal, spontaneous or induced. Our cumbersome languages undergo a further processing and transposition. In paperback, in ready-to-follow guides, in oversimplified magazine articles (including nude magazines), in long-playing kits, the public is kept abreast of the mental health field, such as it is. Yet the most socially significant writing by scientists is sometimes found in such popular reviews; and it tells the tale of our times, that it is often on these occasions that, for the first time, professionals are understood by each other. The language barriers, both within our fields and between ourselves and the public, thus, are formidable. In a world of word packages—a world in which the average child, when entering the first grade, is estimated by S. I. Hayakawa to have spent more hours in front of television than he will in a college classroom—we are viewed, more and more, as the Grey Eminences of 1984, a sort of Private Academy to Big Brother. That the public should sense the danger and insist that we tell them what we know only increases the need to put our house in order. The legend of the Tower of Babel is quite topical. We might, however, also wish to remember that dictators enjoy the hobby of playing with the meaning, and shades of meaning, of words.

Antilanguages and Metalanguages

Cultures, however, are living bodies and, in the manner of living bodies, respond. If the overworked and finished products of our popular mental health industry and the media that feed on it

fail in their primary task of enhancing communication, self-communication, awareness, and personal growth, new symbols have to be invented to meet ancient and persistent needs. When the invader is the dry word—alien, mechanical, remote, pedantic, and inhuman—the response is the No-word. When discursive and "sensible" thought impoverishes experience, new sounds take over. When languages fall short, antilanguages and metalanguages are born.

So in our day we have youth, the great harbinger of change, developing its own secret language, strange words, odd syntax, subtle inflections, absurd inversions, which we "squares" find hard to penetrate. We find dress flamboyant, distinctive, individual, yet worn like a uniform; music inventive, strange, atonal, harrowing, world-endish, loud enough to shut out the outside. In literature and theater there is a sharp shift from structure and plot to chance and unpredictability, from logic to paradox. I find the Theatre of the Absurd not Absurd at all. Indeed, as pointed out by Martin Esslin, it has much in common with Wittgenstein's "word games," which he intended to clear verbal ground for an active play of the creative imagination.

Indeed, as one looks about one, our culture abounds with all manner of strange and profoundly significant experiments and movements to get us out of the word cage in which we dwell. In centers—practically all of them significantly outside formal academia—elaborate methods are being developed to train people to guide and help them to be themselves in small groups. Styles and objectives may vary. Group composition, times of contact, the use of words or of other means, the degree and kind of staff support and involvement may vary; so may the relative emphasis on positive and negative affects. But again and again common ingredients emerge: the initial resistance to personal exploration; the expression of past feelings, and especially past negative feelings in front of others; the honest expression of immediate interpersonal feeling, leading to the cracking of facades; the beginning of self-acceptance; expression of positive feelings and closeness; the encounter with another, the healing capacity of the group, and the changes in the group as a whole. These changes can be profound, though we still do

not know how enduring they are. Clearly they have a deep biology of their own, the regularities of which we are only just beginning to describe, let along understand. They are social lenses of high power, refracting, focusing, amplifying interpersonal signals, greatly enhancing learning by crisis and learning by lysis. If the small group be the engine of society, it is only just beginning to acquire its Systems Engineers; and they had better be kindly men.

There is another area that is emerging in parallel. Body-language techniques are returning, after being banished to faddism. Breathing, stance, posture, relaxation, the use of one's own weight, skin contact, and a systematic training of sensory acuity are being developed to enhance the enteroceptive and proprioceptive vocabulary of the individual, using his own body. Much inventiveness is going into these new techniques; and many new and strange phenomena will no doubt be discovered as they are used in groups.

This is not new; the East has always regarded the body as a planet worthy of exploration. Hatha Yoga has developed an elaborate system of training for both voluntary and involuntary controls. There is in these exercises great slowness, deliberation, and beauty. It is good, I think, that young people are interested in these things. Some of us even believe that these techniques, including meditation, if taught properly and consistently, could go a long way to satisfy the exploratory drive into drugs, and to replace the quick instant "Trip" by the good hard work of a "Journey."

Whatever their use, these techniques obviously represent the obverse of the triad to which I alluded. For against discursiveness and obsessive mechanical rigidity, they put a premium on spontaneity and openness, which indeed may be very unsettling. Against remoteness, there is great emphasis (and great skill) in ensuring personal involvement, contact and "encounter"; against pedantry, and showing off, a much more genuine live-and-let-live kindliness, which makes discoveries quite personal but lays no claims beyond it. Interestingly, too, there is a shying away from theory, despite a clinical intuition of very

high order. There is, in the best attempts, much genuine search, rather than *re*search. Theory, one assumes, will follow later.

There is another obvious aspect to these new emergent movements. Is not their emphasis on the positive affects – warmth, growth, and human closeness – related to the perennial aims of the good family life and good education, and does not their appearance point to a gross cultural deficiency disease? How has man's most important school, the family, fallen so short in our culture? And how and why have family and school—apart from the appalling shortcomings of academic education -failed in the education of the sentiments? Perhaps, however, on second thought the case is not quite as extreme. Perhaps the fact that our culture is posing these questions in so poignant a way does indicate a healthy response to this failure, which response inevitably leads through education.

Possible Early Correctives

We have argued the failure of our languages in much of our professional communication. We have also argued that they obfuscate and bar experimental learning.* I believe much of the malaise to be a part of our general culture. Nevertheless, we must start nearer home, in the training of the health and the mental health professions. It is a parochial view; but to examine the more general issues would be far beyond the scope of this brief statement.

The student arriving at medical school is already encumbered, but not half as encumbered as the average psychiatric resident arriving for training. Much of the latter's training, indeed, is *un*training, a divestment of prejudices, of formulas, and of "working to rule." This process should start not with the resident but should reach deeply into medical education. I have argued elsewhere for a Laboratory and Field Practicum in human development and interpersonal processes taught during

*As C. P. Snow's *The Two Cultures* (science and the humanities without substantial communication) helped bring into general awareness. *Eds.*

the first or second year of medical education. Such a practicum must be experiential, and not merely didactic and data gathering. It is not, for example, enough for a student to "visit" a family and write a "report." Sitting on the floor and playing with children, experiencing and getting data and describing what is happening to oneself *and* the child, all at the same time, may prove exhausting, but it is also much more satisfying to the issues at hand.

Again, role-playing and psychodrama techniques offer great educational opportunities for sharpening one's sensibilities to the ways of others within a framework that is relatively safe. Group games, set up as exercises in conflict and conflict resolution (including attempted resolution of insoluble problems), may provide another level of experience and move to a little more realistic level; with adequate leadership these can still be kept at an operational temperature. True intensive group exercises, if properly conducted, may become very personal; their success, however, again—both in terms of personal training and academic yield—will depend on the competence of leaders.

We have recently revived, as an elective at Hopkins, the autobiographical essay, first introduced by Adolf Meyer. In this exercise the student is asked, in an initial essay, to answer the question: "How did I become the person I am? What people, events, and ideas have influenced me most?" He then meets with his preceptor on seven subsequent occasions for one hour to go over aspects of this material, it being made very clear that this is *not* psychotherapy by another name. Such individual exercises, coupled with experience of the realities of group experience, may be useful in enhancing personal awareness, directness and honesty in reporting; in short, they are splendid shortcuts through our jargon.

On the Need for New Symbolic Systems in Psychobiology and Psychiatry. Inner-Space Laboratories and "Intronauts"

In closing, I would like to resume a historical and somewhat more theoretical thread.

In 1854, George Boole, a self-taught man who had risen to a Royal Society Medal and a Chair in Mathematics at Queens College, Cork, published his *Investigation of the Laws of Thought*. In this work, as in an earlier one –*The Mathematical Analysis of Logic* (1847) -he examined the ability of symbols to express logical propositions, "the laws of whose combination should be founded upon the laws of mental processes which they represent." In searching for such outward representation, he invented the theory of classes and sets and the nonassociative relation between them, devising a symbolic algebraic shorthand for the expression of these relations, in which concepts such as product, complement, inclusion, and a number of others are clearly stated.

Boole's path-breaking contributions led–by way of Frege (1879), Jevons (1864), Peirce (1880) -to Whitehead and Russell's *Principia* (1910-1913) in our day. (One may note, in passing, the titles of some of these earlier works. Jevons named his work "Pure Logic, or the Logic of Quality apart from Quantity." Frege called his study a "Begriffschrift"–a "formula language" (Formelsprache) of pure thought.) Somehow the inexpressible, suggestive qualities that, in other circumstances, we would call intuitive, grew into communicable notations and symbols of great propulsive power; and opened a world of relations hitherto considered closed.

It is outside my competence to examine the influence of Boolean algebra on modern experimental physics. However, the relation of a theory of sets and classes to communication and information transfer is nearer at hand. For the very word *communication* (from "communicare") implies sharing i.e., the sharing of properties; and any encoding process depends upon the apprehension of such shared properties among sets and classes. It is by this sharing, too, that redundancy, far from being wasteful, serves in the transfer of information. Redundancy provides context and thus minimizes error; it is a safety device a reserve in the flow of information; a reserve, incidentally, amply encountered in biological systems.

Yet how interdependent are the demands of a subject and the demands of a language for a subject. When chemistry or electrical engineering needed appropriate symbolic forms of notation, such systems were duly invented: and when turn of

the century physics felt constrained by Newtonian mechanics, it was modified according to need. However, so young is biology as a science, and so much younger still is the biology of mental phenomena (which we will call psychobiology), that its great discoveries were made using a linguistic apparatus leased from chemistry and physics and from the language of everyday use. This hybrid arrangement has served for a time; no one will deny the many advances made so far. Nevertheless, it is clear that demands of quite a different order are pressing on the biology of our day. Interaction in macromolecular systems, and the control mechanisms inherent in such systems, are evidently of a different order from reactions between simple inorganic compounds; any accounting for the flow of information in such systems (as, for example, in the obvious instances of the gene or the immunological specificity of proteins) demands a language in which mere chemical or descriptive language is no longer sufficient. (J. H. Woodger in *Biology and Language* has indeed attempted to define the elements of a concise formal language for some aspects of genetics and evolutionary theory: a difficult but enormously worthwhile task.)

It is the fortunate, if embarassing, feature of the phenomena of behavior and of mental life that by their very nature they brook less compromise in such matters than any other branch of biology. The purely physical and chemical analogies do not hold. For behavior implies multiple simultaneous change of a system in time, and *form* in behavior is really a topology in time. Discursive, linear, metric language does not apprehend such patterns. Presentational, experiential language suggests intricate simultaneous relationships but does not define them. Yet it is the characteristic of every culture that it has invented symbols for such subjectively experienced relationships; it is significant, too, that in its own evolution, physics (and the branch of mathematics known as topology) has developed a shorthand for the apprehension of cognate simultaneous relations in the so-called outside physical world.

Could it, thus, be that in behavior and subjective experience we could see if we wished to look - most clearly and cogently

the "laws of thought" of which Boole spoke and which govern our understanding of the physical world? And could it be that the two uses of language that we distinguished represent two mutually complementary ways—one multiple, simultaneous, and another serial, successive—by which the brain constructs its models of reality?

In this context the distinction between "serial" and "parallel" programming of computers concerned with pattern recognition is of special, if topical, interest. Essentially, the distinction is one between asking questions serially one at a time, i.e., letting each answer determine the next question by successive elimination; or asking, as Neisser put it, all the questions at once. It is found, for example, that in the recognition of patterns of letters of different calligraphic quality the multiple, parallel method is more economical and effective.

There is at least inferential evidence that, at one level of its organization, the nervous system has the capacity of asking many questions all at once. The multiply connected reticular mixing pool [in the upper brain stem] may provide a substrate for precisely such transactions. The illogical thought process of intense subjective experience, of the dream, and so-called "primary" process may thus have its parallel in presentational language, in the "geometric" thinking of Clerk Maxwell, the principles of complementarity and coexistence of physics, and the multiple (or "parallel") approach of the modern computer; the logical, structured, sequential pattern of conscious deliberate action (sometimes called "secondary process") may be mirrored more closely in discursive language, the arithmetical approach, the scale, the serial analysis. Counting and pattern, rating and correlation, are thus at opposite ends. One feeds into the other, and science draws on them both. This process is well illustrated in William Harvey's famous passage in Chapter VIII of *De motu cordis* where, following the minute sequential observation described in the preceding parts, the "movement, as it were, in a circle" is first conceived. "Movement in a circle" implies an intuitive seeing of a relation in time. Indeed, time would appear to be the main axis around which we build our

models of reality; and nowhere is this more apparent than in the models we construct to represent behavior, including human behavior.

It would seem advisable, in view of the foregoing, to give early thought to the development of adequate new symbolic systems in the study of these very rapid intrapersonal, subjective processes, and to relate such attempts, whenever possible, to existing instruments in the psychological sciences. The creation of such new systems would require long-term planning within small groups. It would require highly trained observers and highly trained subjects capable of self-observation, to whom unfamiliar phenomena have become familiar through practice, as foreign territories are to seasoned travelers, and who are capable of developing operational definitions of states experienced and observed. Such an endeavor, which one might call Inner-Space Laboratories, engaged in the training of a species of "Intronaut," would require close cooperation between psychiatrist, psychologist, linguist, mathematician, and communication engineer; it may require training of one discipline in the skills of the other to ensure a most direct personal contact with the phenomena. It will require much debate and much crude trial and error. It will require money, which Congress could properly regard as a wise investment. For the history of science suggests that once such a beginning is made, progress can be quite rapid.

It may be not too much to hope that concepts only partly or inadequately covered by present-day language may, before very long, find a more adequate expression in new symbolic systems of greater precision and power. The usefulness of such systems may and, I would venture to say, will not be confined to the study of behavior. For the phenomena of behavior pose, in a most poignant way, some fundamental issues in biology, particularly in regard to the storage and transfer of information in living systems. Indeed, the chief merit of the study of behavior may perhaps lie in its intolerance to facile analogies borrowed from other branches of science, and in its compelling need for rules in its own right.

The behavioral sciences, and that vast body of experience

known as clinical psychiatry, thus, need not look apprehensively over their shoulder; having been nourished by the natural sciences, they may well be in a position to repay a long-standing debt. It is one's hope—and, if pressed, would be one's contention—that a science of clinical psychiatry is in the making in our day; and that in its growth it will enlarge the realm of the very sciences on which, quite properly, it still depends.

Evolution Toward the Essential

17

Charles de Montet

Dr. Charles de Montet was a skillful and successful psychiatrist whose private sanitarium in pre-World War II French Switzerland treated such celebrities as Maurice Ravel, Sacha Guitry, the then French "Wheat-King" Louis Dreyfus, the sister of King Albert of Belgium (who visited there incognito as "Duchesse de Vendôme") and the major French writer Paul Claudel (The Satin Slipper). *But Dr. de Montet was also a philosopher and a keen student of human consciousness. At the end of his career, he set down his* pensées *in an unusual book of penetrating analysis* Evolution vers l'Essentiel, *Lausanne, 1950, which has never yet been translated. De Montet is strong precisely where Jung is weak—at the pivotal point of individual survival after bodily dissolution, and hence his writings are valuable; for he offers us a far richer fabric than the banal Aristotelian "immortality" by historical fame or the Jungian absorption into the collective unconscious, which is merely a psycho-analytic version of Aristotle. That the drop contains oceans is more important than the truism that the ocean contains drops. The following translation is ours, as are the notes in square brackets.* C.M.

The Essential

Impossible to reconcile the idea of Divinity with this abominable principle of the connection between contraries!

Impossible? . . . unless . . .

Unless this complicity does not enclose something else immense, ineffable . . . unless all separation, all suffering, all conflict, all opposition be the gauge of a hidden and secret

solidarity, cosubstantiality and communion that no "judgment from appearances" could menace.

If the problem of contraries confronts in pressing fashion our saddest experiences, it can no longer be allowed to be considered as a merely academic question foreign to life itself.

Appearing with the first cosmologies and from the beginning of philosophy, that problem has played a great role in Taoism, Mazdeism, the Kabbalah and Manicheism. Among the Greek philosophers, already Anaximander and Heraclitus attribute a dynamic and creative power to the play of opposite forces, and the debate between Parmenides and Heraclitus about permanance and change was simply a particular aspect of the same question.

With Plato that question became the problem of the Same and the Other. At the epoch of alchemy and the religious struggles of the Middle Ages the idea of a secret relation of opposing essences was very important. About 1450, Cardinal Nicholas of Cusa wrote some magnificent pages on the vision of God and the coincidence of contraries.

In the course of the last century the problem assumed greater size with the antinomies of Kant and the dialectic of Hegel. When the enthusiasm raised by the Hegelian doctrines subsided, interest in the problem of contraries slumbered. But it has awakened because modern physics has shaken men's minds in giving a prominent place to the notion of complementarity.

However, with rare exceptions, the philosophers have not taken enough into account that the alliance of contraries is but one aspect of the act of knowing. To be sure they all recognize that it is impossible for us to define anything without opposing to it its contrary; but that does not suffice. Louis Lavelle has particularly shown how various aspects of the act of knowing are multiple and polyphonic and how their ensemble goes far beyond a simple opposition of contraries.

But if one would say that polyphony produces vertigo, justifies skepticism or risks our sinking into relativism—that would be to neglect the essential. That would be the failure to see that such polyphony means the ineffable plentitude of

reality, that it is the measure of omnipossibility. Thus Léon Bopp is quite right in demanding that we give *n* dimensions not only to the world, but to intelligence, which is to say, to the act.* The book of life is never finished. How could we desire to know the end of it!

The aspects of the principle I am seeking to characterize are extremely diverse, but they all say the same thing. The concordance of these aspects, so heterogeneous in appearance, is the touchstone guaranteeing the validity and universality of that principle.

This conclusion is affirmed already in the notions of the point and the straight line—which are material as well as immaterial [belonging to the nature of consciousness itself as well as to the perceivable world]. Again, I perceive this shadow not directly and in itself, but by grace of the background from which it is demarked. Everywhere is needed a "beyond" which supports what we isolate or separate: no matter how large a space is enclosed in a circle we trace in thought, there will always be space beyond that circumference.

When you descend into the infinitely small, when you consider perception or measure, you are engaged willy-nilly in comparison, you meet the indissoluble bond between excitation and sensation. Is not this liaison the source of that prodigy of the arising of phenomena? Is not this common measure of what is interior and exterior that which offers us as a pure gift this world of intoxicating forms and colors?

When the dancer fascinates me, when music transports me, when I am galvanized by rhythm or ravished by proportions, I hear resounding the imperishable dialogue between the figured and the abstract. Before the miracle of language, before the wonder of friendship or of love stands, inexorable, the impossibility of reducing the original connection between the similar and dissimilar or of escaping it.

*See the periodical *Dialectica*, issue no. 13.

On Modern Man: His Technology and the Incompleteness Which Is His Hope

Here on my desk lies *The Twenty-Fifth Hour* of Virgil Gheorghiu, a poignant book which might frighten many since it denounces the failure and the horror of Western technological civilization [the East has now caught up!] overstuffed with bureaucratic rules in which the individual person is abolished.*

As to the continuation in the USSR of the misdeeds of Western technology [note the growing pollution of the Baltic and Lake Baikal by industry] no one could predict the surprises reserved for this bizarre passion, this sheeplike mystique toward uniformity [Hitler's *gleichschaltung*].

The incompleteness of the notion of Man**—of this Unknown of unceasingly changing configuration and whose external appearance holds in itself all the mystery of incarnation and phenomenal manifestation—does not that confirm our dignity, our immortality, our participation at the council of creation?

On Number

The myth of the all-puissant divinity Pembelé*** conveys among other things, as do all ancient cosmologies, a number symbolism extremely ramified. Thus 2 is the number of twinness, expressing the duality of being. In the twinness of Pembelé coexist the two principles of male and female, represented respectively by the numbers 3 and 4. Their sum 7 symbolizes the ideas of the creative duality, fecundity and perfection, as well as the combination in one person of a male

*Gheorghiu's novel, originally written in Rumanian, was published in the United States by Regnery. *C.M.*

**I.e., man being in fact a larval form. *C.M.*

***A Bambara (West Africa) myth discussed by S. de Ganay in *Journal de Psychologie*, April 1949.

and female component—this is the Bambara *dya*, the immaterial double, which is of opposite sex to the body of its owner as the animus and anima of Jung.

The number 22 represents the ensemble of all spoken words on earth and is generic for all language. For the Bambara also "At the beginning was the Word."

The Bambara symbolism we have outlined touches on most fundamental concepts in any world-view. It will not suffice to speak of "primitive mentality" in referring to a cosmology whose problems are as profound as ours. In trying to grasp the so-called "primitive," we receive as much as we are able to give. I offer this essential principle as a subject for meditation by missionaries and psychotherapists.*

The Beyond

Grief over the death of a loved one can be considered as the sign of an invisible presence. We could not suffer so, often to the end of our days, if the departed one did not continue as some part of our existence. In *The Blue Bird* Maeterlinck proposes the idea that the dead revive each time the living think of them. Would it not be better to say that suffering teaches us they are not dead?

Reared amid overwhelming "rationalistic" prejudices, Western man tends to hold as real only what he can see or feel, and he assimilates memory to the unreal. But it must be recalled here that this illogical realist fails completely to realize that he passes most of his time in not seeing, in neglecting the things around him, and in feeling those things which are not present. These watertight partitions that one erects between memory and reality are artificial. We know well enough that there are memories infinitely more intense and living than most of our sensory impressions and that certain absences are actually more

*The profound studies of the Dogon (African) cosmology by Germaine Dieterlin and Marcel Griaule, and the intriguing account in abridged popular form of the "sorceress" Wamba's teachings by William Seabrook (*Jungle Ways*, 1930) all bear out Dr. de Montet's conclusions. *C.M.*

real presences than most of the presences that we perceive. I recall here the spirit of the last message addressed to his beloved by a renowned biologist exiled by World War II. Tell her, he said, that nothing can separate us, neither distance nor death. And this dying savant used to call himself an "atheist" . . . . Oh, these words!

Communication with the Criminal Mind

18

Phillip M. Becker

The author is a well-known and successful criminal trial lawyer in the state of Idaho, and here contributes a valuable summary of his first-hand awareness of aspects of life most people only read about. Included is the substance of conversations with the author over several days.

The criminal is identified as such by his acts and conduct but his thinking and psyche are not well enough known. Long ago our society recognized the need for rules and regulations for the protection of the rights and privileges of its members whereby they would all have protection for their persons and property. These rules and regulations make certain acts crimes and prescribe a punishment for their violation.

A crime may be generally defined as the commission or omission of an act that the law forbids or commands, under pain of punishment to be imposed by the state by a proceeding in its own name.

A distinction is made between crimes that are *mala in se* (wrongful from their nature) and those that are *mala prohibita* (wrong merely because prohibited by statute). It is perhaps sufficient to say that crimes *mala in se* are those so serious in their effect on society as to call for the practically unanimous condemnation of its members, that is, murder, robbery, etc; while crimes *mala prohibita* are violations of mere rules of convenience designed to secure a more orderly regulation of the affairs of society, that is, charging too much interest on money loaned, overparking, or violation of some country's customs' rules as to the importing or exporting of non-harmful goods.

The following observations and conclusions are taken from actual case histories of the writer. Therefore, it must be remembered that this article is not the result of an exhaustive research but is limited to my personal experiences. Still, none of the following conclusions is based upon any single experience, but rather a cross-section of my contacts with criminals, coupled with confirmatory notes from colleagues.

It is my intention to share the observations made of the thinking, habits, conduct and attitude of the colorful criminal. To do this, attention will be given only to the obviously intelligent criminal. The reason for this is that it is the intelligent person who actually tries to outsmart his fellow man and uses crime as his professional means of making a living.

The intelligent criminal seems to treat crime as a game, and though he profits from his efforts, his greatest desire is to have as his trophy the "perfect crime." Regardless of their field of crime, such intelligent criminals all have developed to a high degree their ability to gain your confidence, be convincing liars, and appear to have much self-confidence.

Attention here will be focused on the crimes of fraud, burglary and robbery. The other areas are not dwelt upon because of the involvement of insanity and other technical defenses.

Without conscious realization the criminal will go into the particular field of crime which depicts his character and personality. That is to say, the criminal has, from birth, taken on certain fears, desires, habits, needs and attitudes which compel him to choose one area of criminal activity over another. A burglar becomes a burglar because he feels more comfortable doing that than being a robber. He might be compared to the athlete who becomes a basketball player rather than a boxer.

Often the most colorful criminals are those who obtain money or property by means of fraud or misrepresentation. There are as many different schemes as there are imaginative minds to create them. This type of criminal has as his most obvious characteristic his over-confidence. He has total and complete confidence in his mental superiority and has no doubt that he can always conquer his less intelligent victim. To him all

other members of society are less intelligent than he. He is the businessman of the criminal world.

This individual must always have a well-prepared plan or scheme. Many long hours of thought and consideration go into his scheme and each believes his to be infallible. If he should be caught and punished, it is most probable that he will return to crime upon his release. In that case, without fail he will always go back to the use of his original scheme. He will make a few minor modifications from time to time, but these are designed toward making his original method more perfect. For example, one who enters the world of crime with a get-rich scheme selling fake stocks, will always sell something fake, though he may change his style a little.

This type of criminal is always honest with his lawyer, and quick to admit to what he has done and his modus operandi. However, due to his belief that he has superior intelligence, he feels compelled to advise his counsel as to how he should handle the case. The criminal generally is well aware of the criminal laws, and in his opinion he is an expert in the field. This sometimes makes him a difficult client to represent.

These people prefer to work alone or sometimes with a lady accomplice. They never stay in one area too long, and they like to keep moving and living out of a suitcase. However, where a particular area has been fruitful, the criminal will return—but tries not to over-harvest.

I will comment briefly on the robber and the burglar.

The least mentally creative or original, but the bravest of the sophisticated criminals is the robber. Generally the robber does not display a noticeable degree of intelligence, but compensates for this with fortitude. He may be characterized as the boldest, most daring and "outgoing" member of the criminal world.

His object is to obtain money the quickest way. He does not want to get involved in making any detailed plans, and wants to perform his job without much labor. Though usually strong, he is physically and mentally lazy. Unlike the burglar, he is not forced to depend upon others' aid. He can either work alone or with help. But the only assistance he really depends upon is the weapon he usually uses in his work.

The old cliché, "a thief in the night" most accurately described the burglar. It would appear that, like the robber, the burglar's approach is physical rather than psychological. He is in effect the working class of the criminal world. One type of burglar confines his activity to entering buildings and removing personal property, while another prefers the challenge of opening a safe.

But unlike the robber, the most noticeable characteristic of the burglar is his lack of courage. He is afraid to face his victim, and therefore feels safer practicing his profession at a time and under circumstances which avoid contact with people. Usually the burglar is dependent upon the help and assistance of others. He needs help to enter a building, help to carry off the goods, and help to market what he has taken.

It is my opinion that he also requires the moral support of his helpers. The burglar does not seem to have much self-confidence but likes to look upon himself as boss. As clients, they tend to talk a lot but during the first interview do not always tell the truth, and sometimes may completely deceive themselves. I once represented a burglar who seriously confided to me that the term "burglary" is not specifically forbidden by the Ten Commandments.

In a free society, there must arise technicalities, confusions, loopholes and delays in the law because the resourcefulness of human nature can never be completely or simply controlled by legislation without tyranny setting in. The only alternatives are either chaos, in which all sorts of criminality and looting would arise, or an overlegislated tyranny in which a relatively small group of men determine the lives of all others under their control.

The inescapable confusion inherent in a free society does bring with it some corruption and occasional injustices of omission and commission. Those plumping for some form of monolithic or totalitarian tyranny make much of this. But the undesirable side effects of freedom are far preferable to the alternative: living under oppression, psychological fear or thought control. The function of a defense lawyer who is not a mere puppet of the prosecution is a basic characteristic of any

free society. Criminal trial lawyers are sometimes reproached for defending their clients. My answer is that if we did not exist, no accused person would have any rights, and democracy and freedom would speedily end in an epidemic of arbitrary accusation and secret or forced sentencing.

The criminal trial lawyer is one of the foundation stones in our society for the protection of *all* individuals' rights. That this statement is not mere preachment is chillingly clear in the degeneration of the defense attorney to a puppet of the prosecution in all tyrannies—one of the most prevalent forms of government in the present century. Not following suit may become a greater and greater problem for the United States because there are many economic advantages in state slavery, where all live under the boot heels of a comparative few calling themselves "the State" and arrogating to themselves all ultimate power and decision in the society. Such focus and speed of decision can be very strategic and profitable even if untold (literally censored!) human misery must pay for it. Free men consider that price too high.

The function of the uncoerced criminal defense lawyer is one of the primary safeguards in maintaining those levels of consciousness of human justice and awareness of freedom that are essential in all healthy societies. Again, the quality of (a people's) consciousness plays a key role in (their political) reality.

Ecology-Consciousness: Dialogue with the Environment

19

Louis S. Clapper and George St. George

Richard Bellman spoke for the world when, in accepting the first Norbert Wiener prize for applied mathematics at Laramie, Wyoming, in 1970, he reminded us in knowledgeable fashion:

> I think it's beginning to be realized that our systems are falling apart. We don't know how to administer them. We don't know how to control them. And it isn't at all obvious that we can control a large system in such a way that it remains stable. It may very well be that there is a critical mass–that when a system gets too large, it just gets automatically unstable. The problems, then, we see in our medical systems, in our educational systems, in our legal systems, in our transportation systems, in our garbage collection systems, all the systems you can probably think of, these are problems of instability. It may very well be that these are inherent . . .

Specific examples of what Professor Bellman has ably and responsibly called to attention are not hard to find almost anywhere we look. Growing technology in the U.S.S.R. was beginning to pollute the once purest waters of Lake Baikal, and the U.S.A., more technologically "progressed," has turned the Great Lakes into cesspools. The lovely lakes of Switzerland are fast following suit. Everyone knows what oilmen's greed, with cynical official cooperation, has done to disfigure and soil once beautiful Californian coasts.

The city of Miami, a virtual paradise in the 1950s, has now also hopelessly polluted and soiled its beaches, its water and its air, due to the overwhelming avarice of a comparative few in encouraging far more

tourists and settlers than the ecology could withstand. Peter Baljet, the surrounding county's pollution control officer, predicts dense smogs for Miami which will last for days even when the trade winds are blowing. He adds that to correct only the present local water pollution problem it would cost as much as two billion dollars, taking what have come to be the usual official costs and delays into consideration. It is to be feared that the delays will be used in the old game of squeezing extra dollars out of the consumer under the excuse of imminent danger, and then not even adequately correcting that danger. Corruption, political and industrial, is the prime ecological threat in all countries.

These examples are typical of a worldwide situation of incredible political as well as environmental pollution. The former pollution is coming into focus because its unbelievable crassness is now, through the latter, harnessed to direct health damage to people at large. The prognosis is still dim, however; because history has shown that massive corruption never reforms itself in time. The only real hope is for a new set of leaders to emerge with a genuine concern for people's well-being instead of for a public image or private gain.

Mr. Clapper speaks as Conservation Director of the National Wildlife Federation, Washington, D.C. Mr. George St. George, a citizen of Russia by birth, switched to American citizenship in the 1930s but still lives in Europe, at present residing in Paris. In his profession as a writer on the Soviet scene, he has recently completed a tourist handbook about the country of his birth.

Ecology-Consciousness (*Louis S. Clapper*)

Many capitals of the world are suddenly concerned about their environmental problems. That's the impression we get from talking with foreign diplomats and U.S. officials who have traveled overseas in recent months.

The beautiful Rhine is a cesspool, most Germans acknowledge ... Tokyo and New York are experimenting with closing certain downtown streets to automobile traffic because air pollution is rising to such dangerous levels ... A wildlife team has just returned from the Amazon to report widespread destruction of animals such as ocelots and jaguars for the fur trade.

The rising concern about environmental quality is truly international....

World Environment Institute

Recognizing the worldwide scope of pollution, the U. S. Senate, by unanimous consent, recommended that problems resulting from technical development and population growth be solved through international cooperation. The International Conference on the Human Environment scheduled for 1972 under U.N. sponsorship provides a forum for an international organization. The Senate "urges and supports" the creation of a World Environment Institute to act as a global research and information center.

Inside the Factory Fence

New teeth in the Federal Fisheries Act "will help us clean up our Canadian environment from coast to coast," predicts Canada's Minister of Fisheries and Forestry, Jack Davis. The measures, which point the way to pollution control for many nations, will keep pollution "inside the factory fence," controlling effluents uniformly on an industry-by-industry basis.

Mr. Davis indicates that the capital cost of a new plant or mill may increase by as much as five percent to ensure proper treatment of wastes. He calls for tough regulations, strictly enforced, because unfair competition would result if some areas "are willing to trade scenery for dollars or clean rivers for jobs."

Is Population Control Enough?

Even if population stabilization can be achieved, will the resulting environmental "savings" be enough to reverse man's seeming trend toward self-destruction?

A stable population would probably slow the upward spiral of resource depletion and pollution. But many experts are convinced that people in highly developed nations like the United States will also have to alter their lifestyle.

This basically means using less energy for routine daily tasks. For example, are electric shoe polishers really necessary? It means conserving and reclaiming resources, especially by recycling wastes. It means placing greater emphasis on cultural, aesthetic and religious values. Technological advances may make some of these changes easy, but many believe men must eventually come to terms with their world on a nontechnological, more essential, basis. After all, isn't that what conservation is all about?

Kangaroos in Danger

Wildlife managers in the U.S. are viewing with exceptional interest the rising pressure in Australia to curtail, if not prohibit, the commercial hunting of kangaroos for their meat and hides. The depletion of red and brown kangaroos, Australia's most popular wildlife, may parallel the demise of the American bison in the 19th century because livestock grazers are interested in keeping the numbers of kangaroos in check. Determined to prevent this, the Australian Conservation Foundation, a nonprofit citizens' group, is spearheading a drive to induce government curbs on kangaroo exploitation.*

However, the foundation's president, Sir Garfield Barwick, Chief Justice of Australia, says: "The banning of all commercial hunting would not provide a satisfactory solution to the problem." Dr. Francis Ratcliff, scientific secretary of the

*Fish now vie with kangaroos: only 10 percent of Atlantic herring remain (1971). *Eds*

organization, believes the commercial hunting industry must operate on the principle that the "annual harvest should not exceed the equivalent of the natural increment," or number of young expected to reach maturity.

Noise of the SST

"The SST [Super-Sonic Transport] boom would be at least 10 times too strong to be acceptable over land. Several countries have already, de facto, prohibited supersonic overflights," asserts Bo Lundberg, former director general of the Aeronautical Research Institute of Sweden.

"Nevertheless," Mr. Lundberg goes on, "building of production aircraft of Concorde by England and France and prototypes of the SST by the United States . . . started on the assumptions that the boom will not cause appreciable harm *over sea*—and that such sea route operations will be an economic success. Both assumptions are incorrect."

The United States Department of Transportation has embarked on an ambitious three-year, $26.7 million research effort to provide precise answers to questions about supersonic transport planes. Transportation Secretary John A. Volpe believes the environmental project will be able to judge the impact of worldwide SST operations and provide a scientific basis for [final] decisions on proceeding with—or halting—commercial production of the plane in the United States.

The research will center upon noise suppression, effects of cosmic radiation flare, possible weather modification, pollution of the air in high altitudes and the possible creation of additional "smog," and impacts of the construction of large airports near metropolitan centers.

Mercury Poisoning

Recent consternation in the U.S. about mercury poisoning is surprising only because it comes too late in view of experiences

in other countries. During the period 1953-1960, 111 persons were killed in Japan and many others suffered permanent brain damage. A second serious outbreak occurred there in 1965. In Sweden, mercury used extensively as an agricultural fungicide has caused a drastic decrease in many bird populations, which fed both upon fish and upon seed treated with methyl mercury.

Authorities in Sweden fear lakes there may be contaminated for as long as 100 years even when mercury pollution is stopped. The United States used six million pounds of mercury in 1969. These are the main reasons why urgent demands are being made to control the discharges of mercury and other heavy metals into U.S. waters.

Editorial note. *The need underlined by Mr. Clapper for a new human awareness of the natural environment—an ecology consciousness is vital to our future. It may even help to unite the world spiritually on a level far more important than organizational or political "unification."*

The problem is truly planetwide and Professor Linus Pauling (chemistry Nobel prize winner) called to attention in an NBC telecast of May 8, 1971, that there is a 28 percent increase in cancer cases due to artificial radioactivity of one sort or another. Other globally distributed environmental poisons such as pesticides, industrial pollutants, automobile emissions and jet-plane exhaust, exacerbate the world's grave health problem still further; and we have not even mentioned the problems of food supply, crowding, epidemics and war which are connected directly with the now unbalanced increase of the human population of the world.

In such a situation what the British representative to the United Nations, Lord Foote, finds most repellant may become most common through unscrupulous oportunists: "To me," he said in an ABC telecast of May 6, 1971, "the worst thing in the world is dividing people in hatred and urging people to violence."

Already in this country a new law (the Clean Air Act of 1970), announced by Dr. John Middleton who heads the Environmental Protection Agency's Air Pollution Control Office, demands pollution-warning systems throughout all fifty states to be fully operational by 1976; and Dr. Middleton predicts that there will be times when children will have to be kept at home or not allowed outside of school buildings. Thus the new law is an assured promise that dangerously increased pollution will come.

In Japan—which contains some of the most polluted areas on the globe—an object lesson is provided for the rest of the world. In the more than quarter-century of the phenomenal growth of Japanese industry there was no ecology consciousness—with disastrous results, including the inability to stand, a form of lockjaw and the horrible new itai-itai *disease in which the bones become so weakened by absorbed pollutants that ribs and other bones break merely in the course of natural movements.*

As John Hess reported in the second issue of International Wildlife, *even on the twenty-fifth anniversary of the atomic bombing, the Japanese newspaper headlines of 1970 were about pollution. The Japanese government has established an Anti-Pollution Council, but it is rather late in the day, for now the changes needed to eliminate the ecological crimes would require nothing less than the redesigning and rebuilding of the entire huge Japanese industrial machine. It may as well be honestly faced that the United States and highly industrialized parts of Europe and Russia are in the same boat. There is as yet little tangible sign in any of these quarters that the consciousness of the leaders has changed sufficiently to make possible the drastically needed metamorphosis of the world industrial complex. Man is now in the position of the sorcerer's apprentice pursued by a Frankenstein-like creation he seems unable to control. The only action being taken consists of stop-gap measures, with no basic remedy even on the drawing boards (Lavrentieff notwithstanding).*

Another, more hopeful aspect of the ecological problem is discussed at the end of chapter 23.

Dialogue with the Environment (*George St. George*)

The speaker was Soviet academician Michael A. Lavrentieff and . . . he did not spare his listeners:

"One day the world is going to wake up to a nightmare: nature destroyed, food inedible, water undrinkable, air unbreathable. This is more frightening for the future of humanity than even a nuclear war because so few realize the danger, and so little is done to prevent it."

This statement was made several years ago, before ecology had become a worldwide issue. And the man who made it is head of the brain trust that is the guiding force behind the industrial development of modern Siberia, which many consider the richest largely undeveloped piece of real estate on earth.

Lavrentieff, who runs his cerebral empire with single-minded dedication, is a fierce, almost fanatical lover of nature, a passionate champion of its preservation.

"We're not protecting nature *from* man," he told me when I interviewed him some time ago in Siberia. "We are trying to protect it *for* man. We want to prove that there is enough room in this world for both man *and* nature. That's quite a problem. It doesn't take many germs to start an epidemic and once the process gets out of hand, it is devilishly difficult to stop or reverse it. The idea is to prevent an epidemic from starting. Prophylaxis is infinitely more effective than therapy."

"Still, man is not a [disease] germ," I said as hopefully as possible.

Lavrentieff smiled. "Isn't he? Just look at this earth from the outer space. A small globe of matter enveloped in a beautiful blue and white mantle of air and clouds. But go through this cover, and you will see large areas of horrible blight where nature is destroyed."

Lavrentieff, as the president of the Siberian Branch of the Academy of Science of the Soviet Union, is the undisputed science "Tsar" of Siberia. A brilliant mathematician of international reputation, he also developed the hydro-gun which has revolutionized mining in Siberia. New ice-breakers are being fitted with the device which cuts the thickest ice as if it were tissue paper. This may make all Siberian rivers navigable throughout the winter.

Lavrentieff has direct jurisdiction over the 50 higher scientific institutions of Siberia. He rules his immense science empire from a small, brand new, jewel-like town which may have the highest collective IQ in the world [or at least one of them].

Akademgorodok was built in the virgin taiga (that area of swampy coniferous forest between the tundra and the steppes) near the Siberian "capital" of Novosibirsk. Former U.S. Senator William Benton, then editor of the *Encyclopedia Britannica*, called it "the symbol of the Soviet intellectual challenge to the West," and it is a remarkable place. Built by scientists for scientists, it has been especially designed to house a massive concentration of brain power.

Of its 45,000 inhabitants, more than 15,000 have higher science degrees.

Among them are academicians, professors, doctors, science candidates, as well as thousands of the most brilliant students of Siberia, selected for study here through a process of "Science Olympics" conducted each year throughout the country. This is a hand-picked, intellectual elite [from] every branch of science, brilliant specialists as well as all-around learned men and women. The average age of the scientists, moreover, is under 35; in Moscow, it is over 55.

Squeezing his 6-foot-6 frame behind the steering wheel of his small "Volga," Lavrentieff took me for a ride around his domain. Only then did I realize what infinite care must have been taken not to disturb the natural environment while building this ultra-modern town.

City Set Inside Forest

Instead of clearing virgin forest, the city has been set *inside* it, made a part of it. Some trees must have been cut down, of course, but as few as possible. Pines, larches and cedars were everywhere, raising their green tops over the brand-new apartment buildings, surrounding them, separating them from one another, stretching their branches onto the balconies. Some streets had buildings on one side and virgin taiga on the other. Lawns and flower beds were everywhere.

"Squirrels come onto our balconies to eat breakfast with us," Lavrentieff told me, "and birds build their nests on our window ledges. This is the kind of 'forest city' we are planning for Siberia, direct from drafting boards."

"But what about large industrial centers?" I asked.

"Personally I am an enemy of large cities," Lavrentieff replied. "They're man's crime against nature and against future generations. You have seen Novosibirsk. Huge industrial cities like that are not for Siberia. We have specific conditions here, and we must approach them in a specific manner. With long and severe winters, and a short, but intensive growing season, we

should develop a new type of population; city dwellers in the winter and agriculturists in summer; people with double professions . . . . One needn't sleep next to a blast furnace one is tending."

Lavrentieff's thoughts shifted, his mind moving in another direction.

"Surely it is more pleasant to live next to nature in summer," he went on, "than to sweat in hot offices or factories. And if agriculture is given the same social status and the same material rewards as any other work, there would be no dearth of volunteers. "This is not only an economic necessity. The psychological effect is even more important. City dwellers tend to become divorced from nature; they cease to respect it or care for it. They must be taught this love and respect—even by compulsion if necessary." [Farmers and herdsmen abuse nature too, and with less excuse.]

"But would office workers, for instance, like to work as peasants?" I asked.

Avoid the Common Errors

"Wrong semantics," Lavrentieff said. "Agriculturists, not peasants. This is the matter of education. Here in Siberia," he went on, "we can still avoid the crime of stripping the land of its priceless green cover, if we control and punish all predators. It is incredible what damage even a single thoughtless man with a rifle or an axe can do . . . ."

His mobile face changed again and he was off on a favorite thought: "You know that in all Siberian lumbering camps there is a strict rule—*two* young trees must be planted for each one cut down.

"But we had to deal with other stupidities, too. And not only the idiocy of career-blind bureaucrats, but of some so-called scientists as well . . . . This is why we are so careful about letting people come here. Every young scientist worth his algebraic abstractions dreams about working at Akademgorodok, but we are mercilessly selective.

"About wildlife," he continued, "when we first started taking stock some twenty years ago, we were shocked. The sable, for instance: once all Siberian forests were teeming with it and it became practically exterminated. A few were left in the Barguzin River near Baikal Lake. The area was declared a sable preserve, and we have been air-lifting live sables to all the areas where they were once plentiful. As a result, we have enough of these beautiful fur animals to ensure their stable biological balance, and even to permit some limited hunting.

"Or take the famous Ussuri tiger, the largest, most beautiful in the world. Only five of them were still alive. Today we have eighty, and the number is growing. Many species of valuable food fish were on the brink of biological extinction. We are protecting them now, and air-lifting them to rivers and lakes where they once thrived.

"And then there's the *saigak*, a species of wild antelope in southern Siberia. Once there were enormous herds of them, but then hunters massacred them, driving them onto river ice and clubbing them to death each winter, for their meat, hides, and antlers which were considered in China to possess medicinal properties. Thirty years ago, the animal was at the point of extinction. Then the government stepped in. Saigak breeding grounds were closed; armed soldiers and helicopters guarded them. Today there are three million saigaks, enough to supply people with meat and hides, and Chinese pharmacists with saigak horns.*

"I shouldn't forget the freshwater otter either. Twenty-five years ago there were barely 500 left in the entire country Today there are 40,000, but hunting them has been strictly forbidden . . . .

"We have a tremendous animal population to take care of: over 300 species of mammals, over 700 species of birds, 124 species of reptiles, and 30 species of amphibians. We are

*Yet the Siberian government seems to be following the Chinese lead: the author elsewhere admits that from Siberian deer antlers Russian scientists are extracting a substance called *panti* used in the Siberian "rejuvenation tonic" *pantakrin*, distributed throughout most of Asia. Such extraction and distribution require many antlers, and for other than only Chinese pharmacists. *Eds.*

watching them like hawks. We even have 19 full-blooded American bison living wild, 79 European bison, or *zubr* and 'zubro-bison' of mixed American-European parentage.

"But setting up national parks is not enough. Here in Siberia, we hope to run the entire country, from the Urals to the Pacific, as one great national park. Nothing, but nothing, can be done without our approval; not an animal killed, not a cedar tree cut down. In every school in Siberia, from the first grade, children are taught to value nature, to fight for every tree, bush, flower, animal and bug, *and* for every stream and lake. We are raising a generation of nature wardens. They will know exactly how many valuable trees there are in Siberia, how many sables, bears and tigers, how to guard their water and air from pollution, how not to get poisoned by carbon monoxide and food chemicals. That is our best hope for survival." . . .

The future of Siberia lies with hydroelectric power, Lavrentieff told me, until the explosive power of the atom can be utilized with greater efficiency.*

But one must be honest. Siberia is a sometimes bleak, sometimes beautiful frontier land, and many of its people were rebels who did not fit well into the Soviet collective system under Stalin—and so were sent to Siberia. No wonder that there has evolved here a fiercely independent group of Soviet citizens in this largely empty part of the world—determined to build the "ideal society."

And that, of course, is what Lavrentieff so enthusiastically describes—the "ideal." In my interview with Lavrentieff, he boasted to me that Siberia can avoid most of the mistakes made by industrial nations, including other industrialized areas of the Soviet Union.

*This viewpoint—expedient as it is—lies behind the present Soviet drive to divert, for power purposes, key rivers that empty into the Arctic Ocean, thus tending to diminish—perhaps dangerously—that flow of water to the polar regions, on which many other eco-climatological balances depend. Soviet scientists admit that a 25 percent change in water temperature will be effected by this proposed technology, but say it will do no harm—a statement as open to doubt as those of the off-shore oil-drillers in the despoiled Santa Barbara Channel. *Eds.*

MYSTERIES OF THE DELIC PSYCHE

IV

Introduction: Delos, Birthplace of Light

Apollo expressed the powers behind the light of the sun. The light of Apollo could be inner as well, and the mysteries of the dark sun—"Apollo *lykaion*" (the *wolf* being a symbol of awareness despite obscurity)—centered on the normally inaccessible light of awareness that was called, by Dionysius the Areopagite, "the most super-luminous Dark Ray."

Delos, identified in legend as the birthplace of Apollo, was the rocky island in the Cyclades. The word *delos* derives from *dēlóō* (δηλόω) "to manifest" or "make clear," and later came to mean "prove," "show" or "explain." The idea expressed in this word is exemplified by the powerful type of revelatory consciousness discussed in the introduction to Part II. The Delic Psyche has attained the birth of the inner light and, looking at a problem, can illuminate it so clearly that the answer springs Athena-like into the conscious awareness.

The Delic Psyche is thus a power of man destined to be evoked at will, just as we can move, say, the middle of the left hand repeatedly after announcing "Now I will move it." This concept of the *Delic Psyche* contrasts with that of the *Psychedelic* (mind-manifesting), which imposes itself even to the possible detriment of the subject, and which has come to be confined in meaning to the action of certain drugs, natural or synthetic. In the Psychedelic context, the molecule runs the man; in the Delic Psyche, the man runs the molecule. Indeed he even creates the molecules that the demands of his awareness need in order to function through present human biology. (It is impossible for any higher state of awareness to come about without the endogenous production in the brain by neurosecretory cells of at least hormonally minute amounts of certain molecules.)

The Psychedelic has its uses. They are more or less confined to subjects who cannot get to higher states "under their own steam" and who are willing to sacrifice some freedom for the

sake of the experience. Psychedelic sessions, under competent supervision, may thus provide the launching platform for the later non-drug takeover of the Delic Psyche. The creative eighteenth century physician Samuel Hahnemann was by all counts the first to point out—in 1796, in the *Journal der Praktischen Arzneykunde* (Vol 2, part 3)—the psychedelic and psychotomimetic effects of *agaricus muscarius*, the mushroom now called *amanita muscaria*, saying that it "produces, as far as I can ascertain, a furious and drunken sort of manic state accompanied by sudden and bold resolves and a heightening of poetic and prophetic abilities . . . . " Anticipating work with LSD on psychotics done only within recent times (for example, the pioneering work of Dr. Stanislav Grof in Prague in the 1960s), Hahnemann goes on to say that "it will remove mental affections similar to those it causes [in normal people]." He also mentioned that the length of a mushroom trip "lasts from twelve to sixteen hours." All this in 1796, to which now the first scientific notice of psychedelic drugs must be dated.*

The Delic Psyche refers to the luminous potential of the human spirit, to the ever open choice of human regeneration, the "new birth," as it was often called in ancient times and throughout the writings of philosopher-mystic Jacob Boehme in early seventeenth century Silesia. It refers to the man in whom the god-like awareness that is man's birthright has become born out of the dark cave of his unawakened self, just as Apollo emerged from out the rocky caves of mysterious Delos.

C.M.

*This same mushroom, commonly called "fly agaric," is now thought by some to be the sacred soma plant of ancient India and Iran. There is, however, evidence against this identification, the most notable being the continuing use of a differently identified soma or homa plant in the ancient Iranian tradition, now imported by the Parsis from the mountainous regions of Afghanistan.

Man's Potential

20

Charles Lindbergh

This luminous discussion, by a figure who repeatedly met the world as a man of action, originally appeared in Life *magazine (4 July 1969) preceded by the following explanatory note: "Forty-two years ago Charles Lindbergh completed one of the great adventures of modern time, the first solo flight from New York to Paris. In the '30s he became involved in the beginning of the space age, raising money to support America's rocket pioneer, Robert Goddard. Last December he was at Cape Kennedy to meet the astronauts and to watch the launching of Apollo 8.*

"A Life *editor, who is also a personal friend, asked Lindbergh if he would write an article . . . about the motivation behind man's great adventures in history, including the forthcoming landing on the moon. Lindbergh wrote back a long, detailed letter explaining why he could not undertake such an article. The letter itself was such an unusual document that* Life *asked and received Lindbergh's permission to publish it." We also did.*

Your suggestion that I assess the astronauts' moon mission in the context of other great adventures in history, and the motives behind them, tempts me. But years ago I decided to stop writing articles about aviation and astronautics.

Aviation and astronautics were once my prime interests. As a student pilot, at the age of 20, when aviation was much more dangerous than it is today, I concluded that if I could fly for 10 years before being killed in a crash, I would be willing to trade an ordinary lifetime for that experience. In the '30s, I assisted Robert Goddard, the father of spatial conquests. Standing with him on New Mexico plains at the foot of his

converted-windmill launching tower, it seemed to me that the greatest adventure man could have would be to travel out through space.

What motivates man to great adventures? I wonder how accurately these motives can be analyzed, even by the participants themselves. When I think of my own flights in the early years of aviation, I realize that my motives were as obvious, as subtle and as intermixed as the waves on oceans I flew over. But I can say quite definitely that they sprang more from intuition than from rationality, and that the love of flying outweighed practical purposes—important as the latter often were.

For instance, I believed that a nonstop flight between New York and Paris would advance aviation's progress and add to my prestige as a pilot—with ensuing material rewards. In seeking financial backing for that 1927 flight, I argued that it would bring closer the golden era of air transport I felt was bound to come. But without my love of flying and adventure, and motives I cannot even now discern clearly, it was a flight I would never have attempted.

Then, as the art of flying transposed to a science, I found my interest in airplanes decreasing. Rationally I welcomed the advances that came with self-starters, closed cockpits, radio and automatic pilots. Intuitively I felt revolted by them, for they upset the balance between intellect and senses that had made my profession such a joy. And so, as intuition had led me into aviation in the first place, it led me back to an early boyhood interest. the contemplation of life.

Gradually I diverted hours from aviation into biological research. How mechanical, how mystical was man? Could longevity be extended? Was death an unavoidable portion of life's cycle or might physical immortality be achieved through scientific methods? What would be the result of artificially perfusing a head severed from its body? This question, especially, intrigued me and resulted in my working intermittently for several years in the Department of Experimental Surgery of the Rockefeller Institute for Medical Research. There, in collaboration with the great surgeon Alexis Carrel—he developing the operative techniques, and I the design of

equipment—I constructed an apparatus that, for the first time, could pump synthetic blood through organs without the entrance of infection.

To me, my years at the Rockefeller Institute involved great adventures. They convinced me that the cycle of life and death is essential to life's progress, and that physical immortality would be undesirable even if it could be achieved. I found the mechanics of life less interesting than the mystical qualities they manifest. With these conclusions I began studying supersensory phenomena and, in 1937, flew to India in the hope of gaining insight to yogic practices.

But the approach and explosion of World War II immersed me in military aviation and international politics. Man's fundamental need of survival, for both individual and group, separated me from projects I would have carried out in peaceful times. After our fighting war was over (I had worked on the production of bombers and fighters, and flown 50 combat missions with the Army Air Force and Marines), the cold war with Russia held me to militarily oriented tasks—the study of new weapons, the reorganization of the Strategic Air Command, the essential need of developing intercontinental ballistic missiles.

I served for seven years as a member of scientific ballistic-missile committees, first under the Air Force and then under the Department of Defense. At the end of this time, with Atlases and Titans in position, with Minutemen coming and Polaris submarines under way, I felt our United States had achieved the indestructible power to destroy any enemy who might attack. But I had become alarmed about the effect our civilization was having on continents and islands my military missions took me over—the slashed forests, the eroded mountains, the disappearing wilderness and wildlife. I believed some of the policies we were following to insure our near-future strength and survival were likely to lead to our distant-future weakness and destruction. Also, I was tired of windowless briefing rooms, Pentagon corridors and the drabness of standardized air bases. I wanted to regain contact with the mystery and beauty of nature.

I resigned from the ballistic-missile committee and declined a

position in the new civil agency being set up for the development of space. I decided to study environments, peoples and ways of life in various areas of the world. To make this possible, I returned to my prewar position of consultant to Pan American World Airways.

Wilderness expeditions in Africa, Eurasia and the American continents brought me to an appreciation of nature's extraordinary wisdom. I found myself in the fascinating position of moving back and forth between the ultracivilized on the one hand and the ultraprimitive on the other, with a resulting clarity of perspective on areas between—a perspective that drove into my bones, as well as into my mind, the fact that in instinct rather than in intellect is manifest the cosmic plan of life.

Then, a few months ago, I received an invitation from Apollo 8's astronauts to attend the launching of their mission to orbit the moon. This plunged me back into astronautics as World War II had plunged me back into aviation, though for a period of days instead of years. I was literally hypnotized by the launching. I have spent most of a lifetime in close contact with test flying and man-controlled power; but I have never experienced anything to compare to that mission of Apollo 8.

Three miles away from the pad, where I stood watching with free-from-duty astronauts, the size of the rocket still seemed huge. When ignition came, clouds of smoke and flame churned like a storm's convulsions; and when the sound waves struck me, I shook with the earth itself.

Above that flashing, billowing chaos, the prow of the rocket rose. In it I visualized the three men I had lunched with hours before, strapped into position like test pilots, tensed to emergency procedures and to the dials of the instruments they watched, men actually launched on a voyage to the moon! For a moment, reality and memory contorted and Robert Goddard stood watching at my side. Was he now the dream; his dream, the reality?

During the first seconds of the Apollo's inching upward, my sensation was intensified by a vision of the last launching I had witnessed, that of a big military missile which rose three or four feet, faltered, and then crumpled into explosion—an explosion

seemingly less violent than that smothering the whole aft end of the Apollo.

My body staggered with the rocket's effort to life above its lower, relaxed as it leapt upward into air, thrilled as the ball of fire, with its astronauts, diminished in the vastness of space. Here, after epoch-measured trials of evolution, earth's life was voyaging to another celestial body. Here one saw our civilization flowering toward the stars. Here modern man had been rewarded for his confidence in science and technology. Soon he would be orbiting the moon.

Talking to astronauts and engineers, I felt an almost overwhelming desire to reenter the fields of astronautics—with their scientific committees, laboratories, factories and blockhouses, possibly to voyage into space myself. But I know I will not return to them, despite limitless possibilities for invention, exploration and adventure.

Why not? Decades spent in contact with science and its vehicles have directed my mind and senses to areas beyond their reach. I now see scientific accomplishment as a path, not an end; a path leading to and disappearing in mystery. Science, in fact, forms many paths branching from the trunk of human progress; and on every periphery they end in the miraculous. Following these paths far enough, and long enough, one must eventually conclude that science itself is a miracle—like the awareness of man arising from and then disappearing in the apparent nothingness of space. Rather than nullifying religion, and proving that "God is dead," science enhances spiritual values by revealing the magnitudes and minitudes—from cosmos to atom—through which man extends and of which he is composed.

Forty-two years ago, bucking a headwind on a flight in my monoplane between New York and St. Louis, I tried to look into the future beyond man's conquest of the air. As the wheel had opened land to modern travel, and the hull the sea, wings had opened the relatively universal sky. Only space lay beyond. Could we ever extend our travels into space? If so, it seemed we must develop rockets and their jet propulsion. Such dreaming

and reasoning brought me in contact with physicists, chemists and engineers in the explosives industry—and eventually with Robert Goddard. Who then could foretell that, as soon as 1968, men would hurtle around the moon and back?

Now, again, I try to penetrate the future. What travel may, someday, take place beyond our solar-system space? What vehicles can we devise to extend the range of rocket ships as they have extended the range of aircraft? Scientific knowledge argues that space vehicles can never attain the speed of light, which makes a puny penetration of the universe within a human lifespan; and that, therefore, cosmic distances will confine our physical explorations to those planets which orbit the sun.

As wings and propellers once limited man to earth's thicker atmosphere, scientifically established principles now seem to limit him to the space-territory of the minor star he orbits. We are blocked by lack of time as we were once blocked by lack of air. Mars and Venus may mark dead ends for spaceship travel, unless we break through physical laws and construct still-more-advanced vehicles.

But by establishing these new planetary "dead ends," are we cracking open the entrance to another era, as aviation cracked open that of astronautics—one that will surpass the era of science as the era of science surpassed that of religious superstition? Following the paths of science, we become constantly more aware of mysteries beyond scientific reach. In these vaguely apprehended azimuths, I think the great adventures of the future lie—in voyages inconceivable by our 20th Century rationality—beyond the solar system, through distant galaxies, possibly through peripheries untouched by time and space.

I believe early entrance to this era can be attained by the application of our scientific knowledge not to life's mechanical vehicles but to the essence of life itself; to the infinite and infinitely evolving qualities that have resulted in the awareness, shape and character of man. I believe this application is necessary to the very survival of mankind.

Science and technology inform us that, after millions of years of successful evolution, human life is now deteriorating genet-

ically and environmentally at an alarming and exponential rate. Basically, we seem to be retrograding rather than evolving. We have only to look about us to verify this fact: to see megalopolizing cities, the breakdown of nature, the pollution of air, water and earth; to see crime, vice and dissatisfaction webbing like a cancer across the surface of our world. Does this mark an end or a beginning? The answer, of course, depends on our perception and the action we take.

Every era opens with its challenges, and they cannot be met successfully by elaborating methods of the past. Our technologies become inadequate; but among our sciences—paleontology, genetics, physics, astronomy, atomics—are those that still can point a way, shaping concepts of life, time and space.

We know that tens of thousands of years ago, man departed from both the hazards and the security of instinct's natural selection, and that his intellectual reactions have become too powerful to permit him ever to return. It seems obvious that to achieve the maximum scope of awareness, even to survive as a species, we must contrive a new process of evolutionary selection. We must find a way to blend with our present erratic tyranny of mind the countless, subtle, and still-little-known elements that created the tangible shape of man and his intangible extensions. Through the eons these elements have raised the human complex to a sensitivity which recognizes that both the material and the ethereal are varying forms of basic essence.

That is why I have turned my attention from technological progress to life, from the civilized to the wild. In wildness there is a lens to the past, to the present and to the future, offered to us for the looking—a direction, a successful selection, an awareness of values that confronts us with the need for and the means of our salvation. Let us never forget that wildness has developed life, including the human species. By comparison, our own accomplishments are trivial.

If we can combine our knowledge of science with the wisdom of wildness, if we can nurture civilization through roots in the primitive, man's potentialities appear to be unbounded. Through his evolving awareness, and his awareness of that

awareness, he can merge with the miraculous—to which we can attach what better name than "God"? And in this merging, as long sensed by intuition but still only vaguely perceived by rationality, experience may travel without need for accompanying [physical] life.

Will we then find [that] life to be only a stage, though an essential one, in a cosmic evolution of which our evolving awareness is beginning to become aware? Will we discover that only *without* spaceships can we reach the galaxies; that only *without* cyclotrons can we know the interior of atoms? To venture beyond the fantastic accomplishments of this physically fantastic age, sensory perception must combine with the extrasensory, and I suspect that the two will prove to be different faces of each other. I believe it is through sensing and thinking about such concepts that great adventures of the future will be found.

The New Copernican Revolution

21

Willis W. Harman

A forward thinker of our times, Willis Harman (Ph.D.) is director of the U.S. Educational Policy Research Center at Stanford University. His article, written in 1969, is followed by a significant memorandum written by Dr. Harman to Dr. Robert Kantor and other colleagues at the Research Center in May 1970.

As future historians look back on our times what will they conclude to have been the most significant event of the present decade in terms of its impact on the future? The riots in the cities? The Vietnam War? The Great Society programs? The hippie movement? Student protest? Technological and scientific advances? Man to the moon?

None of these, I would make bold to guess. Nor any of the events or trend discontinuities which the in-vogue forecasters are picking out with their current methodologies. I will suggest below that it will be something quite different from any of these, an event perhaps well symbolized by an obscure scientific conference to be held in Council Grove, Kansas, in April 1969.

What follows is a report on research in process. It does not pretend to present demonstrated conclusions. Rather, it raises questions and advances possible interpretations which are so momentous in their possible implications for the future that the fullest possible amount of responsible dialogue is called for.

Let us suppose for a moment that we are back in the year 1600, concerned with forecasting probable future trends. In retrospect it is clear that one of the most significant events in progress was what came later to be called the Copernican

revolution. Would our futurist researchers have picked this up? They might have, if we were looking at the right things. What was the essence of this remarkable transformation that started with the brash suggestions of Nicholas Copernicus and Giordano Bruno and led to consequences as diverse as a tremendous acceleration in physical science and a decline in the political power of the Church? One useful interpretation is that a group of question relating to the position of the Earth in the universe, and the nature and significance of the heavenly bodies passed out of the realm of the theological and philosophical and into the realm of empirical inquiry. No longer were these questions to be settled by referring to this or that ecclesiastical or scholarly authority; rather they were to be subjected to illumination by systematic observation and experiments. The consequences of such a shift are manifold. New research activities are started; familiar phenomena are given new interpretations; educational approaches are altered; power structures in society undergo change; new bases for consensus are applied to conflicts between belief systems.

A later similar event occurred with the work of the geologists, paleontologists, and biologists of the nineteenth century culminating in the controversial evolutionary hypotheses. Questions relating to the origin of the earth and of man were relabeled "empirical" instead of "theological." Again the consequences reverberated throughout the worlds of research, education, and politics.

I believe there is good reason to suspect that we are in the midst of another such saltation today. Much evidence suggests that *a group of questions relating to the commonality of and interpretation of man's subjective experience, especially of the "transcendental," and hence to the bases of human values, are shifting from the realm of the "philosophical" to the "empirical." If so, the consequences may be even more far-reaching than those which emerged from the Copernican, Darwinian, and Freudian revolutions.*

The evidence is of various sorts. The most obvious kind, of course, is simply the indications that scientists—that is, persons with recognized scientific training, on the staffs of research

organizations and universities with high standards, and holding membership in good standing in recognized scientific associations—are manifesting more and more interest in developing an adequate science of ordinary and extraordinary subjective experience. This is not completely new, of course. The phenomena of hypnosis have been studied in a scientific way, off and on, for at least a century and a half. Phenomenology has been a sometime influence in psychology. Freud's psychoanalysis and its offshoots have attempted to probe the unconscious process. Pioneering books in the exploration of supraconscious processes include F.W.H. Myers' *Human Personality and Its Survival of Bodily Death,* Richard Bucke's *Cosmic Consciousness,* William James' *Varieties of Religious Experience*, and Pitrim Sorokin's *The Ways and Power of Love*, the first three being approximately two-thirds of a century old. Early in 1968 appeared the first issue of the *Journal for the Study of Consciousness*, dedicated to the systematic exploration of consciousness. Early in 1969 appeared the *Journal of Transpersonal Psychology.* The April 1969 and 1970 conferences on "voluntary control of inner states" at Council Grove, Kansas, represented unprecedented assemblages of scientists working with altered states of consciousness.

In the field of clinical psychology several scientists are proposing to formulate through their researches "a natural value system, a court of ultimate appeal for the determination of good and bad, of right and wrong" (A.H. Maslow), "universal human value directions emerging from the experiencing of the human organism" (Carl Rogers).*

An ever-increasing number of students, now in the millions at least, are involved with "awareness-expanding" activities in free-university courses and elsewhere. This concern is intimately related to student demands for a person-centered, rather than scholarship-centered, education.

*Worthy as such aims are in some respects, they could, if not wisely deployed, lead to new and hateful intolerances in the name of "science" and, a step or two further, into clinical paranoia, vying thus with Skinnerism (the Skinners versus the Skinned). Who would preside at a "court of ultimate appeal" for the human race? Such power dreams are dangerous. *C.M.*

The science of man's subjective experience is in its infancy. Even so, some of its foreshadowings are evident. With the classification of these questions into the realm of empirical inquiry, we can anticipate an acceleration of research in this area. As a consequence there is new hope of consensus on issues which have been at the root of conflict for centuries (just as earlier there came about consensus on the place of the Earth in the universe, and on the origin of man). The new science will incorporate the most penetrating insights of psychology, the humanities, and religion. These developments will have profound impacts on goal priorities in society, on our concepts of education, on the further development and use of technology, and perhaps (as in the case of the Copernican revolution) on the distribution of power among social institutions and interest groups.

Young and incomplete as the science of subjective experience is, it nevertheless already contains what may very well be extremely significant precursors of tomorrow's image of man's potentialities. Space does not permit documenting them here; however, the following three propositions have accumulated an impressive amount of substantiating evidence:

> The potentialities of the individual human being are far greater, in extent and diversity, than we ordinarily imagine them to be, and far greater than currently in-vogue models of man would lead us to think possible.
>
> A far greater portion of significant human experience than we ordinarily feel or assume to be so is comprised of unconscious processes. This includes not only the sort of repressed memories and messages familiar to us through psychotherapy. It includes also "the wisdom of the body" and those mysterious realms of experience we refer to with such words as "intuition" and "creativity." Access to these unconscious processes is apparently facilitated by a wide variety of factors, including attention to feelings and emotions, inner attention, "free association," hypnosis, sensory deprivation, hallucinogenic and psychedelic drugs, and others.
>
> Included in these partly or largely unconscious processes are self-expectations, internalized expectations of others, images of the self and limitations of the self, and images of the future, which play a predominant role in limiting or enhancing actualization of one's

> capacities. These tend to be self-fulfilling. Much recent research has focused on the role of self-expectations and expectations of others in affecting performance, and on the improvement of performance level through enhancing self-image. On the social level research findings are buttressing the intuitive wisdom that one of the most important characteristics of any society is its vision of itself and its future, what Boulding calls "organizing images." The validity of the self-fulfilling prophecy and the self-realizing image appears to grow steadily in confirmation.

Assuming that the evidence substantiating these propositions continues to mount, they have the most profound implications for the future. For they say most powerfully that we have undersold man, underestimated his possibilities, and misunderstood what is needed for what Boulding terms "the great transition." They imply that the most profound revolution of the educational system would not be the cybernation of knowledge transmission, but the infusion of an exalted image of what man can be and the cultivation of an enhanced self-image in each individual child. They imply that the solution to the alienation and widespread disaffection in our society is not alone in vast social programs, but will come about through widespread adoption of a new image of our fellow man and our relationship to him. They suggest that the most pervasive illness of our nation is loss of the guiding vision, and the cure is to be found in a nobler image of man and of a society in which his growth may be better nurtured. They reassure that an image of fully-human man and of a new social order need not be built of the gossamer of wishful thinking, but can have a sound foundation in the research findings of the most daring explorers of the nature of man and his universe.

It is perhaps not too early to predict some of the characteristics of the new science. Preliminary indications suggest at least the following:

> Although we have been speaking of it as a science of subjective experience, one of its dominant characteristics will be a relaxing of the subjective-objective dichotomy. The range between perceptions shared by all or practically all, and those which are unique to one

individual, will be assumed to be much more of a continuum than a sharp division between "the world out there" and what goes on "in my head."

Related to this will be the incorporation, in some form, of the age-old yet radical doctrine that we perceive the world and ourselves in it as we have been culturally "hypnotized" to perceive it. The typical commonsense-scientific view of reality will be considered to be a valid but partial view—a particular metaphor, so to speak. Others, such as certain religious or metaphysical views, will be considered also, and even equally, valid but more appropriate for certain areas of human experience.

The new science will incorporate some ways of referring to the subjective experiencing of a unity in all things (the "More" of William James, the "All" of Bugental, the "divine Ground" of Aldous Huxley's *The Perennial Philosophy*).

It will include some sort of mapping or ordering of states of consciousness transcending the usual conscious awareness (Bucke's "Cosmic Consciousness," the "enlightenment" of Zen, and similar concepts).

It will take account of the subjective experiencing of a "higher self" and will view favorably the development of a self-image congruent with this experience (Bugental's "I-process." Emerson's "Over-soul," Assagioli's "True Self," Brunton's "Over-self," the Atman of Vedanta, and so on).

It will allow for a much more unified view of human experiences now categorized under such diverse headings as creativity, hypnosis, mystical experience, psychedelic drugs, extra-sensory perception, psychokinesis, and related phenomena.

It will include a much more unified view of the processes of personal change and emergence which take place within the contexts of psychotherapy, education (in the sense of "know thyself"), and religion (as spiritual growth). This view will possibly center around the concept that personality and behavior patterns change consequent upon a change in self-image, a modification of the person's emotionally felt perception of himself and his relationship to his environment.

John Rader Platt has argued in *The Step to Man*—as have Kenneth Boulding and Teilhard de Chardin before him—that the present point in the history of man may well, when viewed in retrospect by some future generation, appear as a relatively

sudden cultural step. The portentous impact of the new technology is the heady yet sobering realization that we have the future in our hands, that man recognizes his role as, to use Julian Huxley's phrase, "a trustee of evolution on this earth." The new man, "homo progressivus" in Teilhard de Chardin's words, is described by Lancelot Law Whyte as "unitary man," by Lewis Mumford as the "new person," and by Henry A. Murray as an "ally of the future." The challenge of our time is whether we make "the step to man" or our Faustian powers prove our undoing and the whole vast machine goes off the track through the strains of internecine conflict and degradation of the environment.

To become the new man and to construct the new moral order require a guiding image which is worthy of the task. Man's highest learning has seemed to comprise, in C.P. Snow's terms, not one culture but two. And the noblest of the images of man to be found in the culture of the humanities appeared somehow alien to the culture of the sciences. The preceding arguments suggest this state of affairs is probably a temporary one. For example, Ernest Becker proposes that the two cultures can be joined in a true science of man through admission of the universal value statement that that which estranges man from himself is unwholesome. Whether this or something else becomes the unifying principle, the reconciliation may soon take place. On the one hand, we will come to use comfortably many pluralistic images of aspects of man—one for his biochemical functioning, another perhaps for dealing with his pathologies, still another for encompassing his most fully human actions and proclivities. But on the other hand we will find nothing incompatible between any of these and an overarching image of what man can be, or perhaps more accurately, can come to realize that he is already.

The social significance of our dominant basic assumptions regarding the interpretation of subjective experience can be made more specific. At the surface level, so to speak, the nation is beset by numerous social problems which we point to with the terms poverty, crime, racial discrimination, civil disorder, unemployment, pollution, and the like. Experience with

attempts to deal straightforwardly with these problems—to tackle discrimination with civil-rights legislation, to alleviate the ills of poverty with minimum-wage laws and welfare payments, to eliminate ghettos with urban-renewal programs, to deal with civil disorders by increasing police power—indicates that such direct measures typically have unexpected and unintended outcomes. It is as though an "ecology of situations" were upset by a piecemeal approach.

The reason appears to be intrinsic. It seems that these manifest problems are in a sense symptoms of underlying conditions that are more pervasive and less easy to objectify. At another level these problems reside in the institutions of the society, in built-in power distributions, in the traditional roles to which persons are trained, in the time-hallowed structures and processes. At a still deeper level they involve the most basic assumptions, attitudes, and felt values held by the individual and promoted by the culture. The most carefully designed social measures will not achieve their desired goals unless they involve not only rationally designed programs and structures, but also changes in deeply-rooted beliefs, values, attitudes, and behavior patterns, both of the individuals who constitute "the problem populations" and of the self-righteous others who assume that they are not implicated.

An analogy with the process of psychotherapy may reassure that in attending to these underlying conditions we are dealing with that which is more, not less, real and relevant. In the end the neurotic discovers that he was divided against himself, and in a sense lying to himself to conceal that condition. So it may be with our social problems that the significant constructive change is first of all an inner one rather than outer, and in the direction of recognizing the hidden lies and resolving the hidden divisions. To put it in somewhat different terms, just as it is possible for a person to have a pathological set of beliefs about himself, so it may be possible for our society to possess a dysfunctional belief and value system.

In fact, much of today's student unrest centers around the accusation that the society's operative assumptions about man's deepest desires are indeed not consistent with individual inner

experience nor in the long-term interest of man or society. A dominant theme among disaffected students is that the American corporate capitalist system manipulates and oppresses the individual.

Thus it is not solely in an idealistic vein that the new science of subjective experience is hailed as having profound significance. It has survival value as well.

Several recent scholars of the future such as Robert Heilbroner, Kenneth Boulding, and Fred Polak have made much of the concept that it is the *image* of the future which is the key to that future coming into realization. "Every society has an image of the future which is its real dynamic." As previously noted, much evidence has been accumulated to indicate that the power of the image may be far greater than we have heretofore suspected.

To whatever extent the science of the past may have contributed to a mechanistic and economic image of man and a technocratic image of the good society, the new science of subjective experience may provide a counteracting force toward the ennobling of the image of the individual's possibilities, of the educational and socializing processes, and of the future. And since we have come to understand that science is not a description of "reality" but a metaphorical ordering of experience, the new science does not impugn the old. It is not a question of which view is "true" in some ultimate sense. Rather, it is a matter of which picture is more useful in guiding human affairs. Among the possible images that are reasonably in accord with accumulated human experience, since the image held is that most likely to come into being, it is prudent to choose the noblest.

It is strange to observe that at this point in history when we literally have the knowledge and material resources to do almost anything we can imagine—from putting a man on the moon, to exploring the depths of the oceans, to providing an adequate measure of life's goods to every person on earth—we also seem the most confused about what is worth doing. The great problems facing us are a sort where we need belief in ourselves

and will to act even more than we need new technologies, creative social program concepts, and program budgeting. At a time when the nation may well be in its gravest peril in over a century, and Western civilization may hang in the balance, it could even come to pass that a new "Copernican revolution" might provide a missing balance in some four-century-old trends started by the first one.

Afterword: Supraconscious Choice—A Memorandum

Out of our conversations, and a few with others, I am organizing my thoughts on the concept of "supraconscious choice" we talked about. I know that I haven't captured all of your ideas, but maybe we can build from here.

The basic concept is that the individual experiences the phenomenon of choice in a variety of ways, not all of which are experienced as conscious selection among available alternatives. Two points relating to policy analysis stand out: (1) To whatever extent the subconscious and supraconscious choices are present, they clearly need to be taken into account in policy analysis; (2) The extent to which they are present is one of the most important meta-policy issues of our day. It is a central theme in the student protest against "diminished man."

Because of subconscious choice policies have "unintended consequences" which are, at some other level, intended. Because of supraconscious choice we "build better than we know." A quote from Yehezkel Dror's recent paper defining policy sciences makes the same point: "Policy sciences clearly recognize the important roles both of extra-rational processes (such as creativity, intuition, charisma and value judgment) and of irrational processes (such as depth motivation). The search for ways to improve these processes for better policymaking is an integral part of policy sciences, including, for instance, possible policymaking implications of altered states of consciousness."

Behaviorist psychology, in its deterministic form at least, in

effect assumes that the organism makes only mechanistic responses of the sort we place in the range denoted "subconscious choice"—conscious free choice is treated as an illusory epiphenomenon. Freudian and derivative theories, especially in their more existential forms, deal with both conscious and subconscious choice. Implicit in the psychotherapies based on these theories is the desirability of bringing the subconscious choices into conscious awareness, so that one ceases to be controlled by them. Jungian theory, the psychology of the Nancy school in France, Assagioli's "Psychosynthesis," the social psychology of Sorokin, the Eastern philosophical religions, and others deal with the entire range and assume the desirability of bringing into conscious awareness both subconscious and supraconscious choices. It may be a bit of an over-generalization—but not much of one—to say that they agree on the ultimate desirability of aligning the conscious choice with the highest discernible supraconscious choice, in which case the subconscious choices too will tend to follow.

In adopting this terminology we are not simply relabeling some well-known observations. Rather, we are deliberately shifting the emphasis (by stressing the "choice" aspect) to bring out the significant relationship to policy.

One could cite many examples to indicate how the Freudian ethic has infused recent policy. Recognition that criminals may be victims of subconscious choices affects legislation, the courts, and policies relating to punishment and rehabilitation. Early education policies and practices are affected by the assumption that unfavorable early environments may result in the child being handicapped by dysfunctional subconscious choices. Welfare policy and social work practice are influenced by the theory that welfare recipients are not inherently lazy, but victims of bad subconscious choosing. Political analysis often includes conjectures about the subconscious choices of party and national leaders. Some recently heard voices of despair . . . have based gloomy prognoses on images of masses of people helplessly in the grip of collective subconscious choices leading them to war, famine, and destruction.

Thus policy based on recognition of the power of subconscious choice is radically different from policy deriving from the assumption of behavior governed by conscious rational choice. By analogy, we might expect that policy would be similarly affected if taking the supraconscious range of choice into account became widespread. Most obvious, perhaps, is the radically different implied concept of education. Training for remunerative employment becomes merged with education toward self awareness; work, fun, and learning become indistinguishable; education, psychotherapy, and religion have the same ends.*

This way of looking at things poses many questions, not all immediately answerable. Some are scientific, such as the question of distinguishing subconscious from supraconscious choices, and the question of the limits of supraconscious choice. Others are political, such as potential implications for policy and difficulties of transition if the dominant view is shifting to include the supraconscious range. . . .

As we know, indications abound that the "full spectrum" model of human choice is making a bid for dominance. Among the changes that could be expected—and we see it happening—is a reassessment of value positions in policy. Relativism and "value-free" observation in policy analysis are on the way out. One of the possible approaches is to note that a natural basis for values exists in the "preferred directions" in evolution. Putting this in the terminology of this note, it is as though there were a "collective supraconscious choice" evidenced in the evolutionary process to move in the direction of increasing awareness.**

*cf. "The Present Dilemma in Psychotherapy, Religion and Education," *Journal for the Study of Consciousness*, July 1969, p. 91. *Eds.*

**In a prior luncheon with Dr. Harman, one of us had drawn his attention to this important thought (higher evolution proceeding in the direction of increasing insight) and to its expression in the *Journal, cit. sup.*, July 1968, p. 81. *Eds.*

The Social State, Laboratory of the Self

22

Arthur M. Young

Depressing as is the current scene, there are encouraging signs. Things are getting worse, but people are getting better.

One way in which this development shows itself is in the nature of our mutual concern. In the First, and to a lesser extent, the Second World War we were inundated by patriotic zeal, and endorsed a total commitment to savagery in the name of making the world safe for democracy.

Since that time this sort of commitment has become less blind. less total. Perhaps the atom bomb induced self-scrutiny. Certainly, even among the military, it has brought an awareness of reciprocity, the responsibility involved in power, and perhaps even of the insecurity of absolute weapons. "Uneasy lies the head. . . ."

The years since the bomb have seen the development of an attitude that is not so completely identified with one side of a polarity. Having seen our former allies become enemies and our enemies allies, our love and hate have become confused, alloyed with other elements, and rudimentary intelligence concerning such matters may be striving to get born.

Nevertheless, our social sense persists in trying to find external causes for our obvious troubles. It seems to *require* an object upon which to fix blame or adulation. A few years ago, prompted by the Russians' successful sputniks, it singled out for a target the education of more scientists, and the universities were inundated with research funds. Now we are disillusioned with science, and turn elsewhere.

In examining our current difficulties, we are led to ask: Does man exist for the state, or does the state exist for man?

The question, strangely enough, is not a political one—though it has always been a basis of political philosophy—because we don't really know what man is. The answers of the past, which were primarily of religious origin, have with the onset of science been set aside in the hope that "any day now" science would be able to provide a solution. This anticipation has led to an extraordinary split in our consciousness. On the one hand, we honor a past commitment to the concept of self-determination and human rights, which is to say, to a belief in the essential capacity of the human spirit to initiate, to be a cause; and on the other, we believe in science, which is to say, in the basic premise that everything has a prior cause, which implies that the self is impelled by causes exterior to itself and therefore does not, in any significant sense, exist.

Caught in this double think, it is a wonder that we are not even more confused than we are. How can a court of justice rightly punish when, according to determinism, there is no theoretical possibility of a person being the cause of his own acts? How can we reward a person if his abilities are not his own, but conferred upon him by the "advantage of education," an external cause conferred by the state?

On the other hand, the double-think endorses freedom and would have society hand it out; yet at the same time, in making freedom depend on external causes, it subtly removes freedom's true origin.

Thus it is not only determinism that denies individual freedom. The permissiveness that would confer it—by making it totally depend on circumstances—deprives it of a status of its own. "Darling, you may do anything you want." "No, I won't," says the child.

Thus, the paradox of selfhood weaves its subtle web around the emerging intellect and reason confounds itself.

To the question of whether the individual exists for the state or the state for the individual, my answer is, *neither.* Both the state and the individual exist for the *self*, which must not only

individuate for its own evolution, but must participate with others and therefore requires the state.

This inquiry raises the question: What is the self, if it is not the individual? But this of course is not a new question. It is a subject to which the great of the past have devoted thought. We need not repeat this thought here, except to say that *the self* is that end point in evolution toward which we strive and is that which we can eventually become—and to which our present identity is a finite step. Further, as we shall see, it is this ultimate promise that makes life with its tragedies and sufferings worth living, and is the valid basis for moral action.

All of this has been dealt with by religion, more or less profoundly, though not without distortion. To invoke such teachings here would not contribute to our investigation because a theological analysis cannot overstep the barrier that the existence of science has thrown up against teachings which are not grounded in empirical fact. To talk satisfactorily about the self, we must answer science on its own terms.

So we must find other grounds for the concept of a selfhood beyond the bodily identity of the person. Let us then examine such a "person" in the light of strict scientific knowledge.

A person consists of some 1,000,000,000,000,000,000,000,000,000 proton-electron pairs. These are organized on a number of levels, first as atoms, with some 20-odd electrons and protons per atom. The atoms occur in combinations known as molecules, which comprise from as low as 3 atoms per molecule (for water) to as many as 20 million or more atoms in the DNA molecule. Recent work in biochemistry has shown that the molecular structure of even proteins and enzymes is highly organized, comparable not to a house made of bricks but to intricate machinery. Molecules (in muscle, for example) are again not poured into a mold like cement but are structured molecule by molecule.

The next level of organization, the cell, is so complex that it is still not understood. At one time it was said that the cell was filled with protoplasm, but as the biologist George Gaylord Simpson writes, this is like saying a radio is a box filled with "radioplasm."

We come, then, to multicellular organization. Putting the entire subject of zoology in a single sentence, we can say that the human being is an organization of 100,000,000,000,000 (one hundred trillion) cells.

This is a very large and complex organization. Yet it operates as a unit. It can move, communicate its needs, and perform all kinds of actions, from driving an automobile to playing a sonata. Even if we deny it free will, *it can act as a single entity*, and this implies that every nerve and every fiber, every cell is coordinated in a hierarchy millions of times more complex than any state that has ever existed on earth.

The next point to note is that this highly complicated organism has *evolved* from simpler organisms, from single cell creatures. How has it done so? Since it is not a mere mass of cells, but of systems and subsystems, each with its own lines of authority, coordinating and interacting, it must have gradually worked its way from one level of organization to another, first as cells coordinating (as in a sponge) for mutual interest to obtain more food, then as an organ (the stomach) to ingest and digest food, then as a number of organs (the heart, liver, etc.) to enlist cooperative functions for digestion and circulation, then through metamerism (segmentation) to place organs under a chain of command, leading ultimately to the development of the spinal column, nerve ganglia, and the central nervous system with headquarters in the brain.

Now, however you think of this amazing development, whether you consider it natural or supernatural, it evolved from a relatively unorganized community of cells, and this evolution has consisted in cell differentiation, in creating specialized organs and systems. Moreover, and this is an essential consideration, the digestive, the reproductive, the circulatory, the motor, the nervous, even the computer system of the brain are all coordinated and ruled by the *will.* An organism is thus a hierarchy, as Thomas Sugrue has pointed out, an autocracy. (It is ironic that he himself was so physically paralyzed he could not even write his own book.)

Note that it would be inappropriate to say that the brain or the will has "enslaved" the population of cells, or that it gains a

profit from its autocratic function. Its role of leadership is as necessary to the whole person as are all the other functions—respiration, digestion, circulation, and so on. In fact, the well-being of any particular segment is as much dependent on the rest of the organism as it is on itself. We may even say that a given part has come into existence only because the whole requires it.

Yet if we turn our attention to the social scene, we find the concept of a highly organized and perfectly coordinated state repugnant. It is somehow not only impossible, it is not even to be desired. Why? Why has social reform always sought to reduce centralized power, to equalize wealth and status? While I cannot speak for all sociologists, I have recently been exposed to one who is evidently held in high regard. He singled out for his main attack what he called the "topdog-underdog" structure of society, even coining the phrase "structural violence" to imply that all social structures contain an innate stress that can erupt in violence—like a violin string made so taut that it is ready to snap.

Aside from the practical and realistic consideration that a society, especially in the present technical age, cannot survive without structure, what we might ask is, what theory is behind the idealistic conviction of most social reform, indeed, of most social thinking, that insists that the perfect state should be amorphous, a commune of undifferentiated units. It is useless to point out that the experiment of communism, which started on this basis, going even so far, at one point, as to abolish marriage and the family, has moved through a series of crises leading to a hierarchy stricter than capitalism (with its specially privileged party members, its Stokanoffism, and so on). This only elicits a more fervent appeal from the reformer to what we must do in the future.

In posing the problem in this simplified form—if the self is such a perfect hierarchy, why are we so opposed to such a model for the state?—I am no doubt overlooking many important distinctions, many issues involving other considerations, but the pith of my argument does not depend

on these special considerations and is best reached by a simplified treatment of what otherwise would be an endless debate.

So, to answer our question, let us return to the self. We have said that it is a hierarchy, an organization of cells, organs, senses, all under the jurisdiction of the will, and the will, as the leader, is free to choose the most desirable course of action to which the rest coordinates. But this description also fits the higher animals—creatures, it is sometimes said, that are more perfect examples of evolution than is man, who may be one of nature's "mistakes."

But I think this misses the point. Whether the cause be nature, God, or man himself, and whether or not a mistake, man is a project. He is the attempt to produce a creature that, unlike the animals, responds to goals beyond his own life span, beyond the immediate needs of survival. Man engages in pursuits of a different order than do animals. Indeed, the contrast presented by the enormous variety of shapes, sizes, and modes of behavior of the hundreds of thousands of species of animals, and the fact that all men are of but one shape, one species, make it evident that, in man, the emphasis has been transferred from the problem of specialized roles in the drama of survival to the problem of creating a dramatist, a creature that can himself create, whether this expression takes the form of tools, weapons, art, architecture or even civilization itself.

In other words, it is one of man's jobs to make civilization.

Now, it must follow that he does not want to knowingly create a Frankenstein, a state that will outdo him or make him its subject, and therefore he properly withholds conveying upon the state any absolute power, for to do so is to resign his own sovereignty.

What do we mean by "his own sovereignty"? I believe that it is in this direction we can find the true answer about the relation of man to the state, for the answer that man does not wish to resign to the state leaves exposed—and unanswered—the question of just what principle he does serve.

Must man serve a principle? "Must" is a poor word, but I believe he not only must, but does. In fact, historically, he

always has, and with due caution I suggest that this is why man has always been religious, for the trait, or rather, increment, that distinguishes man from the animal is the capacity to pursue goals beyond his immediate biological needs, and this trait requires symbolic embodiment, embodied, if you like, in ritual, worship, or other forms of self-transcendent behavior.

I say I offer this with due caution, for I do not want to become entangled in religious questions for the reason I stated earlier, that the authority of religion has lost its force. Furthermore, religious insights once valid, become completely falsified when expressed in rational or scientific terms.

There is another way to recognize that man does serve a principle greater than himself. This takes us back to evolution. Consider again the progressive development from a single cell or a colony of cells, to the highly organized vertebrate mammal. Each step of this progression hinges upon delegating a part of the self-interest that exists at the cellular level to something beyond itself, the total integrity of the organ, the organ system, or the whole animal. Complete self-determination is exchanged for partial self-determination in a larger and more effective community.

That this force, tendency, or impetus is unconscious in animal cells goes without saying, but in man it begins to become conscious. In fact, it is perhaps the origin both of consciousness and of the conscience, for it is born of conflict of interests and, seeking resolution, learns to exercise a kind of judgment. We do not need to postulate the supersensible to explain this delegation of autonomy because the generation of this process occurs with the sensible, and requires only memory to set it in motion. The self, at whatever level, is capable of recognizing the difference between the short and the long term interest. If I drink too much, I'll have a hangover. If I don't save seed, I'll have none to plant next year. If I kill the goose, I'll not get the egg.

It is natural and inevitable to compare courses of action and to anticipate consequences. This equation has no final term. It projects toward an ultimate and hypothetical projection of the best possible state of affairs and hence is belief. Such belief

underwrites all conscious action, and the notion of an ultimate God and of religious ritual grows out of the comparison that is its essence: From good through better, we envision a best, an ultimate to which we dedicate ourselves.

This seems clear enough, but it is worthwhile to examine the reason that this statement about belief, or about ultimates, seems not to be scientific.

Science, dedicated to and dealing in the objective, is embarrassed by infinity in whatever form, and rightly avoids it. Science gains its knowledge by definition in terms of limits. But emotion is not apprehended in terms of limits. It encompasses and inundates the self, and emotion, whether of love or of desire, of wonder or of awe, or even of fear, is imagined as without limit until fact shows it otherwise. In other words, infinity, or lack of limit, is natural to the emotional state. Sense experience teaches limitations. The physical object is finite. So emotion, or imagination, has to create an ultimate, whether it be of awe, of love, or of good, and such an object inspires a motivation far more powerful than the finite object.

Such motivation is the source of religion, and, we suppose, has its roots even deeper, in an innate tendency in all life for self-transcendence.

But let us push on. Our thesis is that there is this basic impulse to self-transcendence in all life, that it is a cause of the evolution of lower to higher forms, and in man leads to religious belief which we interpret as a faith in one's own evolution, ultimately to godhood.

It is this hierarchy that is echoed in the state. We could even say parodied.

We might go on to say that the reason social reform is so opposed to hierarchy is that within ourselves we have not accepted our higher self. We avoid the responsibility for self-government and eternally disapprove of what we ourselves are unsuccessful in accomplishing.

But to say we all suffer from the failure to take responsibility for self-government smacks too much of a universal indictment, and, as Washington said, you cannot indict a whole people.

It seems more likely that we misdirect our idealism. To be

sure, the god within is a very sacred matter. We cannot accept even a minor flaw, but to expect the social state to be ideal is inappropriate. "Render unto Caesar the things that are Caesar's."

This leads to the suspicion that it is not hierarchy, but its finite custodians that evoke disappointment and invite the urge for reform. It is certainly true that no system can be any better than the persons administering it and that the difference between good government and tyranny is due to the moral integrity of its incumbents. My own observations of history indicate that neither the feudal system nor government by king warrant the condemnation that social reform puts upon them. In a study of the Middle Ages I was struck by the ease with which a talented person, whether artist, philosopher, or leader, could rise from the ranks and be accorded recognition. Mathematicians, for example, whose profession is one that is not easily appreciated, rapidly rose to recognition and were prominent in the life of the court. Artists flourished under the hierarchy of court and church. It was not till the mercantile era of the nineteenth century, when tastes were dictated by academies, that the Impressionists were excluded and a van Gogh could die without having sold a painting.

But I am getting away from the principal point. The question to resolve is why social reform rejects hierarchy. I am led to believe that the answer is again an interior one. The anathema against hierarchy, despite sociologists, is not against hierarchy but against its ideals. When we condemn a leader, as we inevitably do, even if he does good for his constituents, we are not so much condemning leadership as we are expressing a vacuity in our own search for an enduring principle to which to adhere. We have lost our own god and are not ready to accept someone else's.

This takes us into deeper waters. We did have a modern god—it was science, the great contribution of modern times. But of late, we have begun to have secret doubts about the brave new horizons that science conjures up. I will not mention the new forms of war. Even the peaceful uses of technology—computers, automation, leisure to watch television, supersonic

transports, colonies on the moon—have a desperate, whistling-in-the-dark, false assurance about them. If nothing else, they lack humor, and while we cannot but admire the ease of a jet flight to Paris or a transcontinental telephone call, there is something unnerving about such painless achievements. Perhaps we need some physical exertion to complement the effortless ease of button-pressing existence.

So, quite apart from feeding the spirit (which I believe science did achieve in the nineteenth century, not because it was correct but because it was an enthusiasm), modern science doesn't really feed the body, and we are beginning to withdraw that total support which made it a religion.

Feeding the spirit is something, in fact, that religion even in the church-going sense has failed to accomplish for a long time now. Hundreds of years from now historians will ask to what god were skyscrapers raised. The clichés and fatuous pronouncements we brandish in the name of what we call religion will not reach their distant ears. They will measure our spirit by the monuments we have erected, because it is from these endeavors we derive our spiritual nourishment.

Currently, however, these past movements of technology are beginning to pall, and it is possible, and even probable, that this failure has a correlation to the acute sense that something is wrong with the present scene. Too materialistic is the ready answer, but one detects no zeal or dedication that would indicate a nonmaterialistic trend. Perhaps the revolt of youth, its rejection of the organization and its endorsement of zen, yoga, and other cults is a sign of something, but this movement is more the search for a cause than the discovery of one.

What seems most lacking in the modern scene is the courage to face the enormity of our ignorance about man himself. In the midst of our great technological progress, when discoveries in the stellar evolution, in the fundamental particles of physics, in the chemistry of DNA have carried physical science to fantastic heights, the admonition "Know thyself" receives no attention. We may mutter about the inadequacy of Freud and try to question the behaviorists, but this is hardly adequate. It betokens the poverty of our philosophy.

Why do we not try to know more of the self? Ask this question and people turn away. Ask why we don't help the underprivileged, and everyone takes an interest. Truth is, it is more difficult to correct oneself than it is to correct others.

Since the inner conflict is a lonely one, it becomes easier for man to project this innter conflict; to make of it an outer crusade. Joining with others, he finds companionship.

This being the case, let us look at the social drama with more care, realizing that it is the laboratory of the self.

Here we find it necessary to delineate another problem, related to that of hierarchy, but simpler and perhaps more fundamental, the problem of individuation. How does individuation occur? How does an individual become the person he does?

It is all very well to refer in this connection to taking responsibility, but to emphasize responsibility without explaining how it comes about misses an important step. Before one can even feel responsibility, one must feel oneself to be an independent and causative agent. To accept responsibility when there is no self-determination is taxation without representation. But no one wants responsibility and no one will take it, for it is a burden not an asset. How, then, does one come to assume it?

The answer is that responsibility is preceded by something else and this something else is attractive, is an asset. This earlier thing is *freedom to act on one's own.* This freedom *is* attractive (or becomes so when the self is ready for it) and the self joyfully seizes on it. It enjoys this freedom to initiate its own acts. Such acts, like all other acts, have consequences. But the acts that the self has initiated have consequences that the self can recognize as stemming from the self and for which *it is therefore responsible.* It is only thus that it learns responsibility. In fact, this is learning. It is trial and error, feedback, and the way we learn control. It is both good and bad. It seems bad because the consequences of action plunge the self into painful experiences, but it is good because in this process the self becomes more than it was.

Examples of this are so numerous and self-evident that we may now pass on to a more difficult question. At first glance,

freedom to act on one's own is so obviously desirable that everybody leaps to enjoy the privilege, but closer examination proves otherwise. Anthropologists and social workers are often amazed because in primitive cultures people don't show any great alacrity to act on their own. In fact, it would appear that God himself had difficulty getting man to do so. He provided a Garden of Eden for Adam and Eve, and they just didn't act on their own. He was finally forced to resort to a subterfuge. He had to command that they do not eat of a certain tree in order to get them to do so. Fairy tales tell the same story. There is always one room that it is forbidden to enter. Disobeying this edict creates the story.

In fact, it is the prohibition that makes possible self-determination, for without prohibition, action has no boundaries to distinguish it from the general current of flux. Prohibition also sets up a resistance which has to be overcome and thus insures that actions have a certain necessary vigor. The shell on the chick's egg, the long passage that the sperm must traverse, the barriers and impediments to every form of self-expression are its guarantee that it has the necessary staying power for the trials ahead.

There is nothing original in these thoughts; they are etched in the history of man in his fables and legends.

Related to such motifs is the theme of "killing the father." Freud would interpret this as the child's wish to displace the father in the mother's affections, but traditionally there is another interpretation. If we recognize the evil stepmother as a comparable obstacle, and perhaps also the false stepfather (i.e., Hamlet's), plus the long series of adversities which the hero or heroine has to endure, we can perceive that these stories deal with the self's development of its own potentials (the three fairies' gifts) before it "comes to the throne." To this we can add the curious and colorful account in alchemy, "the killing of the red lion." The hero must squeeze the red lion to death; he must then save the white bones; with these he constructs the green lion which becomes his companion.

Such accounts tell the story of individuation. One comes into life with potentials only. These must be brought out and

developed by hard trials and ordeals. They start in outer conflict (the red lion is a threat which must be overcome). But from the eventual conquest of the adversary one learns the laws, how things are put together (the hero must save the white bones). Upon this construction he mounts the throne. He returns and himself becomes king.

We no longer have kings, of course. I am not advocating a return to monarchy. The problem is not an outer one, anyway. It is the king within that we must restore, the essential dignity of self.

I think it was in the middle 40s that there suddenly emerged a curious phenomenon. Everywhere one saw scrawled on walls and buildings "Kilroy was here." This was the start of what I would call modern social concern. Perhaps "God is dead" is another instance. In any case, I can detect some progress in this area. Wars which once enlisted the entire population (and for some populations still do) now have mostly lost their value. The Second World War already gave some indications that it was not being regarded as a true cause. This shift in attitude implies that modern man has graduated from the compulsion to hate an enemy and is gradually coming to transcend that duality. To return to a point raised at the outset, note that we were allied with Russia and China against Germany and Japan. We then were friendly with Germany and Japan and considered Russia and China our enemies. In 1971 China was again favored. The relatively short span of these shifting alignments tends to neutralize the compulsive polarity. We have become less caught up in the duality. As Pogo said, "We have met the enemy and they are us."

We can recognize a number of patterns in which inner-struggle conflict "dramatizes" in outer conflict.

The inner struggle for self-determination dramatizes as revolution, rebellion against authority, overthrowing the king, viz., the United States in 1776, France in 1789, and the host of twentieth century revolutions.

The inner struggle of growth to extend boundaries dramatizes in wars of aggression. The ability to conquer and hold territory is tested and finds its limits. While this has its origin in the

growth and vigor of the nation in question, it is resolved by the establishment of boundaries and by inner and outer law (viz., the United States in the period of growth following the revolution: the acquisition of more territory as the 13 colonies became the 50 states).

Conflicts within the self may occur at any time. There is a possible correlation between repression of basic instinctual drives and civil war. In the case of our own Civil War, the diagnosis is difficult. It is clear that it was not simply a matter of freeing the slaves, since in the first place this did not resolve the problem, which remains with us today, and in the second place, the Civil War dramatically intensified a schism between North and South that still endures. It seems hasty to designate this schism as intellect (the North) versus emotion (the South), except that there is currently a civil war between quite different factions—the hippies versus the establishment—that fits the same designation.

Here it seems far-fetched to read the hippie/establishment conflict as a projection of the self, since the parties seem so separate, but our thesis would suggest both parties look within themselves for the source of the split. Seen in this light, the problem is not so much a matter of mediating between different interests, as it is of getting the self to recognize in itself that what it calls the enemy is its own "shadow," as Jung would call it. To attempt a diagnosis, we might recognize that the older generation has competence and is articulate, but its values are hollow and sterile. The younger generation is inarticulate, incompetent, but its values are sound and relevant. Each faction needs what the other has.

Now, I do not see the solution as a mediation between these two opposing elements. The outer social conflict is an outward dramatization, a good show, and as long as it commands interest, it should continue. Each time an organization man in his dull alpaca sees a long-haired hippy or a mini skirt, he may realize he's missing something. Each time a hippy hears a jet set executive deliver a well-turned speech or articulate a subtle thought, he may realize there is a bit of satori in the sartorial.

So, on this and most social issues, I'd say, *let be.*

The wind touches the tree tops
Yellow leaves flutter
The hot rod spins a tire on the gravel
One can still mutter
Curious that nothing says it enough
And that so much persists
I am turning myself around
And find areas unknown
Opalescent sparkling contagious
Amazement waits in the station
And doesn't connect
Perhaps next day, another life
Something will come
Meanwhile, I must arrange something.

But the dislike of hierarchy still needs resolution. Where can we find that which we would serve, to which our dedication would be our fulfillment, our ultimate completion?

Here *we* cannot do without what the whole undertaking of being a person, being man, has never been able to do without, the concept of something beyond. If at one time this took the form of God—and our intellect could not dislodge such faith—it was sufficient, enough for that continual exercise in peering through immediate and prevailing murkiness to something beyond.

Now it can no longer be called God, it must be something we create and recreate.

What would we be?

The asking sets in motion the growth of the seed that can become what we would be, but this destiny is not written down, either in the stars or in DNA. It is scrawled in our own hand, pushed up from our own roots, or like Dr. Seuss' 700 hats, bursts from our own head. It is a growth that requires long evolution. For the self, this evolution has taken many lifetimes.

Let me not insist you believe this, but if you did, would you not respect your own ultimate goal, the best hope you could entertain for your own future? And if you did not, and truly think that death is the end, you must indeed expect a miracle, for such death will need be a skillful surgeon. He must cut your

pound of flesh, to which he has contractual right, but if there be spilled one drop of the blood of desire, be it desire for something better, for resolution or curiosity to try again, be it a drop of pain, of fear, of hope, of dread, then by Venetian law, death's life is forfeit—and the death of death is life.

So I say, restore in your own heart your own king. Pay him homage, pay him respect, for he draws his power from you, and you draw yours from him. Let be the hierarchy of inner self, and when this is restored, then shall the dignity of all men be restored, for on this all can agree, that all men should be true to their own higher selves.

TOLTEC FORM OF THE WINGED POWER
on ancient ceremonial drum (*tepomaztle*) from the Malinalco temple. From the pho
graphic archives of the National Institute of Anthropology and History, Mexico.

The Winged Power:
New Discoveries of an Ancient Path to Enlightenment and Regeneration

23

Kenneth Demarest

The author is a historian and a writer-researcher in the field of symbol systems, scientific and religious.

> In sum, it is good that all which is fullest of meaning be couched in concise, even obscure terms—so that a mediocre mind prefers to see only nonsense in it, and so desists from mistranslating it into his native insipidity.
>
> Jean Paul Richter (1763-1825)

The following account emerges out of careful investigations into the remaining writings, inscriptions, symbolic images and oral traditions left us by certain former civilizations, these investigations conjoined with recent scientific research into the nature of matter, mind and number (see also Chapters 8, 25 and 26). The details fill several manuscript volumes.* All we give here are the principal results, which has the advantage of making connections more readily discernible. We do not expect those results to be popular with a heretofore prevalent scholarly establishment, which—with a few notable exceptions—has so carefully avoided mentioning or researching the evidence for man's immortal nature and spiritual connections, trying either to psychologize them away or deny them.

The history we are about to relate is one of the most exciting and most relevant for us today. It says briefly that in ancient times, before the last great geological catastrophe of volcanic

*This and Chapter 25 are based in important part on researches of Dr. C. Musès, since 1958.

erruptions, earthquakes and flooding tidal waves—the violent effects of which extended to about 12,000 B.C. (particularly affecting the North African coast and what we now call the Northern Sahara)—men enjoyed contact and instruction from those in a more advanced and benevolent evolutionary stage, who naturally were held in high reverence and respect, with titles like "Master", "Lord" and "Divine Being." A very vivid account of a first contact with them by one group of men is recorded in the ancient history of Sumero-Babylonia, telling how they came as apparently great birds or flying eggs of luminous or fiery appearance dropping into the sea. These "eggs" rose to the foaming surface, opened or "hatched", and out of them emerged human figures dressed in strange fish-like suits whereby they could swim underwater to their capsules. Sometimes we are merely told that the "fish"-clothed beings—suggesting some kind of space suit—simply rose from the sea (see Figs. 1*k* and *o*). The translation of the extant ancient record follows on page 351.

Fig. 1

Fig. 2

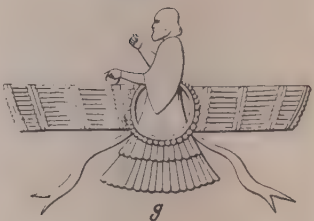
Fig. 3

a

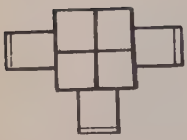
e

f

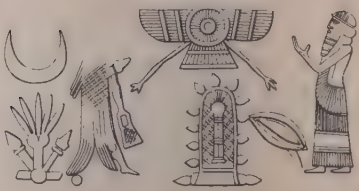
b



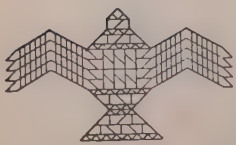
g



c



h



d

i

Fig. 4

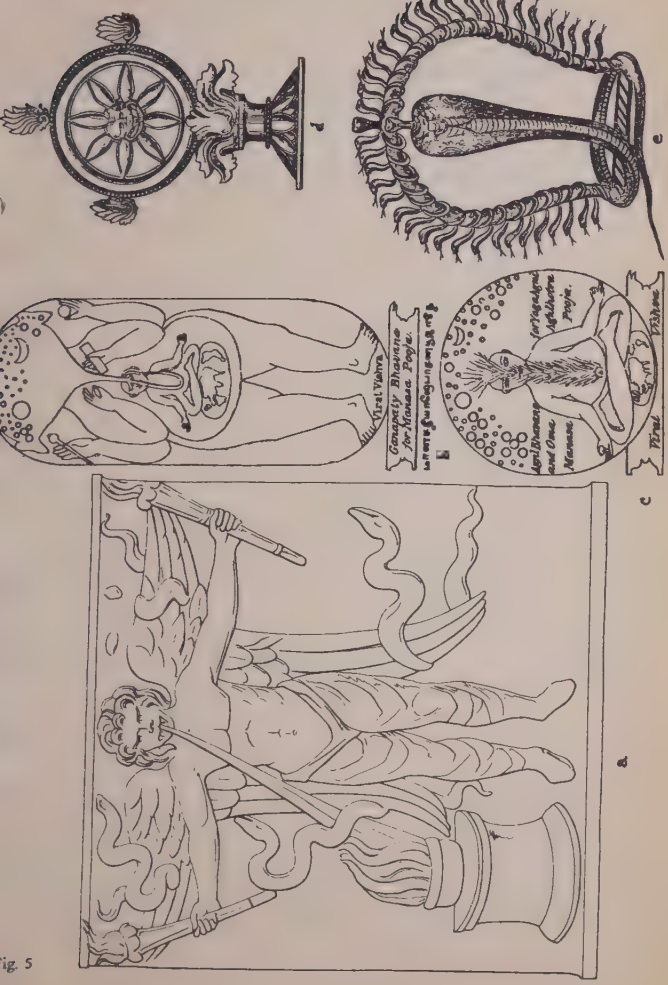


Fig. 5

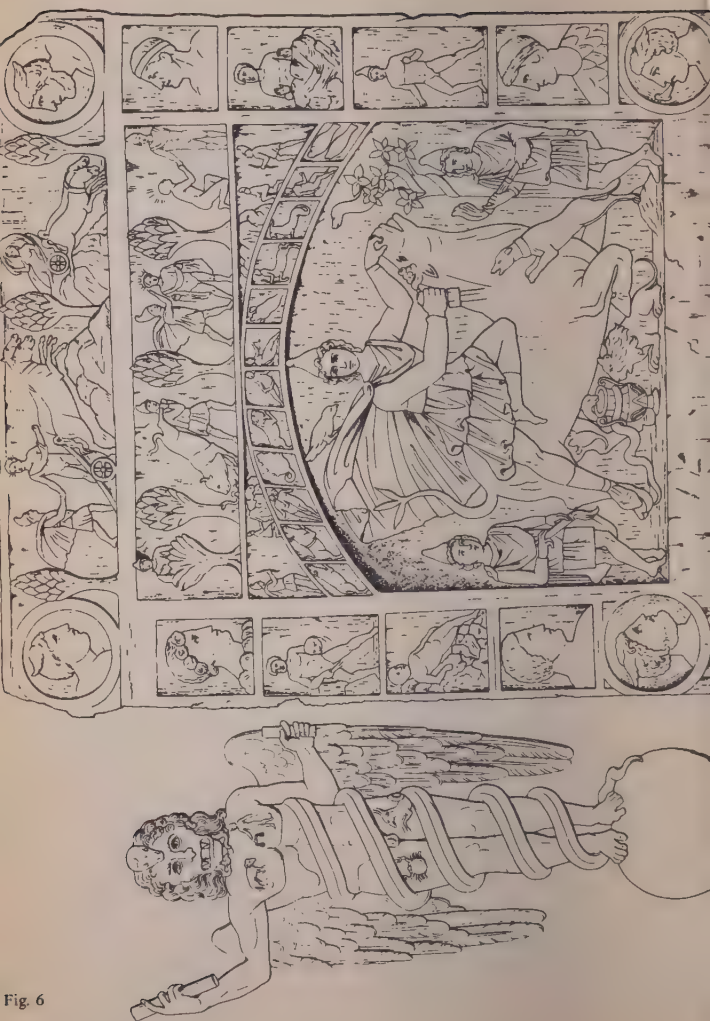


Fig. 6

Gods in Space Suits?

The longest version of such an event is preserved in the two mutually supplementing quotations, by Syncellus in Greek, and by Eusebius in Latin, both quoting from the Greek chronicler Alexander Polyhistor, who in turn is quoting from the now lost work *Babylonian Antiquities* of the Chaldean priest-historian Berosus—a contemporary of Alexander the Great—based on temple records even then very old.

The scene is the Persian Gulf on a part of the coast not too far from ancient Babylon. It was a time, Berosus tells us, when that region was most fertile and where many men of diverse origins had settled, but were living a savage life, without law and "after the manner of animals."

In the first year of the (later named) era of the prediluvian Sumer-Babylonian kings, Berosus continues,

> There appeared, coming out of the sea where it touches Babylonia, an intelligent creature that men called Oan(nès) or Oè(s), who had the face and limbs of a man and who used human speech, but was covered with what appeared to be the skin of a great fish, the head of which was lifted above his own like a strange headdress. Images are preserved of him to this day.
>
> The entire day this strange being, without taking any human nourishment, would pass in discussions, teaching men written language, the sciences, and the principles of arts and crafts, including city and temple construction, land survey and measurement, agriculture, and those arts which beautify life and constitute culture. But each night, beginning at sundown, this marvelous being would return to the sea and spend the night far beyond the shore. Finally he wrote a book on the origin of things and the principles of government which he left with men before his departure. The records add that during later reigns of the prediluvian kings other appearances of similar beings were witnessed.

In corroboration, there is an account by Helladius, which is preserved and summarized by the Byzantine scholar Photius (Codex 279) as follows:

> He [Helladius] recounts the story of a man name Oè who came out of the Red Sea having a fish-like body but the head, feet and arms of a man, and who taught astronomy and letters. Some accounts say that he came out of a great egg whence his name [*Oè* is linked to the same root as the French *oeuf* and the Latin *ovum*], and that he was actually a man, but only seemed a fish because he was clothed in "the skin of a sea creature."

The fact that priests later wore a fish-like garb and headdress ceremonially shows how the originally awe-inspiring events, that made such a deep impression on the ancient Mediterranean world, were lastingly remembered by such commemoration and ritual re-enactment. The fish- or dolphin-like helmet was later conventionalized into the Phrygian cap (Figs. 1*m*, 3*f* and 6*b*) and the mitre (Figs. 3*a* and *c*).

Even though the fish headdress and garb were later worn by priests in stylized ceremonies, one must not forget that all these conventionalizations derived from an original experience that was shattering and remarkable for the entire civilized Ancient World.

The First Recorded UFOs

Helladius' account is extremely valuable, the more so because it is confirmed by the extant pictorial representations of this wise being (called "the Egg-Born"*) who exited in a strange suit from some kind of vessel—likened to an egg— that "fell" into the sea. Hyginus, Manilius and Xanthus all furnish other corroborating details, speaking of gods in honor of whom the fish-form is sacred, who plunged from the sky into the waters of the Euphrates. In another variant (found in the commentary in Germanicus' edition of Aratus) the power of a holy fish pushed ashore on the banks of the Euphrates near Babylon, the "egg" out of which the "deity" appeared. Before it landed in the waters, the egg-like vessel was of a luminous appearance. Thus the historian Sozomen tells us that the same type of deity

*Paralleled by the Hindu account of the "birth" of Brahmā-Agni, fully mature, from a glowing golden "egg."

descended into the Euphrates as "a fiery star" from the sky. Damascius confirms with another account of a god-like being worshipped in Heliopolis who descended from the heavens in "a fiery globe;" and Zosimus relates that strange luminous globes in the sky appeared regularly at temples and holy sanctuaries in the region comprising Phoenicia, Syria, Persia and Babylonia. Indeed in one of the ancient and now lost portions of the sacred Iranian scriptures written in Avestan, a mighty, deific fish is said to be "the greatest of the creatures of Ahuramazda the Creator" (cited in the *Bundahish*, chap. 14, verse 5).

It is not too much to say that these extraordinary visitations, understood as gods flying in fiery or luminous vehicles that could land in the sea—coupled with the teaching of those beings as to the heritage of immortality for man—was the outstanding teaching of ancient India, Iran, and the Near East and Mediterranean world.

It is clear we today would call these appearances "flying saucers," UFOs, or space capsules landing in water with their masters. Those ancient appearances made such a deep and lasting impression that sacred fish, in commemoration of those events, were venerated in ancient sanctuaries throughout the Near East and, even more surprising, were kept at mosques in Syria and Tripoli into modern times.*

Just as these visitant capsules in the water were remembered as "eggs" from which higher men in fish-garb emerged, so the capsules, when they were in the sky were metaphorically described as great fiery birds or griffons (Figs. 1*l*, 2*d*, *e* and 3*d*, *f*, *i*); or, again, as winged figures or deific men flying in a winged ring or capsule (Figs. 1*j*, 2*a*, 3*a* and 3*g*). "Space visitors" we would call them today. This was the origin of the fiery, immortal *Phoenix*—a name still preserved in *Phoenicia* (Phoenix-land) or Lebanon, above whose mountains the travelling, luminous globes were often seen. The same extraordinary manifestation was called the *Sīn-murgh* or *saena* (divine hawk)

*For further details the reader is referred to the sources assiduously collected by William R. Smith in his excellent *Religion of the Semites*, and to Figs. 1*f*, *k*, *n*, *o*; Figs. 2*b*, *d*; and Figs. 3*a*, *d*, *f* as well as Figs. 4, *a* through *i*, together with the explanations of these figures at the close of this chapter.

in ancient Persia, identified with the hawk form (*śyena*) of the great Vedic god Agni who brought the *soma* or elixir of immortality to earth. The same great bird-divinity in ancient Egypt is Horus the Divine Hawk, who conducts man to an immortal state (Fig. 1*i*).

The same doctrine is preserved in Apastamba's treatise (itself preserving far older traditions) for building the altar sacred to Agni, the divine and immortalizing energy: "He who wishes for heaven should construct the altar shaped like a falcon [in flight] with wings bent and tail spread. This is the tradition." (*Cf.* Fig. 4*d*, stylized form in Fig. 4*c*). The greatest book of secret instruction for using the Vedas, the *Śatapatha Brāhmaṇa* (X, 5, 1, 3-5) clearly confirms the teaching, telling us that the bird-shaped altar represents the celebrant's immortal body. The same ancient book, preserving remote oral tradition, also makes it very clear (IX, 5, 2, 12-13) that this practice cannot be done by one person for another because the golden embryo of one's own higher body can be developed only by one's own exertions. The only seeming exception (V, 2, 1, 10) was a man and a woman who undertake the process jointly and in love. This was not actually an exception, however, for the same verse goes on to say that a man without a woman is simply incomplete, and neither without the other can attain full regeneration. This is the Vedic root of the best in the later Tantric yoga, proving as well that the socio-spiritual liberation of woman was a phenomenon long antedating the twentieth century, and almost as long forgotten in the intervening period. The ancient Brāhmana instructions also tell of the luminous orb and the immortal being within it, symbolized (X, 5, 1, 5) as the leaf of a lotus or water lily (with its bud), again recalling a gleaming capsule floating on the surface of the waters.

The historians Apollodorus and Abydenus, writing in Greek, furnish the added information from Berosus that six other deific personages, wearing the same fish-like (space?) suits, appeared on the Babylonian coast of the Persian Gulf, one being called Odakon, a corrupted variant of the god-name Dagon, the ancient Phoenician-Assyrian deity clothed as a fish (Figs. 1*n* and *o*), the ultimate root of whose name appears to go back to

the ancient Semitic-related Celtic root *dag* meaning "good," the same word meaning "fish" in Semitic. An ancient Celtic shrine to the deity *Da'ada* (Irish *Dagda*, possessor of the sacred cauldron of immortality) still exists, with a Christian church now at the site, in the present canton of Fribourg in French Switzerland, on a lovely little hill near a stream.

The widespread connection of great rivers, lakes or seas with the landing of such capsules later conventionalized the fish-beings into dolphins (symbolizing their vehicles' power, as dolphins were believed to be able to draw boats and carry men in the sea), mermen and mermaids (Figs. 1*b*, *c*, *e*, *g*). Dolphins, as shown in Fig. 1*b*, where they hold her breasts, were sacred to the Great Mother Goddess, identified with both the sea and the moon as Berosus tells us, and who was also depicted as a feminine higher being clothed in fish-garb, with the fish-head helmet thrown back above her head*—the same headdress that was conventionalized as the white crown of Osiris (also depicted as a fish—the origin of the Christian use of a fish-form sacred to the Christ), which later became the *Mitra Melitensis* or the Papal Crown of modern times (see Figs. 3*a* and *c* from ancient Maltese coins). Thus the memory of the strange and wonderful cosmic visitants of the antediluvian Near East, and the wisdom they taught, is preserved indelibly in the very headdress of the present Chief Pontiff of the Western world.

The memory of "fiery divine chariots" reaches as far as China. Bernhard Karlgren in his *Early Chinese Mirror Inscriptions* translates an inscription (p. 29) reading:

> If you ascent the T'ai Shan [Mountain], you will see the divine men who eat the essence of jade and drink the limpid spring. They have attained the Way of Heaven. . . . They yoke the hornless dragon [power] to their chariot and mount the floating clouds.

And on a metal mirror from a tomb of the Chinese colony at Naknang, Korea (see Photograph 462, in *Geschichte der Koreanischen Kunst* by A. Eckhardt, Leipzig, 1929) there are

*Such a feminine form of visitant from the sea was venerated as the great goddess Atargatis, a sculptured head of whom was found in 1937 in Khirbet Tannur, Palestine, by the archaeologist Dr. Nelson Glueck.

the four archaic Korean characters *chón-sang-üi-su* meaning "Heaven(sky)-generates-necessary(vital)-water." This talisman, enshrining ancient belief, was to ensure immortal life to the deceased, and was clearly not a banal reference to rain, but to the same waters of life dispensed by the great sky and light gods Horus and Agni in other cultural settings.

From the lost Taoist book *Hua Hu Ching*—destroyed by Buddhist fanatics as Christian and Muslim fanatics destroyed other documents of earlier civilizations, and refound in part at the beginning of the present century in the caves of Tuen Huang in Kansu province through happiest chance by Aurel Stein and Paul Pelliot—we discover another fragment of the same tradition (the spirit of Lao-tse speaks; italics ours):

> Then, after more than four hundred and fifty years,
> *Mounted on the self-luminous vapors of Tao, I flew*
> To the Jade Kingdom of the Western Moon.

Lao-tse goes on to say that one of his avatars was Mani, the founder of Manichaeism, showing the deep kinship felt by Taoists themselves between Taoism and the doctrines taught by the Persian Mani, combining gnostic elements in Mazdeism, Christianity, and the Mystery-Religions of Egypt and the Near East—the point of all of which was the attainment of a god-like "body of light" possessed of extraordinary powers and independent of human food (cf. Berosus' previous account of the wise being Oannès who did not eat) and mortality.

The possibility of such a transformation of man is recorded in one of the old Chinese characters in the great early *Shuo Wen* dictionary and, though it has not hitherto been noticed, in the ancient Chinese text of the *Tao Teh Ching* (chapter 54, 25th character: *chen*) as well. The meaning of the character, derived through the component pictographs of its earliest form, is literally the transformation of a man into an immortal by the unified action in his consciousness of eight cosmic powers. The passage in Lao-tse where this character occurs correctly reads: "Who cultivates holy power (Té) in his mind and body will become immortal."

Man's Ancient Preceptors and Their Teachings

The purpose of these superior beings' various contacts with men, the records tell us, was that humanity was not only primitive but deprived, its members not knowing how to gain access to their own nascent godhood which, however, could be duly developed by proper instruction. Thus they could be brought into the same glorious and powerful state as their preceptors.

Today, the knowledge that was thus transmitted has mostly been lost. Like language, which must be taught to young children of each new generation by those who already know it in order that the children may learn to speak—*even though* they possess the physiological and mental capacity for speech—the higher and largely inaccessible abilities of man must also be periodically retaught to him for him to be able to develop and use them.

The greatest of all these abilities (which more than include the whole gamut of what we term parapsychological or yogic powers) was the capacity—this point is meant literally— to develop an *alternative* to the death process. We shall return to this issue. All current attempts to circumvent dying by mere prolongation of the functioning of our present easily destructible carbon-based bodies represent simply a puerile corruption of the much subtler and more thoroughgoing teaching of man's ancient perceptors.

The misuse of those teachings by too many men, bent then as now on personal power at others' expense* already anciently resulted in calamities, starting with the severence of the originally direct instruction and proceeding to consequent gradual corruption—save for some faint memories and a golden thread of men and women throughout history who were devoted to the preservation, restoration, and transmission of the

*Such misuse has on occasion been said to stem from too little collectivist government. That is a naive error: it is individuals who steer and run all groups. Power-seeking and consequent corruption may alter in form, but they never disappear from social groups, however "collective."

living doctrine. These people eschewed politics and publicity, knowing by their use of the laws of time that those able to preserve the tradition and keep that lamp lit would inevitably be drawn to them and what they taught. This was the chief reason they left books and records. For such records could bridge even discontinuities in the direct oral succession. Thus there were always those who could learn how to decipher the records and reconstitute the original teachings.*

Even before the final catastrophes—estimated at some dozen millennia ago—that destroyed the then centers of civilization, there were colonies formed both by the natural course of human exploration eastward (as far as the Indian and Pacific oceans) and, more importantly, by the bands of more highly developed leaders who had become increasingly dissatisfied with the corruption of motive around them, and who, at the culmination of this period, actually were told beforehand of the coming physical disaster and hence formed safely distant colonies.

Analyzing the extant records preserved to us, we find three main streams of colonists. Each was headed by a different class of the priesthood, each specializing in a particular branch of the sacred knowledge that had been imparted, though all shared a common heritage. Each priestly class gathered around itself those groups of people (usually hereditary clans) who were most interested or involved in that particular branch of the teaching.

The three principal branches of the priesthood were: the theologian-philosopher-physicians, the mathematicians and astrologer-astronomers, and the psychologist-yogis. Although each branch possessed knowledge of the other two, there was a definite emphasis and specialization within each.

The first group settled largely in Egypt, and the second in ancient Sumer, on the Persian gulf, with a subcolony on the Phoenician coast near Tyr. It has long been known that the most ancient names of rivers and cities (like Erec and Larsa for instance) in Mesopotamian Sumer were neither Sumerian nor

*These statements are based on empirical study.

Semitic, and analysis shows them to have strong affinity with proto-Celtic, which is close to archaic Egyptian, Berber, and Semitic, as will be mentioned again later. One example. The old god of Tyr, *Melkart*, does not, as often misstated, mean king (*melk*) of "the land" or "city"—the translation of the word *'aretz*—because in the most ancient inscriptions the last letter is clearly a "t" (*tau*) and not a "tz" (*tzadi*). Thus *Melkart* was King Art, and *Art* means in Old Irish "the good, noble or divine", and is the basis for the ancient proto-Celtic heroic name *Art*, still preserved in an altar niche as *Artehe* in the old church of Saint-Péd'Ardet in the French Pyrenees. The name *Artu* also appears in the ancient cuneiform Armenian inscriptions, Armenian being also an Indo-European language, near the border, like old Celtic, of the Hamitic-Semitic group.

That group left us among the remains of their knowledge the Sumero-Babylonian cuneiform records* of mathematical tables, including trigonometry, the Pythagorean theorem (centuries before Pythagoras), and tables of square and cube roots, along with a knowledge of astronomical cycles and careful observations of observed lunar, solar and planetary motions, together with their synchronization with earthly events such as weather, catastrophes, plagues and wars—a study that is re-emerging in twentieth century science, incidentally.

The third group of the ancient priesthood first settled in Medea, Iran, and formed the basis of the later Magian priesthood; but after internal differences over the form of burial and other matters, and as the memory of the ancient teachings began to fail and practice grew corrupt with animal sacrifices and other degenerations, a more purist group, though still retaining the corruption of animal sacrifices (which had also

*The Sumerians in ancient Iraq, like the Pelasgians in ancient Greece, seem to have been in part transmitters of a proto-Celtic culture to their successors—the Babylonian Semites and the Hellenic Greeks respectively. The fact that the most ancient Mesopotamian river and city names were not Sumerian or Semitic was confirmed by the well-known sumerologist Dr. Samuel Noah Kramer in a conversation at the University of Pennsylvania with Dr. C. Musès, who had arranged and edited the first publication of Kramer's *From the Tablets of Sumer*. It was Muses who later was able to make the proto-Celtic identifications of certain Sumerian and Semitic god and place names (for instance, p. 370, note 13, *Celticum XII: Actes du IV^e Congres International d'Etudes Gauloises Celtiques et Protoceltiques*; 1965).

thoroughly permeated all the other colonies), pushed on further eastward from Persia through Afghanistan and into northwest India, which they began to invade about 1500 B.C.. This was the aryan conquest of India

The purist group brought with them a meticulously memorized oral literature involving chants, ritual altar building, ceremonies and sacred plants—all designed to alter and raise the state of consciousness. Many of the chants are preserved in the Rig, Sama and Yajur Vedas, and the valuable ritual-performing instructions and explanations are preserved in the Śatapatha and other Brāhmaṇas.

This primordial knowledge carried into India by the eastward migration of this third group was centered (as was that of their Iranian offshoot enroute) on the various aspects of universal energy, the external prototypes of which were fire, sun, and the nightly sky radiances: moon, lightning and starlight. These three prototypes were allocated to the deities Agni, Surya and Mitra. The latter was often linked with Varuṇa (cognate with the Greek sky-god Uranus), but important passages of the preserved rituals tell us that Mitra was more powerful, and included Varuṇa. Mitra ruled the universal energy in its mysterious flight from our world back to its source in the world of joyous, immortal life, on the other side of the boundary of the sun (Surya), who ruled this world of dying and birth into a body that had to die. Agni governed the entrance of the energy into our ken, the uprush of divine fire, symbolized as a great and powerful bird of the falcon type. Mitra governed the flight of the Agni- or Fire-Bird back to its eternal home. Mitra governed the in-breath and the soma- or elixir-bestowing waning moon, as the old texts tell us.

As before mentioned in passing, there was the ceremony symbolizing the development of a higher immortal body and celebrated by a man and woman together to raise the level of their consciousness so that this process of higher growth might thereby be accelerated. The point was to stimulate certain centers in the brain which controlled that development.

We will briefly sketch the main point of the ceremony from the version given in the Śatapatha Brāhmana, to which all

passages cited in parentheses refer throughout the following description.

The most sacred time was the fortnight of the waning moon, during which celebrants gradually fasted from earthly food and increased their intake of soma. As it is said (XI, 1, 4, 4), "Agni the Giver bestows the Divine Soma [from the moon], King of foods" and (XI, 1, 5, 3), "At full moon they press the soma; and in the subsequent half-month [i.e. during the waning moon] he enters all fluids in plants and all animals feeding on them; then during the night of the new moon all the soma is collected [by the celebrants or their appointee-priests]." Further (XI, 1, 7, 4), "All the nights of the waning moon concentrate in the night of the new moon;" and elsewhere it is mentioned that Mitra (the moon waning, or returning to the Sun) is pre-eminent over Varuṇa, who is related to the waxing moon and mundane successes.

Agni as the divine falcon was also identified with the most sacred chant of 3x8 syllables, the Gāyatrī, and the ground on which the bird-shaped altar was made was called the *Vedi*, referring to the higher knowledge or awareness gained through the ceremony. Thus it is said (XI, 4, 1 16), "The Vedi is the Gāyatri. . . . That same golden, brilliant-winged Gāyatrī indeed bears the celebrant who knows it to the heavenly world." The hawk can also fly from heaven to earth: "Soma was in the heavens, and Gāyatrī, having become a bird, flew up and carried him back to earth" (XI, 7, 2, 8). Sacred speech, bestowing higher consciousness, was another power emanating from this divine bird and one would say of such chanting, beforehand in the morning, "Thou art a falcon formed of the Gāyatrī meter, I hold fast to thee. Bear me to bliss" (III, 3, 4, 3). The seven squares in the simplified form of the Agni altar (Fig. 4*c*) represented the seven parts of the Agni Bird: head, neck, trunk, roots of wings, the right wing, the left wing and the tail. In the Great Litany of the principal ceremony, the Gāyatrī form was expanded into three sets of 240 verses each, this latter number being sacred in both ancient Babylonia and Egypt as well, and having a relation to the cosmic power synchronized with the moon's phases (see Chapter 25).

A lotus leaf, symbolizing the germination of the higher body, is both placed beneath the altar before construction and on the altar after it is built (VII, 3, 2, 17). As we mentioned earlier in this chapter, the bird-shaped altar symbolized also the higher consciousness-energy which could form the immortal body of the celebrants, who in some cases mounted and bestrode it (VII, 3, 2, 17). (In later, more corrupted forms of the ceremony a horse, as the symbol of such a vehicle, was ceremonially mounted and then sacrificed.) Continuing with earliest and purest form of the ceremony, the celebrants, after being anointed with fragrant oils, mount upon a ladder oriented preferably from south to north (V, 2, 1, 5), leaned against the *yupa*, the sacred octagonal stake or post, which is seventeen cubits long and hollowed at the top to contain an ear of wheat. The text then continues (V, 2, 1, 10):

> Being about to ascend, the celebrant addresses his consort, saying,
> Come, let us ascend the sky!
> And she answers, Ascend we. . . .
> Without her he remains unregenerated.

As they ascend the man exclaims, "We have become children of the Divine." Verse 12 of the previous reference continues, "He then touches the wheaten top-piece saying, We have come to the light, O ye gods!" and the Black Yajur Veda adds, "We have become immortal!" Verses 14 through 22 conclude the ceremony:

> He then rises [on the ladder] by a head over the post, saying, We have become immortal—whereby he wins the world of the gods. Then, looking in the eight directions, he chants, Ours be your powers. They then throw up to him bundles of salt wrapped in fig leaves [signifying the divine power given to the celebrant from the fig tree]. Then he looks down to the earth saying, Homage be to Mother Earth. He then descends with his consort, stepping upon a gold plate to signify the attainment of immortality. They then bring a throne [to suit that attainment].

Thus did ancient kingship originate in the concept that only

those who had become regenerated from their mortal human condition were truly fit to rule. The doctrine of the divine right of kings—in the Orient, in ancient Rome and in Europe up to the eighteenth century—represents but the corrupted remains of a very ancient and inspiring ideal. We now return to the doctrine of immortality.

Mitra, as already noted, was the guardian of the moon-brewed nectar of immortality, the *amṛta* (literally "the deathless") or divine *soma* which had an earthly counterpart in the soma plant (the *homa* of the Magians, guarded by the great Bird, *Simurgh*).

The love of a developmentally matched couple—as the ritual just given so deeply implies—was an absolute necessity in the ancient Fire-Bird ritual. The old altar texts inform us that the man formed the power of the right wing, and the woman the left. They then climbed a sacred ladder, symbolizing their flight or translation into immortality. A 30-rung sacred ladder, related to the moon's phases (a 29½-day cycle) and carrying man to celestial realms, was also preserved in Egyptian doctrine, which the Hebrews transmuted to the angelic ladder of Jacob's vision.

But ancient and authentic religion of the Indo-Aryans was forgotten relatively soon, and in the later cults centered on Vishnu and Śiva, the great Fire-Bird of immortality having become lost in the relatively trivial magic of the bird Garuḍa, who was degraded into a mere servant of Vishṇu. It was also dimly preserved in the gloriole of sacred flames, the topmost or central flame depicting the face of Agni-Surya (see Figs. 5*d* and *e*). This wheel of fire stands behind most ritual images of Hindu divinities, but it later degenerated still more into the faceless and flameless aureole behind Buddhist images.

The three great divinities, Agni, Surya, and Mitra, became respectively Brāhma (whose cult vanished early), Vishṇu, and Śiva, although Mitra also appears in the vaishnavite divinity of Krishna ("the dark") who, patterned after Mitra, becomes the friend and immortalizer of man in the 18th book of the Bhagavad Gita, whereas in the 11th book Surya becomes a form of Krishṇa. Śiva ("the good") is also a later form of Mitra-Agni in their Rudra-Indra form. Thus did later Hinduism pre-empt its early glories and disguise them.

The great Bird had flown away from Hindu religion between the writings of the Śatapatha Brāhmaṇa and the Upanishads.

The first group of colonists (in Egypt), however, never forgot the original source of their piety, even though they may have lost some of the meditation and ritual techniques. To the very end the great radiant falcon figure of Horus, and the related doctrine of a glorious and individualized immortality dominated Egyptian civilization and irrevocably influenced Christianity, where the Mighty Phoenix-Falcon of Deliverance became the radiant Dove of the Pentecost (see Chapter 25, Figs. 1*h*, *i*, and *j*).

In historical fact, Christianity is simply a deeply Egyptianized form of messianic Judaism, itself already profoundly influenced by Egypt and Perso-Babylonian doctrine. Egypt never lost the radiant bird of divine power that could be evoked by man to conquer death and translate him to a realm of immortal life even before the dissolution of his body. Judaism preserved the ancient idea in the fiery chariot of Elijah, and the translation of Enoch by the power of the greatest archangel Metatron, a Judeo-Hellenistic form of Mitra-Mithra: the power of demanifestation from mortality, and hence salvation.

The Metamorphosis of Man

Let us return now to the main point that characterized the teaching of the earliest preceptors of man. That point must still be central in any doctrine of human nature that addresses itself to the whole of man and satisfies his highest dreams and most persistent desires. That central point, as the reader will recall, was the possibility of circumscribing the power of death either by a complete circumvention of it through a superbiological, metamorphic transmutation of man's present body, or by a slower process which reduced to a minimum the number of dyings and rebirths a given individual had to undergo before such transmutation was possible. In either case the point was the metamorphosis itself—symbolized, though inadequately, by the transformation in the most evolved Lepidopteran species

from the in essence one-dimensional and comparatively ugly caterpillar into a radiantly colored winged creature capable of free flight in three dimensions and feeding on the nectar of flowers (itself the symbol of the ambrosia or elixir that brought about and maintained the deathless body).

In terms of the ancient tradition as preserved in Egypt, the deity Osiris—signifying the possibilities inherent in every man—is wrapped as a bound pupa or divine embryo in the cocoon of his tomb, and emerges as the victorious and perfected Horus (symbolized as the powerfully winged Divine Falcon), the Lord of the Two Horizons (i.e. Master of Life and Death). As noted already, the offshoot of the third colony, the Indo-Iranian Aryans, after long wanderings, finally reached Persia and then India through the northwestern passes in ancient times, though far later than the first Egyptian colonies were founded. They brought with them, preserved by their priests, the same age-old tradition of man's latent godhood and immortality, which they symbolized, as we saw, by a higher kind of fire that appeared in our world as earthly fire (Agni), as lightning (Indra) and as the sun (Surya)—all regarded as forms of Agni. The still higher fire that transmuted both human consciousness and body, was called Mitra, in turn identified with Amrita, the guardian of divine light and immortality. A lower manifestation of Amrita was in the psychedelic juice of the plant, called Soma, also divinized. The name springs from the word roots for "well intentioned mind". However, the psychedelic plant was only for those who did not have the time or interest to cultivate the higher consciousness which alone could pursue the higher soma or amrita dispensed by Mitra.*

After the ancient Persians or Iranians split away from the ancient Hindus, they disagreed on almost everything and reviled each other's gods—all save Mitra, or Mithra. Even the great Ahuramazda was simply an *"asura"* or evil demon to the Hindus; and the Hindu *Devas*, the gods, were merely *devs* or "devils" to the Iranians. So went an ancient propaganda fight,

*We have already noted that Mitra was also associated with Varuṇa (=Uranus), who represented the entire power of the stars of heaven. The Varuṇa or Uranian component of Mitra is preserved in the starry cloak of Mitra's later form "Mithra."

which to those who knew the unifying doctrine must have seemed tragi-comic.

But a shared veneration for Mitra never failed on either of the warring sides. The most sacred book of the Hindus, the Rig Veda, venerates Mitra in exalted terms. In Iran homage to him had as its final blossom the widespread saviour-religion, Mithraism, whose most sacred day, December 25th, was adopted by official Christianity about 360 A.D. That Mitra(-Metatron) dispensed immortality also is quite evident from his repeated connection in the rabbinical commentaries with the translations of Enoch and Elijah. In Abar-ben-el's commentary on II Kings, ch. 2, he clearly tells us that Elijah (like Enoch in the translated or Metatron-like state) "has no need of food or drink or even air, for his body is transformed into a higher condition and has received a spiritual nature." Elijah, Enoch and Metatron-Mitra are thus deeply connected.

All this shows how well the deepest thinkers of Judaism had appreciated what the deepest thinkers of Egypt and Persia had transmitted: the doctrine of metamorphic immortalization of man.

The ageless traditions made their way, often heavily disguised, into Christianity. There were three main routes: (1) the esoteric Jewish communities that played so great a role in the transformation of early Christianity, as the Jewish Gnostic writings and, more recently discovered, the Dead Sea scrolls, have shown; (2) the ancient Egyptian gnostic tradition, still living on in the post-Alexandrian era and deeply affecting both hellenistic Judaism and early Christianity, to which we owe the Great Goddess figure of Mary, Queen of Heaven, and her Divine Child, historically reincarnating Isis and Horus the Babe, the resurrected Osiris; (3) the Indo-Iranian branch of the same tradition which poured into the Alexandrian-Roman world through Mithraism.

Many Mithraic teachings were assimilated into Christianity including not only December 25th as the Holy Birthday, but also—and this has not been noticed—the seven Mithraic initiations as the seven sacraments. Though many such remains have been destroyed, the crypt of the present St. Clement's Church

in Rome is a Mithraic temple. Indeed Christianity became the repository—often garbled and twisted by apologists practically out of recognition—of much in the original traditions that were first learned by men in North Africa and the Near East.

The relation of the seven classical Christian sacraments to the Mithraic degrees of initiation is so important to our theme as to deserve at least a brief resumé to make it clear. The relationships are most easily presented in the following listing, in which the sacraments are given in their traditional order, agreeing with the sequence of Mithraic initiations and with the ancient astronomical succession of the weekdays.

Initiations and Sacraments of Regeneration

1. a) Initiation: *Corax*, the Raven; b) Meaning: The dark or invisible bird of life awakened in the soul by the New Birth of spiritual regeneration (birth of Mithra); c) Sacrament: *Baptism;* Day: Sunday; d) Ruler: Sun.

2. a) *Cryphios*, the Veiled One; b) The stage of spiritual gestation or unconscious, plant-like growth into enlightenment, but with only a *veiled* or dim understanding of the process that is taking place; c) *Confirmation* (which even today requires a veil for female participants); d) Monday; e) Moon. (This initiation stage was also called *Nymph.*

3. a) *Milès,* the soldier; b) The knight-pilgrim treading doggedly onward toward his now quite conscious higher goal, despite obstacles and setbacks; c) *Penance*; d) Tuesday; e) Mars.

4. a) *Leo*, the Lion; b) The great fiery power of all-consuming Time, Change, or Death, girt with endlessly coiled serpent of (zodiacally) cyclic energy (see Figs. *5a* and *6a*). To most, this power is chancy, unexpected or destructive ("Ahrimanic" in Zoroastrian terms), but when properly

understood it becomes beneficent ("Mazdic"), transforming unwanted past impulses and habits and introducing desired "time-tracking" (Musès' term) or destiny-weighting toward conditions of self-fulfillment; c) *Extreme Unction*, this sacrament representing in external form the death to crass motives that takes place at this initiation stage. *Leo* is the twofold point of no return; either a physical or spiritual dying, after which there is in any case no possibility of being able to enjoy again an ordinary consciousness; d) Wednesday; e) Mercury, the bearer of the serpentine caduceus-power.

5. a) *Perses*—not simply "a Persian," but the Mage or Adept as well as the Dragon-Slayer: Perseus, who conquered the Gorgon or Medusa, the sight of whose horrible head paralyzed all who saw it into stone; Theseus who slew the Minotaur; the later St. George, and the type of all such heroes; b) This stage figures the Mage who not only can work with time but begins to stand above it, and hence above anything in himself that might obstruct his efforts—for he now has voluntary access to inspiration and divine power every moment. The first degree of mastery; c) *Holy Communion*, the outer ceremony only externalizing the previously described and actual living and always accessible communion; d) Thursday; e) Jupiter.

6. a) *Heliodromos*, Messenger of the Sun (of immortality); b) This stage is depicted in Mithra's inspirational meeting and pledge with Apollo. The higher body is now matured (but not yet freed) through the joining (yoga or yoking), welding or wedding—by the power of love—of the immortal with the mortal; c) *Matrimony*; d) Friday; e) Venus.

7. a) *Pater* or Father (Teacher); b) This stage denotes spiritual steadiness, the period after full awakening when the responsibility of teaching, and passing on to others what one has learned, is exercised—thus maintaining the golden thread of enlightenment and understanding that helps

redeem human history; c) *Holy Orders,* the sacrament of ordination of priests or spiritual teachers; d) Saturday; e) Saturn.

There are now two very important points, not altogether obvious, that should be dealt with before we close. The first is that, although a spiritually evolutionary sequence has been given, there is an underlying dynamic and organic reciprocation or interplay—it may be called inter-*containment*—between the foregoing seven initiations and sacraments which always maintains their living unity. By "inter-containment" we mean simply that each degree is ineluctably contained in every other—that in each there are sub-stages of conscious awakening (Sun), unconscious growth (Moon), comparative struggle (Mars), critical turning point (Mercury), etc., and finally an ability to teach (Saturn), within each of the seven initiations; and none is independent of the others in any separative sense. Even though each has its distinct individuality, all are symbiotic in the deep sense that has been indicated. Further, one may be experiencing, say, *Miles* on one level of one's nature, for instance, the emotional, while experiencing, say, *Leo* or *Cryphios* on the intellectual level.

The second point to be dealt with here is that—as the observant reader will see—the sequence is alternating or caducus-like in that all the odd-numbered initiation degrees must take place principally on *conscious* levels of awareness, whereas the even-numbered stages are generated primarily in the *unconscious*, working therein or emerging therefrom quite spontaneously without any conscious volitional direction of the subject or protagonist. We will now consider a possible culmination of these even-numbered initiations, all of which take place more or less volcanically, erupting in the depths of one's being or, to use the complementary image, coming like transforming lightning from transcendent levels of supra-conscious awareness. What follows may be described as the eighth degree, one of pure Grace, of which "no man knoweth the hour", indeed it need not happen at all, and hence is not placed in the sequence.

To the above seven, then, may be added an extraordinary and supernumerary initiation: *Aquila*, the Eagle, bearer of the divine lightning and related to a sacrament no earthly church could offer—that of actual translation, the freeing of the higher body even before the dissolution of the mortal body, thus circumventing death. This consummation was only for the few who had attained the special qualifications it demanded. Its domain lies beyond any day of the week, which is to say beyond sequential time as we know it. *Aquila* thus denotes a stage of transcendent freedom. That stage has one precondition however: the seventh degree must have been passed. The eighth stage thus represents the highest meaning of the great bird we have been discussing throughout this chapter, and corresponds to the translation of Mithra in the chariot of Apollo (Fig. 6*b*, top center)—another form of the anciently seen flying radiant vehicles (cf. Figs. 4*a, b, d, f, g*) mentioned in the second section of this chapter. This was a higher Apollo, for the *Sol Invictus*, the Unconquered Sun of the Mysteries, was not the ordinary sun that dies each day.

Modern Applications

Any psychology or religion that would attempt to ignore or neglect this greatest of human possibilities just discussed would have to be considered in the light of the preserved record as little better than cruel fraud, handing men stones when they hungered for bread. That such deceptions are becoming every day transparent is evident in the vast discontent now sweeping the world.

Men and women everywhere are beginning to realize that their external institutional leaders in almost every field do not have the answers to the questions that are most persistent and demanding, and always have been. There is a great thirst in this disillusioned latter twentieth century for real and direct answers. People are becoming more and more aware that most of the ersatz answers they have been given by their leaders have been mere word-shells leading to no solutions to the living

problems of man's nature, origin and evolutionary destiny—questions inseparable from the search for joy and happiness.

The satisfactions of mutual human-community helpfulness, which are held up today in all countries of whatever political persuasion as the highest level of happiness for man, are obviously inadequate to the intensity and sweep of men's inner needs and their own sense of their potential. To remain on the human-community level is to remain a social caterpillar, never metamorphosing—like those pathological butterfly larvae deprived of their transmuting hormones by modern experimental entomologists.

Man, the old teachings tell us, is a larval, not a final evolutionary form. That man is sufficient unto man and that no higher than the human social community is to be envisaged under penalty of "heresy," have been perhaps the greatest delusions of the twentieth century. Those delusions of anthropolatry are only now being recognized as such by the ever increasing numbers of disenchanted men and women, who are more and more demanding what the establishment, whether capitalist or socialist, is unable to give them because it is spiritually and philosophically bankrupt. That bankruptcy is brought about by the persistent denial, on the part of those who want power only for themselves, of anything beyond man. They as falsely deny the possibility of man to gain access to the ancient heritage of his transcendent evolutionary path, for such access would soon put the power-seekers out of business.

Chapter 25 will furnish a more detailed description of a method by which men everywhere can learn to accelerate their evolution and re-establish that too long lost contact with their own best selves, let alone representatives of higher evolutionary stages. Here we simply wish to clarify the nature of the discontent that is sweeping the world, and that will result in increasing social violence the longer men at large are denied the knowledge of their heritage.

Without argument, man is the most intelligent of all living creatures on the earth, and this has made him also the most powerful. The newborn human and gorilla baby have almost the same brain capacity, but within a year the human baby's brain has grown to about three times the size of the baby gorilla's.

Yet, along with this extraordinary evolutionary development that bestowed upon man the bodily tool—the human brain—to express his increasing intelligence, there was no comparable development in emotional maturity. Under stresses relatively small, the emotional reactions of the vast majority of men and even of animals far lower than the apes become largely the same.

This dangerous combination in man of highly evolved intelligence and comparatively unevolved patterns of emotion and desire is now headed toward an inevitable climax, as runaway technology and related population growth play ecological havoc with almost every living species, including man himself. The nature of the problem, as has just been indicated, is such that the gap between emotional and intellectual maturity cannot be bridged in time to stave off disaster, if we look to the human race as the highest source of leadership in the planetary crisis. To formulate ecological controls requires emotional maturity—freedom from greed and power-seeking—as well as intelligence. That is why the present ecological crisis is galloping ahead, with the human race standing practically helplessly watching it.

Man simply cannot gain, in time to match the speed of his technologically magnified destructive power, the necessary *emotional* evolution that the current ecological problem demands. Actually, it would be almost as sensible to expect an overpopulated herd of deer or a colony of ants to discipline themselves ecologically as to expect man to do so at his present stage.

For that reason, practically all of the present socio-ecological writing and concern, courageous and sensitive as much of it is, is beside the point. All the solutions hitherto offered rest upon the assumption that the human race and its leadership will suddenly advance to a stage of emotional maturity corresponding to their intelligence. That is simply not the case, as the entire record of past and contemporary history shows.

Just as the only species—man—that could dominate practically all the others on the planet had to be many times as intelligent as they, so the only hope for human government will be a level

of intelligent life more mature still. The ancient annals, as we have seen, endorse and confirm this conclusion, and furnish the additional information that at previous critical junctures in human history, stages of evolution so far beyond man that he called them "gods" did indeed beneficently intervene. The global crisis of the late 20th century shows all the signs of some extraordinary history repeating itself.

Returning to the old Indo-Europeans and the doctrines they carried with them to India, the *amṛta* elixir or the higher soma was likened both to a divine water of life and to a divine fire or transforming energy that could fly into a transcendent state like a giant falcon. One of the most amazing records left to us are those sacred books of previously oral instruction as to how to build, out of thousands of small bricks, the great falcon altar sacred to Agni and the higher Soma (and hence Mitra). After the decay of the Agni-Mitra worship in India by absorption into Vishnuism and Shaivism in deteriorated form, the same ancient teaching was still preserved in Egypt, nearer to its original source, in the form of Horus the great falcon divinity, bearer of the red or fiery crown (that of the serpent in Chapter 25, Fig. 1*a*), and who also dispensed the elixir of eternal life to thus beatified souls.

This most holy bird-form of Agni (Figs. 4*c* and *d*), the bird of power that transported men-becoming-gods, was deeply linked in the old Hindu-Aryan records to the phases of the moon, the most sacred phases being those between full and new, when men should fast because the divine *amṛta*, the nectar of immortality, begins to enter the earth and its creatures each month, culminating at the new-moon phase when it is all concentrated or absorbed by those who know how to reach it and who have the favor of Mitra, the Guardian-Dispenser of the *amṛta*, the power of deathlessness, to translate the word literally.

This same great personage appears emerging out of a central ring or space in the sacred Fire Bird in ancient Babylonian seals and temple reliefs (Figs. 4 *a* and *g*), being later adopted by the Assyrians and called by them "Ashur", from a Semitic root cosignificant with the Iranian root *asha*, "divine justice",

though to the Assyrians the epithet *ashur* carried also the meaning of "victory"—the central idea the Egyptian epithet "Horus the Victorious," preserved in later Egyptian gnostic and alchemical writings as *Nikotheos*,* literally "victorious god" in Greek, the identical epithet in Latin, "Deus Invictus," being found on Mithraic tombs and temples. That victory in the purest teachings was psychological and not military, recalling the best of alchemy. The earliest alchemy, which was in Egypt, is the purest, and its flavor—still preserved in the surviving writings of Zosimos—was that of a supra-bio-psychological transformation of man. That transformation had already been alluded to in the fragmentary records that had remained from the older, already destroyed center of civilization—fragments concerning the possibilities of accelerating the evolution of man into a more complete being with a new type of body—of substance superior to our present fragile flesh, possessing vastly superior powers of both mind and action, and no longer subject to the disease, aging or death that pervade bio-physical nature.

Brief Explanations of the Figures

All the figures in this chapter and chapter 25 have been chosen and arranged carefully so as to tell their story most easily and clearly. The discerning reader will be able to complete many more details (implied by the subjects and their grouping) than space could provide for explicit explanation on this occasion.

Fig. 1a. The sacred number 240 ($2 \times 100 + 8 \times 5$), as written hieroglyphically on the external surrounding wall (shown as the glyph on the extreme right) of the temple at Edfu, sacred to Horus, the falcon divinity of immortality. This number is linked in the inscriptions to the moon-divinity Thoth, and was also sacred to the Babylonians as denoting the total number of

*Mentioned also in Chapter 8 in the discussion of ineffability.

definable phases during any lunar half month (see E. Hinks, *Proceedings of the Irish Academy*, 1854). From Émile Chassinat's *Temple d'Edfou*, vol. 7 (Cairo, 1932), p. 11. Another form of the same number, now shown with the Moon and Wisdom god Thoth presiding over it, is inscribed on the internal face of the wall (Chassinat, v. 6, 1931, p. 7).

Fig. 1b. The great sea and moon goddess, sometimes called Atargatis, here showing the breasts of divine nourishment flanked by two dolphins. The goddess is crowned with the plants and fruits her power brings forth on earth. This form of the ancient goddess was preserved by a seventeenth century Parisian printer who used it as an end decoration.

Fig. 1c and *g*. Fifteenth century water marks preserving another form of the goddess and recalling also in feminine form the wise beings who came out of the sea in fish-like guise.

Fig. 1d and *h*. Seventeenth century water marks, both pertaining to the power of the moon to distill an elixir in the vase or urn of the human heart. In the first, the triangular array of 28 small circles represents the four weeks (in days) of the lunar month, and in the second the vase is surmounted by a lunar crescent and flowers. In both the handles are reminiscent of the two dolphins associated with the great Moon-Mother Goddess.

Fig. 1e. A Roman ring bearing a dolphin (sacred to Cupid, who often rode one) with the inscription "Thou hast a pledge of love." Esoterically, this pact or pledge referred to the spiritual responsibility of attaining the new awareness of inner regeneration. The dolphin (often made dragon-like) recalls the Moon Power (cf. Fig. 1*b*).

Fig. 1f. A Near-Eastern seal showing two fish-men surmounting a lunar lotus, sacred both to the Hindu Agni-falcon and to the Egyptian Horus-falcon, a stylized image of which stands above the two figures, with a lotus (a lunar symbol—cf. Fig. *j*) and an *ankh* or symbol of eternal life on the right. From an engraved cone of grey chalcedony in the nineteenth century collections of the Bibliothèque Royale, Paris and reproduced as

Plate XVII (2*b*) in Félix Lajard's *Culte et Mystères de Mithra*, Paris, 1847.

Fig. 1i. From a bas-relief in the temple of Isis at Denderah, Egypt (cf. Plate CXLIV, v. 2, of Emile Chassinat's *Temple de Dendara*, Cairo, 1934). Horus in falcon form looks toward the luminous serpentine ray of power springing from the sacred lotus floating on its leaf-boat. To the right is a curious figure of the same type of lotus now on a long stem and at the base of what is curiously reminiscent of an electric bulb, the radiant serpent being the filament. The symbol of absolute steadfastness, again curiously reminiscent of electrical insulators at the top of a pole, supported the "bulb" with human arms, while a god (probably Bes or Horus-the-Old) holds its base and a human worshipper kneels adoringly below.

Fig. 1j. The lunar deity is shown in this Near Eastern seal (from Goodyear's *Grammar of the Lotus*) seated in his crescent-boat above a lotus, extending his arm and blessing to a devotee, while an 8-pointed star shines between them.

Fig. 1k, m, o, from Lajard, plates XVII(3), inscribed agate; LXII(7), stela of grey granite; XVII(1), greenish chalcedony. All are Near Eastern images showing clearly a man clothed in the skin of a fish, which in *m* is stylized down to merely the head (becomes a mitre—a word derived from Mitra-Mithra) and spine.

Fig. 1n. A later corrupted version of the same deific figure above described—here called Dagon, preserved in a seventeenth century book (Jacob Gaffarelli's *Curiosités Inouyes*, Latin translation, 1676) some two hundred years before any excavations in the Near East, thus showing how the ancient tradition had survived.

Fig. 1l. Another Near Eastern seal (Lajard, XVII, 2*a*) showing the griffon or falcon-like flying form of the deity in *k* and *o*.

Fig. 2a. Figure of the Egyptian sky-goddess Nut breathing out the sun as her living word (*logos*), in the form of the divine winged disc (cf. Fig. 4) of the falcon divinity Horus, symbol of

the mortal condition (Osiris) being re-born into immortal life. From the Carlsberg Papyrus No. 1.

Fig. 2b. The ship Argo as a sea dragon, surmounted by the ram of the golden fleece (the divine "robe" or radiant immortal body) delivering up Jason—leader of the Argonauts—to Athena, Mistress of eternal life. Lightning-like power (as serpents) courses along the fringe of her robe, and on her helmet is the griffon (cf. Fig. 3*e*), symbol of the strength of the great bird-like power of transhumanization, to use the apt term coined by the genius of Dante (*trasumanar: Paradiso*, Canto 1) some seven centuries ago. On her breast is the Ahrimanic Gorgon (cf. Fig. 5*a*) whom she helped Perseus to vanquish. Design from a red-painted ancient Greek vase now at the Museo Gregoriano, Rome.

Fig. 2c. The Twin Lion powers (cf. Fig. 6*l*) that guard the Mountain Gate leading to the immortal life (the Ankh) of the transcendent sun. Recurrent Egyptian motif.

Fig. 2d. A symbolic Hellenistic ring showing Isis, the resurrector of the slain Osiris (shown as Serapis = Osiris-Apis in the tail of the serpent) presiding over deliverance out of the maw of the time-serpent (cf. Fig. 2*b* of Jason, whence Jonah was a later borrowing, incidentally) into an immortal state.

Fig. 3a and *c.* The god Osiris respectively in winged (Horus-like) and fish form (coming out of the fish's mouth—cf. Fig. 2*b*). In both cases he wears the stylized fish headdress (cf. Figs. 1*k* and *o*), the *Mitra Melitensis*, which later was adopted by the Roman Church for cardinals and popes. From two ancient Maltese coins, reproduced in A.A. Caruana's *Report on Phoenician and Roman Antiquities on Malta and Gozo*, Malta, 1882, a rare volume in the library of Dr. C. Musès.

Fig. 3b. On the left, Thoth, Regent of the Moon and restorer of his eye or divine power to Horus (on right). Both pour the sacred water of eternal life (staff + ankh glyphs) over the head of the deceased, whose transcending of mortality is symbolized by the flying disc (cf. Figs. 4*e* and *f*) above his head. From the tomb of Rameses VII (XXth Dynasty).

Fig. 3d. Same as *e*, with human head. From a sketch of Austen Layard at Nimrud. From Lajard, plate LIV-C, 10.

Fig. 3e. The Assyrian form of Horus-Agni, with raptor head and human form. A fish-lotus amulet around his neck, the divinity holds the sacred wallet, containing herbs of life-restoration, in his left hand; and in his right, a pine cone, symbolizing the seed in each human being of his or her immortal body.

In Lajard's *Mithra*, plate CIV(2), is depicted a precious fragment from a bas-relief in sandstone, found in 1826 in the ruins of a Mithraic temple at Heddernheim, Germany, and then removed to the collections of the ducal library at Wiesbaden. The subject depicted is Mithra being born out of a pine cone, thus affording the explanation of the cone so repeatedly seen in the Assyrian Horus' right hand. The figure of the griffon-divinity is from a bas-relief at Nimrud, not far from the site of Nineveh (plate 32 of Austen Henry Layard's *Monuments of Nineveh*, London, 1853).

Fig. 3f. A scaled form, with fish headdress and bird's legs, relating the fish forms (Figs. 1*c*, *f*, *g*, *k*, *m*, *n*, *o*, and 2*c*) to the winged forms (Figs. 1*l* and 2*a*, *d*, *e* and *g*). From Gaffarelli's seventeenth century work cited above.

Fig. 3g. The flying serpent as a divinity, holding the symbols of Life (the ankh) or power to be and Breath or power to do (the full-blown sail); from the Mysterious Corridor of the Temple of Isis at Denderah (Chassinat, vol. II, Fig. 3, p. 27).

Fig. 4. All the component designs in this figure show the Winged Power. Some are more stylized, some more explicit depictions. They also demonstrate the intricate connections of this doctrine that extend between ancient India (*c* and *d*) and the ancient Near East (all the other sub-figures). In addition, sub-figure *b*, effaced on top, shows a human form in fish garb, carrying the sacred wallet and standing in front of the moon-and-lotus symbol. Identifications are as follows: *a*, from F. Lajard, pl. LIV-C(3), drawn by A. Layard at Nimrud; *b*, stylized form of the same divine power, from p. 244 of Bk. III,

The History of Paganism in Caledonia, by Thomas A. Wise, M.D., London, 1884 (no source is given, but sub-figure *a* is clearly Assyro-Perso-Babylonian—cf. the winged ring or disc of Figs. 4*b* and *i*, from Lajard, pl. XVII,5, and LXI,6); *c* and *d* are from Apastamba's *Sulvasutra* on sacred altar-building, the first being the square falcon altar of čatur-śyena-čit and the second, the curved wing falcon form or vakra-paksha-śyena-čit; *e* and *f* show two more variants, Egyptian and Chaldeo-Iranian (or Perso-Babylonian) respectively, from Wise (*ibid.*) and Lajard (II,3) respectively; *g*, *h*, and *i* are from Lajard III(1), XVII(5), and LXI(6), respectively from a bas-relief at Bi-Sytun, Persia, a cylinder seal of light blue chalcedony formerly at the Bibliothèque Royale in Paris, and a Near Eastern incised stone cylinder seal in the former collection of C. James Rich.

Fig. 5. Sub-figure *a* of Mithraic origin is an explicit form of the almost world-widespread figure of the flaming face with protruding (fiery) tongue, which in subdued form becomes the Gorgon's head we saw on Athene's breast-plate in Fig. 2*b*. This fierce figure has other variants (cf. Fig. 6*a*), as the faces in Fig. 5*d* and of the largest cobra in 5*e* show. The personification represents the mighty power of Time and Change, burning all mortal and finite things away. When rightly harnessed, this fiery power may be utilized as the uplifting Agni by various forms of meditation (Figs. 5*b*, *c*). Figure 5*a* is from a bas-relief in white marble found at a Mithraic temple in Rome and formerly in the gardens of the Palazzo Colonna; *b* and *c* are from an esoteric yoga text of Tamil origin in the library of Dr. C. Musès. In *b* the kundalini or serpent power that can intensify and uplift consciousness is depicted as the fire of Agni coursing along the central nervous system; and in *c* the yogi, seated on earth, becomes the secret cosmic form of Ganapati, literally, "Leader of the Host," i.e., of the stars and all manifest things—a later form of the Vedic Varuna—i.e. Ganeśa, whose eyes are sun and moon, like the eyes of Horus in Ancient Egypt. In this form the yogi may fly throughout the universe, the "trunk" of Ganeśa being depicted as inside the yogi—an integral part of the fiery Winged Power he is evoking.

Fig. 6a. The terrifying form of all-embracing time (note the four cardinal signs of the zodiacal band depicted to clinch the identification), combining both lion and serpent forms. We have an old staff of Magian affiliation, found in Salamanca, Spain, the handle of which is a Mage's face and head, out of which a great lion and a serpent power emerge. This (cf. Fig. 5, explanation) is indeed the "Colossus that bestrides the world." The coiling or cyclical serpent has a special affiliation with the moon; and the flaming lion power, with the sun, whose transcendental aspect holds the keys to freedom, the guide to that sun being the moon and the power synchronized with its position and phases.

Fig. 6b. A late Mithraic temple relief in sandstone found at Heddernheim (see Fig. 3*e*). Note the zodiacal constellations symbolized in the band above the central figure of Mithra slaying the bull (the legend of Theseus, the Minotaur-slayer and the mystique surrounding the Spanish matador and the entire *corrida* are all from the same root, which was originally a doctrine of man's *self*-conquest, later crudely, and scapegoat-ishly externalized). The flying cape of Mithra in some depictions has the constellations on it, and represents the night-sky. The Phryigian (ichthyform) cap of invisibility—the later *Tarnhelm*—attests to the same origin: Mithra ruled the light in the darkness and the mysterious vanishing of light on a lower level, only to be translated to a higher.

PEGASUS

V

Prologue

Serge Lang is one of the creative mathematicians of our times, who therefore knows that beauty and art are integral to his calling. He speaks for the essential poetry in all creative acts in the following deliciously trenchant passage from a personal letter of November 1966 to one of his reviewers, also a professional mathematician:

> When you write of any book that it is "obviously meant to be understood", whether as a compliment for one book or blame for another, you are still missing the point: I never meant Diophantine Geometry to be understood specifically by you, or anyone who did not have the rather vast background required for its reading. All my books are meant to be understood by readers having the prerequisites for the level at which the books are written. These prerequisites vary from book to book, depending on the subject matter, my mood, and other aesthetic feelings which I have at the moment of writing. When I write a standard text in Algebra, I attempt something very different from writing a book which for the first time gives a systematic point of view on the relations of diophantine equations and the advanced contexts of algebraic geometry. The purpose of the latter *is* to jazz things up as much as possible. The purpose of the former is to educate someone in the first steps which might eventually culminate in his knowing the jazz too, if his tastes allow him that path. And if his tastes don't, then my blessings to him also. This is known as aesthetic tolerance. But just as a composer of music (be it Bach or the Beatles), I have to take my responsibility as to what *I* consider to be beautiful, and write my books accordingly, not just with the intent of pleasing one segment of the population. Let pleasure then fall where it may.
>
> With best regards,
>
> Serge Lang

With appropriately interesting numerical sequence and Diophantine rapport Dr. Lang's gem appeared on page 1234 of *Bulletin* number 729 (the cube of 9) of The American Mathematical Society, where it should not, however, lie buried.

C.M.

Introduction:
Poetry as Evocation

One night, just back from ordinarily forbidden territory in Sikkim outside of Gangtok, a traveller huddled about a fireplace in a little hotel room in Darjeeling, at the foot of the Himalayas, listening to Rashid, a Kashmirir friend, reciting Urdu poetry as lovely as it was too little known in the West. I can still see Rashid's little woolen cap, so incongruously perched over the stream of musical sounds as he spoke the lines of a ghazal that has never wholly left me since:

Ye shaṁ ye seber, ye lala wa gul
Ye chaṅd sitaré, shaïd heṅ
Mêkhun ke asum rota huṅ
Jeb yat tumaria dié

which we translated to run

This night, this dawn,
The lala-flower and rose,
This moon, these stars bear witness:
My eyes shed tears of blood,
I am remembering . . .

The lala-flower, with its red petals and black center, is said by Urdu poets "to have darkness in its heart"—it is sad because it has not found its beloved. We spoke that night of how well those lines, quite aside from their personal feeling, would describe a Kashmiri of today who loved and yearned over his country now seeking its freedom amid sad modern days, with only memories of its lovely past, and trembling hopes for a still uncertain future, with tyranny already advancing on its north-eastern borders, toward Ladakh. It is a situation depicted in another Urdu stanza that Rashid spoke on that cold March night in Darjeeling:

Na karwan hé, na manzil
Na rehebar ka patā
Teri ta lobné kahan
Muchko laké charda.

No caravan, no destination,
No leader; where are they?
Searching to see your face, I have struggled.
I have forgotten everything.

And we thought that thus also might then leaderless Kashmir address its long-sought, beloved Freedom. As the Urdu poet Mirza Galib asks: *What is life; It is flame or dew; sometimes burning, sometimes crying. That is life.*

It was very clear that early spring in Darjeeling beneath the floating form of haunting Kanchenjunga—perhaps clearer than it could be at some more earthly altitude—that the spirit of poetry leaps far beyond race, clime or time, beyond even words; that poetry is a way of regarding life—perhaps the truest way. At least so poets have always felt, and felt it as wisdom.

All who seek to see life from the center out rather than from on the outside are poets, whether they write down what they see or not. The outside seen from without is prose; seen from within, it becomes poetry. But those who write what the poetry in them has seen enable others, through the re-sounding of the word, to awaken the living spirit in them too, and so fan an alchemical glame—that transmutation in the recipient that is the heart of poetry: the re-evocation of the original seeing of the seer. Every poem is a mantram, involving both emotion and insight in its sound. Yet the insight must be charioted by the feeling; otherwise prose intrudes, and we have only the ashes of a fire.

But a burning fire may throw light on a distant place. And it is the poets of an age who have ever been its prophets, unbeknownst to themselves or not. The two are felicitously combined. When not conscious prophets, the poets have captured and fixed the mercurial image of their times in the magic mirror of evocative words. Though it never so often be

prostituted to the soiled uses of propaganda or premeditated pretense, the evocation of original purity of feeling or mood-drenched thought is the genuine office of poetry.

The prophecy of Lalishri* that follows is one example of the powerful light showing the distant place centuries ahead.

Dark and darker shall days coming be . . .
What shall ye do then that seek the light?
In those evil times will nature bow
To them that walk in wrongful ways,
Heedless ever that the Day Sublime
Cometh when the wicked looketh not—
When the apple of the autumn time
Ripens with the summer apricot.**

—from the Word of Lalishri the Prophetess, 14th Century, Kashmir

Another example comes from eleventh century Persia:

The mists of grief have visited the world . . .
The autumn wind shall clothe the sun in dusk clouds
Like a dusty vase of ancient gold.

Already the sun from zenith heights has fallen
Running to the low pool of the sea
To wash from his face the black dust of men.

It is perhaps the
Moment
When great Time itself
Shall open its whale-black maw
And swallow
All the ages.

Only Nahid's lovely glow shines certainty
Upon the black visage of the sky of doubt . . .
At last appears the
Light of the Galactic Way
White milk poured on an azure tablet.

*From the rendition of Sir Richard Temple (Cambridge, 1924).

**That is, a time of almost cataclysmic climatic change.

Now
The hosts of heaven are arming with light
While the despairing armies of the earth
Beshroud themselves in pitch.

So runs our English version* of some of the ghazals of Nasr-u-Khosrov of medieval Iran, who is still sung and honored in the Near East—fitting companions for the kindred words of Lalishri. Prophecy and poetry do more together than merely start with *p* and end with *y*.

One of the most shockingly unperceptive remarks ever to be made—and by a poetry publisher at that—was that a poem had been rejected because it was "too short" (it was, as we recall, composed of four telling lines of two steps each). That remark can be matched by the reviewer who disparaged a book of philosophy on the grounds that it was not long enough! Both these pronunicamentos were actually perpetrated—one in spoken words and one in ink.

It is a basic fallacy ever even to imagine that the degree of either beauty or truth in an idea could be measured by an *amount* of words involved in its expression. Put thus simply the absurdity of the error is evident; but it is an error that all fanatical collectivism or gross quantification fails to see and has no wish to know.

And that fanaticism to de-individualize, de-humanize and mechanize—seen against two contrary backgrounds in the U.S.A. and the U.S.S.R.—is today a poison of the world. There is luckily a growing reaction against it in both countries. Yet still those of us who would survive as human beings must deal with de-individualization of this sort. "To deal" with such a situation, wherever it is found, means to oppose by speaking out one's mind without recanting and without any misguided respect—so easily quislingized—for tyranny wherever found, however highly placed. Poets have realized that such indeed must be "the ultimate weapon" if we are to continue as the human race.

*With acknowledgements to the literal translation of Signor Alessandro Bausani (*East and West*, N.S. v. 9, no. 3). The prophecy speaks of an unprecedented time of global war and despair, culminating in an unexpected and beneficent intervention.

True poets have one thing in common: the gift of a living poetry. There are several ways to deploy a rich expressive artistry in any field. One may harness that talent to willfully unreasoning skepticism, to false-reasoning sophistry, to deliberate confusion instead of clarification—in short, to dishonesty or to honesty. It is no secret that the twentieth century arts have been endangered by intellectual dishonesty of these various sorts, and are just perhaps beginning to recover artistic honesty; and that it might even become fashionable to do so!

But independent of superficial fashions, there has always existed an essential line of artists down the ages. The most gifted of these have been the great creative artists of humanity as distinct from the simply very proficient, whether well known or unknown to the world at large in either case. The poets represented in the following chapter—some well known and some not—share this much; they are using talent in an inspired search for the meaning of life, and not prostituting it to propaganda or preciousness.

To our troubled century the poetry of a former time—such, for instance, as we have quoted from old Persia and Kashmir—must none too seldom perform rites of Endor for our Saulish suffering hearts—so often forced by our own trim and tragic systems to disown their very joy and humanity before the juggernaut of contemporary totalitarian trends. Then, often with the fear-struck eyes of Saul, we behold the ancient authenticity.

For the poet represents man's very essence of humanity: his feeling—his individual feeling and expression of it. The invisible insanity of our time is the psychological mechanization of man. The poet is sanity here, as well as song.

One of the prospects of these binary-coded days is what one might call a Probability Robot. It has not yet been built, and only now named; but it is implicit in everything that has been done, as is the Minotaur at the wrong end of Ariadne's labyrinthal thread. All that follows lies within the reach of an already achieved technological development.

Imagine if you will a multi-machine of amazing alloys, plastics, artificial rubber and other synthetics molded into

human anatomical form and capable of all the major motions of the human frame, including a complete semblance of speech-production. Imagine also that the rubberized visage of this modern homunculus is capable of internally controlled facial expressions, running through a fairly complete actor's repertory and coordinated with appropriate sequences of gestures.

Finally, realize that this masked machine can run its vocabulary of reactions and expression through a rhythmically variable set of interwoven probability cycles imitating free will, say correlated with the planets' motions from Mercury through Pluto. Such a set would not repeat itself for at least some seven hundred thousand years. It would thus afford any given human historical span a never-repeating succession of life-like moods, reaction, speech and motions. The finesse of the human simulation would be limited only by the care and complexity of construction.

What then would differentiate a human being from such a palpable monstrosity? *Nothing* is the sad answer, if our human being has been repeatedly electroded into a mass of safely predictable behavior patterns and habit responses. Where then is the defense against the Probability Robot's obscene caricature? Again the answer is not far away; in a welfare state and a totalitarian world there is *no* defense against such a final degenerate degradation of mankind. And more than many of us in the twentieth century world already have the Probability Robot breathing hard on our napes, saying, Wait for me; I'll soon be by your side, and then as soon again ahead.

But at this very point you must realize also that the one single, fundamental cause of human behavior that cannot be robotized is—the feelings themselves, which are the wells of all our actions. For behave as nicely and as minutely cadenced as it may—prancing so easily over foolish men's misplaced pride, the Probability Robot can never, never *feel*—despite the patent and self-serving delusions of some MIT and other machine-idolators. These unperceptively forget who creates which; that it is men who fabricate machines and not the other way around.

Mechanolatry, however, is a misguided but crude attempt toward the representation of an evolutionarily higher body for

man—one that would commandeer great and precisely controllable powers like the machine, but without bulk and with all the "buttons" on the inside. In this sense the sophisticated technology of the twentieth century is like a lower brute's groping for higher evolutionary expression, not yet having his vague dream realized in his own body.

These facts explain the strong, almost primitive urge toward the development of more powerful and penetrating machines, even regardless of what they do to the environment and to man's physical and psychic well-being. The power of the urge is evolutionary, and cannot be stopped. But it needs a radically new direction. The age of viable *externalized* technology came to an end with the 1960s. In a dangerous sense, therefore, the machine-idolators are behind the times and inhibiting the progress of the race.

Lack of feeling is the zero in the Robot that, multiplying all its millionfold numbers of parts, function spaces, and electronic delicacies—renders them all zero as well. Actually, there is not a single *essential* difference between the most advanced conceivable Probability Robot and a typewriter. The one is a simple tool, and the other a complicated one—that is all. All machine construction is inbuilt instruction. And the imitation of behavior is not aware behavior.

Thus are we left with feelings and their insightful expression as the very essence of mankind; for without feeling, man's primal characteristic—insight—also cannot emerge. We have turned full circle, come back to insight born of living feeling—come back to the poet. In this very real sense every discoverer in his moments of deepest insight was not only a mathematician, physicist or naturalist, but a poet as well, a seer.

There is not at all such a gap between the Gausses and the Goethes as we may be led to believe. Mathematics is extremely close to poetry in its imagination and conception; and the higher either mathematics or poetry reaches, the more they approach each other. When all is said and done it is only the cardboard walls of our ignorance that separate the nature of poetry, mathematics, religion, and philosophy, hiding the high summit holding all of them in one. And for that matter we may

add biology, psychology, atomic physics and astronomy, and still say true. The cardboard walls must come down.

But this in itself is a foreboding for those who play their lives out in paper boxes. Yet to see an end to insubstantiality is not visionary. On the contrary, to see it as substantial and abiding would be visionary. Lalishri is not apocalyptic; nor is any other of the seers. For what they tell us is no longer the vision, but the terrible (or wonderful) *fact.* Terrible, but wonderful that the fact is finally here! Wonderful that the crucial glory of our participating moments in world history can not any longer be hid even beneath the tawdriest of morning newspapers or the most tiresome brutalities. For something is in the wind. And every one of us silently senses that the wind may be a cyclone. So the seers come to claim their inheritance from the age that once in arrogance disowned them.

Poetry is
    not cerebral
    but of epic bone
    and lyric blood—
Tongue of clear
    seeing beyond
    contrivance or
    myopic ugliness . . .

Beyond the trite
    or cerebral
    of poetasters
Poetry is.

And the poet is the magician who, exorcising the blindness and the wounds by his mantras, evokes a new vision of Man.

C.M.

The Reader Enters the Poetic Experience

24

Music and poetry—with which must be considered chanting, singing and the dance—are the most powerful consciousness-altering arts, and would be their own excuse for entering into any serious consideration of states of consciousness. Of all these arts, poetry lends itself best to book form, and its ancient bardic roots support choosing it to represent this entire group of what may be called the noetic arts.

Poems worthy of the name alter states of consciousness, and this chapter thus depends more on the happening than on the wording. It is a happy happening for those who enjoy the essence of poetry, which is non-cerebral (an important phase of the *whole* man to whom this book is dedicated). Good poetry is multidimensional in context and meaning, without ever descending into the banality of confusion.

At the end of each group of poems the name of the poet appears—in parentheses; for the poem's the thing rather than the poet here, the poem not merely printed and seen but sounded and spoken. . . *C.M.*

from NIGHT SONG FOR THE SLEEPLESS

Last night I had a dream.
I stood amid the ruins of a church.
The grass was dry. I thought—
If only rain—! The sky
went black. I heard a fearful sound,
but whether storm, or locust,
or black dust, I cannot say.
The rest is blurred, but I remember this
I woke with rapture racing in my veins.

When will it come,
the all-obliterating rain,
sweep this venom from the air
so we can breathe again!

from THUNDERSTORM

1

A thermal incident, no more. Occlusion
In the classic style. A High and Low
With all the isobars in proper place.
"Out of the chamber of the south cometh
The storm. And cold out of the north . . .
The breath of God," Elihu said. We know

It's atmospheric pressure. A given number
On the Beaufort Scale and counter-clockwise
In accordance with Buys Ballot's law.
A vortex system moving at some thirty
Miles per hour. "God thundereth marvelously,"
But the voice we hear is not the Voice
Out of the Whirlwind. We are rational men.

For metaphor let this suffice: Two giant
Actors on a thousand-mile-wide stage,
An awesome drama of the atmosphere,
Or vaulting Tropic versus crouching Polar
Wrestling in titanic conflict. Still
An ephemeral Depression, nothing more.

2

But here, my hearties, is no schoolroom text,
No blackboard navigation. Here the arc
That leaps between the positive and the negative
Is no equation. Here the isobars
Constrict the heart and all the arrows point
To where the nerve-ends meet. Here every sense
Is false. The ear is deaf, the eye is blind.
A spark of primitive fear ignites the brain
With demon thunder and black rain. . .

3

Here in the awful vortex of the storm
The sound of rain is like the voice of doom.
I gaze into the Void, my senses reel,
I am a creature bound upon the Wheel,
Blind, unborn, and weeping in the womb.

All means are ladders to be cast aside
Before the final leap. "Life is a bridge,
Build no house on it; a journey, take it
And walk on." The ways are many but
The goal is one, and at the final hour
We walk alone. Storm music of the wind:
Along these wings the voice of all the burdened
Of the earth is in the wind tonight.
The fuel burns low and still no beacon light.

from RAINBOW AT MIDNIGHT

If a great wind should come
Cold from the hills
Swift, with a cavalcade of clouds
Clean, with a promise of white trumpets
Strong—
If a great wind should come
Cold . . . swift . . . clean . . . strong

Chorus of Postulants

Rededicate our lives, restore
The sense of wonder; men made brothers
Not in name alone, but deeper,
In the ritual ring. Fresh sacraments,
New meanings valid for our time,
A world reborn, a new hierogamy.

There shall be wings that soar above the storm
In that supernal calm where simple men
Imagined heaven once. There is no turning back.
The course is set. We must go through. . . .

Chorus of Initiates

So let it be a rainbow of the night
The spectrum whole but in a minor key
The perfect circle never seen by day
And at its center, white, the sign
Of things to be.

That when the fire goes low
We be not smitten blind whose eyes
Have seen a splendor of imagined noon,
But patient as the night, we with some few
To keep it burning in some quiet place
Breathe on these embers, till the span
Of night is run, and a new sun ignite
To send it in another twisting spiral up
The slow circuitous ascent of man.

Chorus of Postulants

By what science then and on what paper graphed
Upon what curve of night descending shall we find
Not darkened lands but cities fabulous with light!

(Lawrence Lipton)

The Vietnamese Buddhists, by the peaceful and compassionate tenets of their religion, are more or less tragically caught between the Mainland-Chinese-dominated North and the Western-dominated South. The finest poetry of modern Vietnam has come from the Buddhists, and principally from their leader in exile, Vô Vân Aï, who is based in Paris though he has travelled and lectured also in the United States. Brief and poignant extracts from his revealing letter and poems follow. Although translated from his French by Teo Savory, the poems were originally written in Vietnamese.*

*This chapter called for inclusion of the more poetic rather than the more propagandist or polemic material. Even the Vietnamese Buddhists (not in the material quoted here) seem to be more resentful of the West than the East. This is only natural. At a conference in Europe in recent years we frankly asked a Vietnamese participant whether he felt Vietnam would prefer domination by China,

(continued on next page)

from OUR STEPS

The tempest rises
in the sky of Vietnam
soon it will blow over the world . . .

Our steps are the dawn's seeds
sown on the road of night
from north to south
from east to west

For arms we substitute our hearts
to build a newer world

from WE TWO FORM A MULTITUDE

The orbits of eyes are dwellings
melting in tears of fire
no roofs for the living
no earth for the dead

Fly away into the sky of my soul

Let us find our repose there
in the trees of my forest
the peace of my wandering pathways
there your sadness will be consoled
your solitude understood

I cover you with the perfume of petals and amber
a sun goes with you . . .

of kindred race, rather than by occidentals, since it was clear that world power-politics would not allow such a small and strategically placed country to remain free. He agreed with the prognosis, but without much hesitation said he felt almost certain that the people of his country would prefer to be ruled—if it should come to that—by their historical overlords, the Chinese, rather than by any non-Oriental race. Evidently blood is thicker than ideology, and the course of Asia seems to be determining itself along racial lines, which points to future Sino-Russian conflict. However, some Vietnamese Buddhists have voiced sentiments and thoughts beyond racial or ideological strife, and they are expressed with the evocatory power and upliftment of genuine poetry.

My hands give strength to your hands
Rest on this new ground
your hair calls to the seasons
to ripen our Being
we are brushed by the breath of love
I feel myself grown
transformed . . .

We carve the stone
which comes to life
to save us from madness . . .

Be sky and be earth
be forest be song
be wheat and be rice
man among men
renouncing destruction

FROM A LETTER

I was suffering the most because of the war in Vietnam when I saw that the whole world was concerned in a conceptual way with the problem of war and peace but without seeing the ultimate, human reality. Often in my conferences in Europe I found only extremists, whether they were for the war or against it. They see the problem only in facile terms of black and white. . . .

The war in Vietnam is the war of the technical era, the crisis of a civilization built on resentment and violence. It is not man who is being fought for.* In Vietnam man (the human-being-in-suffering) is

*The architect Albert Speer, one of the more philosophic minds to emerge out of the horror of the last World War, was one of the first to see the inbuilt weakness of 20th century civilization, writing in his memoirs (p. 354, published by Macmillan, 1970) as early as 1947 that

> The catastrophe of this war has proved the sensitivity of the system of modern civilization evolved in the course of centuries. Now we know that we do not live in an earthquake-proof structure. The build-up of negative impulses, each reinforcing the other, can inexorably shake to pieces the complicated apparatus of the modern world. There is no halting this process by will alone. The danger is that the automation of [technological] progress will depersonalize man further and withdraw more and more of his self-responsibility.

Speer did not yet perceive that the disaster which he saw coming would be ecological as well as psychological—physical as well as mental (see Chapter 19). *(Continued on next page.)*

forgotten; truly it is an occidental war, for Communism is the youngest Child of the West.

What the Vietnamese Buddhists strive for in their resistance is, on the one hand, independence and peace for the people and, on the other, a new basis for Action, a new civilization of synthesis that transcends conflicts. They cannot do otherwise, for the essence of Buddhism is to destroy suffering. . . . But today I find that to save people from war, from suffering, is the mission of the whole world. We must accomplish the synthesis between the West and the East. And through the war in Vietnam this synthesis will be realized. . . .

For a long time man had suffered from dualism, from a world centered on ego rather than on interdependence. "Viet-Nam" means the Viet people of the South. Etymologically Viet means "to transcend," "to surpass." From this, I believe that Vietnam must transcend violence, blocs, by making Vietnam able to reveal the [essential] Being—until now veiled by concepts—and contribute to the world its effort at synthesis. In this mission I see all the peoples of the world, not only the Vietnamese. For this reason I dare to think: Vietnam is the blood of emptiness or space or universe—the word *śūnyatā* is magnificent but untranslatable. . . .* our struggle is not that of war in which two sides clash over the same basis of thought (violent thought based on unilateral views and on resentment) in spite of their different goals. Our struggle is not based within the vicious circle of action-reaction. . .

Hatred, war—this monster aiming its poisoned arrows at us every moment. How to be saved? To make arrows ourselves? Oh, we are superior to violence and hate, responsible for our destiny, masters of the situation. We cannot be target for this monster, for we transcend the target which obsesses his conceptual spirit. Thus, all his arrows do not turn my spirit to hatred as I am protected against them by my plumage, my Eagle's robe. His arrows cannot reach me, for I am infinity. Without a target, the arrows fall and the monster fades away, not because I am vengeful but because I have taken him under my wing. And the volcanoes of anger are silenced. Thus my flight is

*The word connotes perceivable emptiness and an unperceivable fullness of life at the same time—a vacuum on one level, a plenum on the other. *C.M.*

Man is now threatened by a pincer-like attack engendered ironically by his own previously and still uncontrolled power and possession drives and his rate of reproduction. He is thus now experiencing a two-pronged assault on himself, involving his body and mind simultaneously and spawned by forces he himself set into motion. *C.M.*

the flight of infinity, of *śūnyatā*, those are limits no longer, the flight cures the world of dualism separating man [from] love: non-duality, transcendental or illluminated knowledge. . . .

The summer of the Phoenix . . . rises from the ashes, from these ruins. . . .

(Võ Vân Aí)

BLACKNESS

Holding the stars of heaven,
White springs from light.
In magic utterance
The many-coloured word flies forth.

Black is that same primal light
But turned the other way to sight
And speeding through darkness back . . . .
To the beginningless beginning
Of every luminous power:
Back to the ultimate lake of light
The black swan flies home.

THE SONG OF ONE TO ONE

You are in the root of me
I am in the root of you
You are in the blossoming of me
I am in the blossoming of you.

The you that is in me
The I that is in you—
That you
That I
Is the Holy One
The Ever-Living Heart
That gave and gives and ever gives us Life.

For the you that is in me
Is the I that is in you;
Twin flowers each the other's root,
This we is God-in-us.

THE KEYS TO THE BOOKS OF THOTH

THE BOOK OF TIME
It moves with itself,
Thus inescapable.
That the end is already in the beginning
Is the whole law of justice, cause
And possibility. Choose your beginning,
And to change your end choose anew your beginning.

THE BOOK OF PROPHECY
Walk by the thread of the image
To its living source.
This is the revealing
Of the signatum,
The Inspiration-key
To the Book of Yet-to-be.

THE BOOK OF TRANSFORMATION
All changes must each
Lead in one of two ways—
Toward or away from divinity.

There is no third way for the will
And all the changes,
Patterns, and laws of change
Are thus given.

THE BOOK OF THE ETERNAL RELIGION
Its key the great command—
Love ever more
For evermore.
And most of all do love divinity.
For as you would love a truest friend
More than a pet,
Just so divinity calls forth
More love than even that.

THE BOOK OF THE MEANING OF LOVE
Love's meaning is
"The source of life itself"
Also "The heart of freedom."

And hence "Infinity,"
In time or space. "The All-Powerful"
Is its Name: "The Enabler of all,"
And the Endless Well
Of the wisdom of the wise.

THE BOOK OF THE LANGUAGE OF ALL THINGS
Image the heart of the natures
And their acts and interacts
Will follow from the images.
The last language
Is that of the Living Images,
And is spoken momently
About us.

The image is a symbol
A sign not barren
A seed of the signatum.
The heart is the essence
The true name and nature.

THE BOOK OF HISTORY
The key to what-has-been, the fruits of time,
Is simple:
Choose the move — and it is chosen.

The consequence is then foregone to choice
The trail is registered,
In evil and in good.

THE PREFACE TO THE EVER UNWRITTEN EIGHTH BOOK
THE BOOK OF THE POWER — IS:
In the name and by the will
Of the greatest love that is!

(Kenneth Demarest)

THIS HOUSELESS HEAD

I said to the farmer, What is home?
He answered me straight with a will:
My field and furrow, my horse and kine,
My orchard and haggard full!
His table was laid and he asked me to dine—
But I dine beside no master.

I said to the coastguard, What is home?
He answered: My country dear!
Her love behind these cliffs I guard
From the rape of the sea-mad rover.
He asked me to take a turn at his watch—
Would he make me the thief of his lover!

I asked the tailor, next I met,
He answered: The clothes I wear,
The coat I turn with stitch on stitch,
And to keep out the whipping air!
He'd make me a suit if I'd sit and wait—
But I wait for no other weaver.

I asked the parson, I asked the priest,
They answered and said: He is Home!
He who rolled the stone from the tomb,
Him you must follow, for He is Home!
They asked me in at their Church to pray—
But I had no tongue for their prayer.

I asked the Seer, last of all.
He answered: Home there is none,
Save the circle of life-in-death be broken,
And his sway is brought back to the swan.
Cold, cold I would be if I went his way—
But I walked by his side at the river.

(Ewart Milne)

GHOSTS

Never to see ghosts? Then to be
haunted by what is, only – to believe that glass
is for looking through, that rooms, too, can be empty,
the past past, deeds done,
that sleep, however troubled, is your own?
Do the dead lie down, then? Are blind men blind?
Is love in touch alone? Do lights go out?
And what is that shifting, shifting in the mind?
The wind, the wind?

No, they are there. Let your ear be gentle.
At dawn or owl cry, over doorway or lintel,
theirs are the voices moving night toward morning,
the garden's grief, the river's warning.
Their curious presence in a kiss,
the past quivering in what is,
our words odd-sounding, not our own –
how can we think we sleep alone?

What do they have to tell? If we can listen,
their voices are denials of all dying,
faint, on a long bell tone, lying
beyond sound or belief, in the oblique
last reach of the sense through layers of recognition . . . .
Ghost on my desk, speak, speak.

(Alastair Reid)

I KNEW AN ANCIENT WOMAN

I knew an ancient woman once
across a passage of despair,
whose eyes were full of clouds, whose hair
was part and parcel of the dance

of light upon the flesh of grass,
who said, 'The other side of death
is easier on blood and breath
but O the wilderness you cross!'

Who said, 'The passage of despair
lies between coveting and not,
between I know and I forgot,
between the object and the air
which runs through bone-dry hands like sea.
Child, child, you need an angel there,' said she.

(Lisel Mueller)

from THE GARDEN

Here at the Fountain's sliding foot,
Or at some Fruit-tree's mossy root,
Casting the Bodie's Vest aside,
My Soul into the boughs does glide:
There like a Bird it sits, and sings,
Then whets, and combs its silver Wings;
And, till prepar'd for longer flight,
Waves in its Plumes the various Light.

(Andrew Marvell)

SPRINGTIME CHILD

Leap
The hills, Beloved Child,
And keep the crocus.
It is yours.

Soon enough
Will come the slow, slow noon
All innocent of stars
And blinded by the sun.

Later still
Will come the long and sometimes lilac skies,
The million little moons
To leave you lonely
In the night.

Keep the crocus,
Child, I beg of you . . .
And one small hill—
For leaping.

(Libby Stopple)

THE FOURTH WINDOW

I have four windows on the world,
But three through which I see . . . .
Grass earth by crystal water purled,
Blue skies where white birds rise,
Then, blue-green walls of water hurled . . . .
These three are all I see.

I have four windows on the world,
One blinded by the sun.
Sometimes white wings are there unfurled,
Then again, the shape of men . . .
Of men who are in and out of the world.

I have four windows on the world,
But three through which I see.

(Mary Woodlee)

QUESTION FOR WORM (AND MAN)

Do you suppose
A caterpillar knows
Its future lies
In butterflies?

UNFOLDING WINGS

Before these wild ones left the shell
What could they foretell?
Did they dream of wings in flight
Crossing continents by night?

Are we different—you and I?
How far timeward can we fly
Into the dawn's eternal sky?

(Elmer Shaw)

DESTINY AND TIME

I feel that purple mother in my veins
whose reins restrain
my charging brain
    and draw it always back,
back to the mind of being
from dead forward glance to magic sideways seeing

The balanced rope to trod
the fall that seemed so easy never made,
some magnet, or some god,
kept me in line.

THINK

Think of jelly fish, driving chevrolets,
on the sea bottom
Think of scientists, lowering TV cameras
from the ship's deck
searching for
Reality
Think of me, in an organism made up
of proteins with a Parker 61
writing you a letter.

ON NO GRIM BED

The moon on Pilsen sleeps
embalmed in tissue of its callow light.
I sit entranced waiting the time
when I too weave the infinite fine
garment. . .
Oh throbbing heart that for an
instant sleeps on no grim
bed of sharp dichotomies—
here has paused an instant only
in its quest from death to
death
let me hear
your hero song—ringing in triumph
and sweetest harmony above the
discord of my self and non-self arguments.

(Arthur M. Young)

THE SONG OF BLODEUWEDD
(from the medieval Welsh)

Not of father nor of mother
Was my blood, was my body.
I was spellbound by Gwydion,
Prime enchanter of the Britons,
When he formed me from nine blossoms,
Nine buds of various kind;
From primrose of the mountain,
Broom, meadow-sweet and cockle,
Together intertwined,
From the bean in its shade bearing
A white spectral army
Of earth, of earthy kind,
From blossoms of the nettle,
Oak, thorn and bashful chestnut—
Nine powers of nine flowers,
Nine powers in me combined,
Nine buds of plant and tree.
Long and white are my fingers
As the ninth wave of the sea.

(Robert Graves)

ATAVISM

I remember well . . .
I was a deer
Chased up a hill
And fleet with fear.

I was a horse
And I felt the crack
Of the heavy lash
On my laden back.

An elephant-king
Of valiant heart,
I died in the ring
for roman sport.

In an otter's shape
I gnawed me raw
To leave in a trap
My bloody paw.

To the cornered fox,
The baited bear,
The seal on the rocks
With the sealers there,

My blood responds
With a secret cry:
I feel their wounds
And daily die.

(Leah Bodine Drake)

The following anonymous poetical fragments were discovered as short manuscripts and marginalia penciled in a close hand on and between the pages of a miscellaneous collection of legends purchased in London, the volumes of which had all evidently belonged to the same person.

Written down in chance moments, these fragments show an unusual talent, depth of understanding and authentic bardic inspiration.

Regarding the first line of the poem, the West is the most ancient traditional direction of immortality. Taoism speaks of the land of the ever-living ones as the Jade Kingdom of the Western Moon. The golden apples of eternal life in old Greek legend grew in the Isles of the Hesperides—the western islands—and the resurrected Osiris was called in ancient Egypt "First of the Westerners." *C.M.*

LINEAMENTS OF FAERIE

I

The Land of the West, the Land of Evermore,
In a sea that is not sailed and a cloud that does not lift,
Which none can penetrate without a call therefrom.
    It sees eternity welling up in glory like a still dawn:
    The Way of the Gates of Faerie: who knows, who knows?
    Many have said, I see; but few there are who enter, and
        few indeed return.
An island set in deep waters, an isle of luminous shadow
        cast from Paradise.
They say that the waters are amethyst, they say that the
        trees are emerald green,
That voices and music are there,
Music of voices, paeans of music sweet . . . .
Strange things unseen of normal mortal eyes
Which follow on certain baptisms and certain words of
        bewitching
At christening feasts.

II

Folly goes fast to the well of wishing
    But prudence approaches slowly . . . .
Give me a wise heart
When the angel comes with gifts!

The hidden trades of Faerie—
    Slippers of glass
    And lasts of golden shoes.
Strange bookings for strange travels . . . .
O the house of exchange in Faerie
    And of what may be bought and bartered!

III

The primal sun of the mind is in Faerie:
O golden fleece of Faerie
    Which never a hunter won,
    For it cannot be got by killing.
All is man in Faerie,
    And this is one of its secrets.
The forest is a great nation
    The still pool is a soul.

A prayer is a work in Faerie
And a moonbeam may carry it.

(Anonymous)

SUMMONS

Be still and learn
And let your intellect
Now take delight.

Let time in lengthened measures
Answer fragile moods
In unexpected questing.

Your thought in space
Can summon truth
And walk the secret path.

HEALING

Against a shore of hyacinths
In space where sorrow is forgotten
We'll find ourselves.
All the silences
So full of sound
Can heal us.
The brightest moments on a clock
Are moments pointing to our joy.
When Time is free
We'll find ourselves
Against a shore of hyacinths.

(Katharine Faletti)

SOME NEW TECHNIQUES OF AWARENESS

VI

Dynamic Resonance Meditation

25

Kenneth Demarest

Even if our bodily functions remained unaltered, our consciousness could hardly differ from that of plants if we were unable to influence events; and if these had no structure or if we were not familiar with some of this structure, we could not influence them. . . . The precision of these laws [of nature] has all the elements of a miracle.

–Eugene P. Wigner (Address at the tenth anniversary of the Enrico Fermi International School of Physics, Varenna, Italy, 1963)

Introduction

The physical moon, as mankind now knows from four lunar landings by eight valiant men to date, is a grey, barren, airless waste that freezes far below zero when turned away from the sun and goes far above the boiling point of water during the half month of lunar daylight. The moon and the other members of our solar system, as confirmed by recent observations, are not inhabitable for any higher living organism, and certainly not for the relatively delicate human physical body based on easily destroyed carbon compounds–the only type of body feasible for a living creature, given the constituents of our physical cosmos. The same basic constituents or chemical elements range to the farthest stars as the spectroscope proves. The only alternative basis for an organic body is the chemical element silicon. But that element, being more than twice as heavy and

unreactive as carbon, would have made life processes so slow and bodies so heavy that nothing but relatively primitive forms could have developed, if even they.

By comparison with the moon and the other satellites and planets of our solar system the earth is still a lovely blossoming paradise, despite man's consistent efforts to destroy it by waste and pollution. That destructive danger is due to a vicious-circle combination of uncontrolled overpopulation and uncontrolled industrial exploitation of natural resources—sex without love and work without love, for only love grants proportion and foresight, because love looks ahead to protect the future of loved ones as well as making the present as happy as possible. Viable alternatives to love and the wisdom it brings do not exist.

The nearest sun to ours is four long light-years away, a distance that would take four years to cross even traveling at 186,000 miles per second (3×10^{10} km/sec.), and we do not even have the assurance of a reasonable probability that that sun would have planets, much less habitable ones. Even with the best projections of technology into the future, there is no probability of attaining even the neighborhood of such speeds: it takes us about four days to traverse the distance to our moon—a mere twenty-five *millionth* of the distance to the nearest stars, which have an over 99% chance of having no livable planets.

Moreover, it has now been verified that the unstoppable cosmic rays, to which every space traveler outside the earth's atmosphere is exposed, would destroy human brain cells at the rate of over 1% every four months—more than 13% in four years.* Since the neurons of the human adult brain do not reproduce, this exposure would represent irreparable damage and the inevitable reduction of man to idiocy in space.

Our space agencies have of course a vested interest in maintaining appropriations for their activities and hence for the livelihood of their personnel. But if they could allow themselves to be realistic, though the economic odds are against it, they would have to reckon with the truth that space exploration

*NASA now claims the damage rate is lower and comparable to the damage done to the brain cells of a low-grade alcoholic. *C.M.*

holds out no hope for man, and that at this stage of crisis in earth's affairs it represents merely a psychological escape and no real solution. The solution lies in the other direction: in the inner space of man, as yet far less perfectly explored or known than the relatively useless astronomical space. It is the comparatively overlooked direction that man must pursue if he wants to negotiate the present critical decade and its aftermath successfully.

The moon, though practically useless to visit, has very great uses to man as the needle or indicator of a cosmic instrument. To send men there is naively to send human flies walking over the indicator needle of a great instrument while remaining in ignorance of how to use the instrument or read it. For centuries farmers and planters have known the profound differences in weather, plant growth and seed-timing associated with the lunar phases. Also, recent data increasingly confirm the other old teaching that insomnia and unstable mental states grow noticeably in intensity monthly from the First Quarter phase, culminating with the Full Moon; and the connection of the tides with the moon's phases is a long-confirmed fact, not to mention the synchronization of the human ovulation cycle with the length of the lunar cycle: about 30 days for both periods.

Far less well known is that the moon may be used as a means of spiritual regeneration and the accelerated growth of a transcendental body allowing full freedom after the functional cessation or death of the carbon-based body or temporary vehicle of continuing individual consciousness. There are hints of the importance of the moon in almost all the survivals of ancient teachings inherited by the present religions of the world, and the calendar of most modern Semitic peoples—both Jewish and Moslem—is based on the moon, because those peoples inherited their calendar from the ancient Chaldean priesthood of Babylonia. In modern India, Siva, divinity of spiritual regeneration and yoga par excellence, is deeply associated with the lunar crescent, and the highest spiritual center associated with the human brain is called "the thousand-petaled lotus" which guards "the place of the hidden moon."

In what follows we shall indicate some of these restored teachings and their sources. Even more importantly, we shall

outline the rediscovery of the ancient method of using the moon in order to time meditation periods so that they become resonantly attuned to the most powerful spiritual forces available to man in his search for higher evolution and metamorphosis—the great quest in which all beings are involved. A new application of such laws will be our concern here.

Special rituals held at the time of full or new moon have long been celebrated in the worship of various religions. The timing of Easter as the first Sunday after the first full moon of spring is a notable continuance of the practice into current times.* But in what follows we shall not be talking about conventional religious full- or new-moon celebrations, ancient or modern, but about a new development which by independent research restores the advanced psychological significance of some of the oldest traditions that have come down to us.

We shall first present the new findings and then give a summary of teachings even far older than the relatively late, though still ancient, practice of celebrating simply at full or new moons. The governing ideas behind both the new research and the ancient beliefs and practice may often be unfamiliar and far-reaching but they are essentially simple to grasp. They also lead to a straightforward and definite method, a technique of applied consciousness, if you will—of noetic science.

Evolutionary Bootstrapping

In order to evolve—either individually or as a race—beyond where we are now, we have to know where the path to such destination lies, and a bit about its topography and hence how to negotiate it. We must be in possession of such knowledge

*Some relatively new fringe cults have given out garbled versions of ancient moon celebrations, alleging some special sanction by the Buddha or Christ in order to gain wider attention. These activities, since they represent simply examples of corrupted survivals of older, more authentic practice, do not concern us here. They moreover consistently make the error of supposing that the waxing moon is the spiritually more important part of the lunar cycle—something the texts of the most ancient traditions never do, telling us, on the contrary, that the waning moon (returning to the sun) fortnight is synchronized with the dispensation of the greatest spiritual power.

long before we can possibly develop the capacity to perceive directly the features of the as yet undiscovered country or how the world will then be like.

By the very nature of ordinary sensory clues, they cannot lead us—the most evolved species on the planet—to know wherein consists our next step and what our experience of the cosmos will then be. There is one kind of clue however that can provide that sort of knowledge which on all other counts is inaccessible. By this exceptional and special kind of clue, although we cannot visualize explicitly what our resulting condition and perception will be, we can determine the operational nature of the steps we must take in order to attain that condition and to expedite our developmental journey towards it.

Such journeys constitute the only meaningful interpretation of the term "time-travel," aside from the comparatively trivial meaning of going backward in memory or forward in anticipation. To evolve is to travel forward in time in the deepest sense; to degenerate is to go backward in the equally same deep sense, but in that case harmfully.

Basis of the New Technique of Knowing When to Meditate

The unique and exceptional clue we have mentioned is how—without knowing mathematics—to use the nature of number (and specifically how to use the deepening or evolution of the concept of number so that the nature of what Dr. Musès has called hypernumber emerges), this process itself providing an acceleration beyond the average evolutionary rate. Numbers, like a bat flying accurately in the dark, can enable us when so used to follow a path and give us messages from a level of the world we could not otherwise see clearly, if at all.

In particular, there is a hypernumber w (see the next chapter for desired details), with the remarkable property that, when multiplied successively by itself, all the resulting numbers lie on a certain ellipse. The numbers resulting from multiplying the square root of w successively by itself also lie on the very same

ellipse, exactly twelve distinct points being generated by both these processes. In the same way, $-w$ generates twelve points (four of which are identical with the previous set) all lying on an ellipse of the same shape and size, but perpendicularly intersecting the first ellipse generated by $+w$ (see Fig. A and end of appendix to chapter 26).

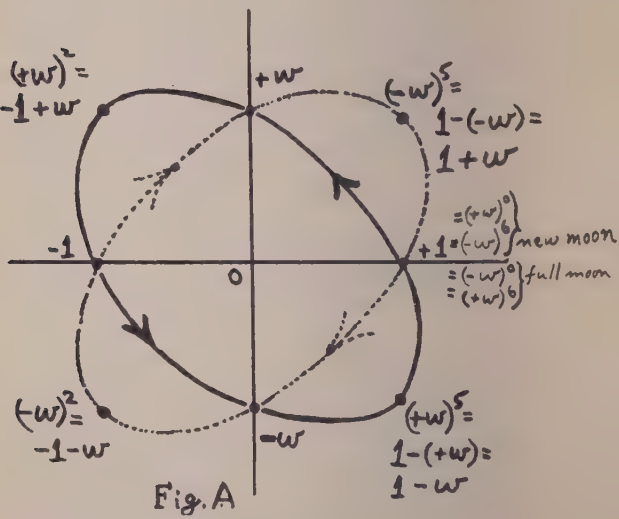


Fig. A

The principal phases of the elliptical orbits of the hyper-numbers $+w$ (full line) and $-w$ (dotted line), here related respectively to the waxing and waning lunar phases from crescent to complete (light or dark) disc (full and new moons respectively). Two key meditation times correspond approximately to the points of the arrows on the $-w$ or dotted orbit. These two times correspond to $\pm\sqrt{-w}$.

These two hypernumber orbits provide the only available mathematical paradigms corresponding to the phenomenologically and cyclically distinct waxing (+) and waning (−) lunar fortnights that together constitute the lunar month of phases, from new moon through first quarter, to full moon, to third quarter or waning half-moon, and finally to new moon again, when the moon and sun are in the same part of the heavens as viewed from the earth.

There are three principal irregularities in the lunar orbit that have been known since Claudius Ptolemy of Alexandria, although the third was rediscovered by the famous 16th century astronomer and teacher of Kepler, Tycho Brahe, as his posthumous writings prove. The three together furnish a set of eight places in the lunar orbit where these irregularities (reflecting configurations of forces) are maximal. These eight places map on the eight points furnished by the integer powers of the hypernumbers $(+w)$ and $(-w)$.*

As noted in chapter 23 each month during the waning lunar fortnight, we have, by the received tradition (of which more later), a time of the absorption by all animate creatures of a cosmic life power, externally manifesting in part as a period of increased cloudiness or precipitation which is directly observable. It should be clearly understood that the lunar motion is used here in the context of a synchronous signal, and not as the origin of the power.

The Dynamic Resonance Technique

It is possible by a certain meditation practice to increase the intake of this power, which will result in evolutionary acceleration since it is the essence of deathless life itself that is so being increased in us. The method of such increase in energy is the same powerful principle that causes tidal waves: the principle of resonance, or synchronization with positive feedback. The same principle is used by every child on a swing who desires to increase the height he reaches by suddenly pulling back on the cords of the swing just as it has reached its rearmost position.

*Explicitly they are ± 1, $\pm w$, $\pm(-1+w)$ and $\pm(-1-w)$.

Just so we can increase the power available to our evolving consciousness by meditating with uplifted and strong aspiration at those times in the waning cycle when the dynamics are slow enough to allow us to interact with them: one never pulls on the ropes of a swing until it has reached an almost stationary point in its backward trajectory or orbit. This provides the clue to knowing how to increase the power of consciousness by correctly *timed* meditation. Hordes of people today meditate. Not one in a million knows *when* it most counts, or the rationale of resonant timing.

Using hypernumbers to bat-guide us through the unknown, we find that there are two points during the waning fortnight when the incoming power surge slows down enough for us to interact with it importantly to increase our noetic power intake. In terms of higher numbers (see Chapter 26) these two points are $\pm\sqrt{-w}$ (see Figs. A and B).

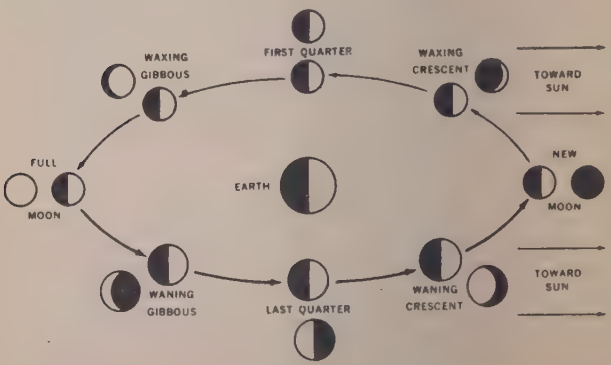


Fig. B

The Phases of the Moon. In the inner ring of figures the moon is shown in its orbit as viewed from the North Celestial Pole, the illuminated hemisphere indicating the direction of the sun. The outer ring of diagrams shows the phases of the moon as viewed from the earth at the eight basic positions in the lunar orbit.

In terms of lunar phases (Fig. B) those two points occur approximately two days, less four hours, after full moon; and similarly after third quarter (waning half moon). The meditation times should begin about a quarter of an hour before the sunset nearest to the given lunar points, in terms of the local time of where you are. The times for full moon and third quarter can be obtained from a farmer's almanac or ephemeris for the month and year in question. For convenience, however, a Time Table of lunar phases through 1975 for use in Resonant Dynamic Meditation follows in the next section.

The basis for using the Table to find the meditation times is the length, in days and hours, of the two quarters of the waning lunar fortnight. This interval averages about 14 days 18 hours and 22 minutes. Having halved this average time period, one could then divide it by four to obtain the meditation phase interval, approximately given before, of 2 d. less 3 h. 42 m., or 1 d. 20 h. 18 m., which can then be applied, as we will see presently, to the times of the moon's phases.

Since our noetic force is small compared to that of the cosmic influx, it will take several months of regular practice and accurate timing for the results of resonance to show. In the cases observed by the writer, results have appeared within six months, and in some cases have led to remarkable increases of insight and psychological development.

This influx is the "divine Soma"* the ancient people were talking about the living energy by which man grows spiritually just as plants grow by water and sunlight. Plato undoubtedly was repeating a phrase he had heard in the Mysteries, in which he was admittedly initiated, when he said in the Timaeus (90 A) that man is "a holy plant with roots above." The identical image is found in the Upanishads, which derive directly from the ancient Vedic teachings of the divine plant and bird—identified with Agni as we will see—who flies down the Soma plant (or its power) to man, and flies man upward to transhumanization (Dante's graphic term in Canto I of the *Paradiso*, which we will look into further presently).

*A Vedic term, cognate to the *homa* of ancient Iranian religion. Their common word-root revolves about the notion of well-being.

During these phase-resonant meditations, the direction one faces should be west, for that is the direction of the power of Mitra, the power of the waning of external light and of the concomitant waxing of the higher light and fire. When we uplift ourselves in meditative aspiration at these key times, we can then unlock the doors within us to synchronization with an energy level and quality of consciousness normally quite inaccessible.

We can thus tune in to a literally infinite energy source, capable of carrying the mind and heart of man to heights and attainments as yet undreamed.

The application of this method does not require anything beyond what the person of ordinary means and station can obtain or understand. That simplicity is the hallmark of a higher justice, which does not bar anyone from the exercise of his or her infinite potential. The only true élite that has ever existed has been the élite of those who genuinely tried. Membership is paradoxically open to all, and its healthy destiny is to become less and less of an élite as more and more people fulfill what human beings can become when they wholeheartedly try.

If these meditations are faithfully practiced, the waxing moon fortnight will take care of itself. For those who wish to advance more rapidly, the complete series of resonant meditations should be performed, preferably shortly before sunset on the given days shortly to be described, which will be seen to be ten in all, with all but the first occurring between the full and new moon. The first or introductory session of the monthly meditation cycle falls about two days, less four hours, before the full moon.

How to Use the Table

The dates for these meditation sessions are found as follows. First obtain the date and time of current full moon, third quarter (waning half moon), and new moon from the Table, and convert these into standard or daylight time for the place where you are. Then apply the following rules to calculate the times of the ten sessions.

For Session 2 (that of the post-full moon), meditate at the first sunset following the full moon. This rule is to ensure that the meditation session resonates with the waning moon and its synchronized influences ("soma-bearing").

For Session 1 and Sessions 3 through 10 use the sunset nearest to the proper lunar phase (specified in the list below)—whether that sunset precedes or follows the phase.

At or above (below) the Arctic (Antarctic) circle, sunsets may last for more than 24 hours. In those regions, meditations would have to be at the local times of the lunar phases themselves (see Table). Under ordinary conditions, that plan would not be practical, as a phase can occur at any time of the day or night. The sunset is then used as a regularizing factor, and is chosen because sunset is the time of day most keyed to spiritual metamorphosis and regeneration. Even relatively unaware persons realize that sunsets are lovely and uplifting moments.

The rules for finding the meditation dates are (the numbers refer to Sessions):

1. Take the date and time of full moon, less one fourth of the time interval from full moon to third quarter (obtainable from the Table). In what follows we will call this time fraction "T_1" and it will be found on the average to be about 44 hours. Thus the lunar phase for Session 1 will always take place at about 44 hours before the full moon, and Session 1 itself will begin at fifteen minutes before the nearest sunset to that phase, thus furnishing the meditation date.
2. First sunset after full moon. (Date and time of full moon are obtained directly from Table.)
3. Sunset nearest to the date and time found by adding T_1 to date and time of full moon.
4. Sunset nearest to date and time found by adding T_1 to date and time of Session 3.
5. Sunset nearest to time found by similarly adding T_1 to date and time of Session 4.
6. Sunset nearest to third quarter moon, date and time for which is given in the Table.

7. Using the Table, we now take one fourth of the time interval between the current third quarter and the new moon, and call this time fraction "T_2." Session 7, then, is at the sunset nearest to the date and time found by adding T_2 to the date and time of the third quarter. Like T_1, T_2 will also average about 44 hours.

8. Sunset nearest to time and date found by adding T_2 to the time and date of Session 7.

9. Sunset nearest to time found by similarly adding T_2 to the time and date of Session 8.

10. Sunset nearest to new moon (date and time shown in the Table).

Thus the ten critical lunar phases are completed.* For those who wish a less demanding although less thorough practice, the series may be contracted to include only Sessions 2, 6 and 10—the post-full moon, third quarter and new moon meditations respectively. The dates for these phases may be found directly in the Table without having to calculate T_1 and T_2. A compromise method is to use the interval of 44 hours 18 minutes as an average for either T_1 or T_2 in applying the above ten rules. This average interval, which may be easily manipulated by regarding it as two full days, less 3 hours and 42 minutes, will give good results, but sometimes will differ from the more accurate method by a day either way.

The lunar synchronized meditation technique thus runs in series totaling ten sessions each lunar month. During all these sessions, meditation should start about fifteen minutes before sunset on each session date. If you do not have the exact sunset time, you simply can observe the sky and estimate fifteen minutes before sunset very well. At the introductory session (the one at two days less 3 h. 42 m. before full moon, and the only one during waxing moon) inner power in the form of higher support is conveyed, either as answers to problems or as surges of re-energizing and strength-giving confidence. Thereafter, the remaining nine sessions form a group in themselves,

*In terms of the hypernumber w (see Fig. A), these ten phases correspond in order to: $(+w)^5$; $(-w)^0$; $\sqrt{-w}$; $(-w)$; $(-w)^2$; $(-w)^3$; $-\sqrt{-w}$; $(-w)^4$; $(-w)^5$; and finally $(-w)^6$.

accelerating higher human development and awareness. Throughout these sessions (during which some progressive fasting also helps) subtle energies are released which, when assimilated and used, can accelerate the formation of higher powers and awareness in man.

Before the following Table can be used effectively you must also know something of how to meditate and also something of the ten sessions so that you may be able to resonate at these times on the best possible level of awareness.

First of all, in order to meditate you disengage from the usual stream of incoming sensations and ongoing chains of thoughts, feelings and memories. This is done not so much by an act of will as by a transfer of the entire focus of attention to the nature of the session and to the stream of higher energy to which it attunes you. This transfer is also not so much a matter of intellection or reasoning as it is a transfer of feeling and desire to what for you at that time becomes all-important.

Physically it is best to sit upright either crosslegged or in a chair that is comfortable for you, with the spine held in a good straight perpendicular from base to head; and it is usually best to let the eyelids close of themselves as you begin. The condition of comfort helps you to forget your physical body during these times. If you know any simple yoga in-breath, hold, and slow out-breath exercise (such as well described in Vivekananda's *Raja Yoga*), you can open the session with that exercise. If not, simply let your in-breathing be calm and deep, with a holding of the breath when the lungs are full. The hold should be long enough to be calming, but not so as to cause any discomfort—the length varying with each person and also with the amount of practice you have built up. The out-breathing should be paced and not hasty.

Regularity as to place will also help. Regularity of time (as explained) and orientation (to the west) is assured by the rules already given. All these regularities help build the resonance.

Now it is also well to be aware of the nature of each session, so that you may achieve a stronger resonance effect, stemming from your deeper understanding.

The first of the ten sessions has already been described as a

time of increase of courage and confidence, when the power of encouragement flows most easily from trans-human levels, without your doing very much about it except being ready and setting aside the time for it.

Session 2 has to do with your re-dedication to higher development each month, as it is the first of the group of nine sessions centered on that aim. It is the time when the higher revivifying forces flow to the earth in synchronization with the moon's position, which simply acts as the needle or indicator of a subtle cosmic instrumentality, telling us when the current is flowing and the kind of current it is. Session 2 thus involves a focusing of conscious awareness upon a supraconscious opportunity in terms of proper timing.

Session 3 provides a vital point of continuity between Session 2 (conscious re-dedication) and Session 4, which is devoted to allowing your deepest desires for inner nourishment and growth to be entrusted to your highest self, which even transcends your highest conscious vision of what you may be. Thus Session 3 is a time when you attune to the uplifting power, knowing that it is then working to join conscious and supraconscious awareness highest conscious vision of what you may be. Thus Session 3 is a time when you attune to the uplifting power, knowing that it is then working to join conscious and supraconscious awareness in you, so that with this session each month you will gain greater access to your own greater mind and being, thus increasing in you the highest kind of negentropy, to use a more technical context of explanation.

Session 4, on the other hand, is when you build better than you know, enlarging, even though you are not yet consciously aware of it, your supraconscious mind and potential.

Session 5 is when the higher power inflow comes like a cool, refreshing breeze—the experience of drinking deeply from a fountain of new life. With this session, momentum begins to pick up, climaxing in Session 9.

Session 6 is a time that will result in increased ability to discern and reason. You perform it with a purifying incense such as sandalwood, not too bitter and not too sweet. This

session is a turning point, a decision, and a purgation, some at the beginning of their practice with this technique even experiencing a strong intestinal cleansing after it. This time represents the point when the inflowing power is turning from purification and healing to inner metamorphosis and the building of a still embryonic higher-model body, destined to be free from subjection to either death or our physical laws.

Session 7 is again (cf. Session 3) a place providing vitally needed and fruitful continuity—this time between Sessions 6 (logic) and 8 (intuition)—these two being too often improperly divorced.

Session 8 is a time of conscious voyaging into the farthest realms yet reachable by your supraconscious awareness, together with the ability to remember what you have experienced when you return to normal awareness. Session 8 also provides an opportunity to develop the intuitive, creative insight so necessary to your effective functioning in higher states of awareness.

Session 9 has already been mentioned in the description of Session 5, but a few words may be added here. At this time you are experiencing the greatest "escape velocity" from ordinary concerns, and it is on one of these peaks of transcendent energy that you will one day be able to effect a transfer of your center of consciousness and voluntary manipulation to your extra-physical vehicle which these sessions, regularly practiced, are designed to develop in optimal time. During the earlier stages of practice with the present technique, Session 9 will be experienced mostly as a time when high and strong states of serenity and bliss are frequently possible during the meditation.

Session 10 is the seeding session of the monthly cycle, when the concentrated effects of all nine previous sessions are planted deep within yourself and your memory, so as to germinate within you during the waxing moon, and bear new fruit in terms of an even stronger resonance-power during the next series of sessions. It is a time when such inner seeding and replanting is natural and easily possible for you.

How to Use the Resonance Meditation Time Table

The Table immediately follows these instructions. Meditation sessions should begin about fifteen minutes before sunset where you are on the dates found by applying the previously given rules to the times of the moon phases shown in the Table, which as noted, are given in Pacific Standard Time (P.S.T.).

1972 - 1975 KEY MOON PHASES (Pacific Standard Time)

F	30 Jan. 3:00 a	28 Feb. 7:14 p	29 Mar. 12:08 p	28 Apr. 4:47 a	27 May 8:30 p	26 June 10:48 a
3Q	7 Feb. 3:14 a	7 Mar. 11:08 p	6 Apr. 3:46 p	6 May 4:28 a	4 June 1:23 p	3 July 7:27 p
N	14 Feb. 4:29 p	15 Mar. 3:35 p	13 Apr. 12:32 p	12 May 8:09 p	11 June 3:31 a	10 July 11:39 a
F	18 Jan. 1:30 p	17 Feb. 2:09 a	18 Mar. 3:35 p	17 Apr. 5:53 a	16 May 9:00 p	15 June 12:37 p
3Q	25 Jan. 10:07 p	24 Feb. 7:12 p	26 Mar. 3:48 p	25 Apr. 10:01 a	25 May 0:42 a	23 June 11:47 a
N	3 Feb. 1:24 a	4 Mar. 4:08 p	3 Apr. 3:46 a	2 May 12:56 p	31 May 8:35 p	30 June 3:39 a
F	8 Jan. 4:38 a	6 Feb. 3:26 p	8 Mar. 2:05 a	6 Apr. 1:02 p	6 May 0:57 a	4 June 2:12 p
3Q	14 Jan. 11:06 p	13 Feb. 4:06 p	15 Mar. 11:17 a	14 Apr. 7:00 a	14 May 1:31 a	12 June 5:47 p
N	23 Jan. 3:03 a	21 Feb. 9:34 p	23 Mar. 1:25 p	22 Apr. 2:17 a	21 May 12:35 p	19 June 8:56 p
F	(29 Dec. '74 7:53 p)	27 Jan. 7:11 a	25 Feb. 5:16 p	27 Mar. 2:38 a	25 Apr. 11:57 a	24 May 9:53 p
3Q	4 Jan. 11:06 a	2 Feb. 10:25 p	4 Mar. 12:22 p	3 Apr. 4:27 a	2 May 9:46 p	1 June 3:25 p
N	12 Jan. 2:20 a	10 Feb. 9:18 p	12 Mar. 3:48 p	11 Apr. 8:40 a	10 May 11:06 p	9 June 10:50 a

a = a.m.; p = p.m.; F = Full Moon; 3Q = Third Quarter; N = New Moon

Newspapers usually give sunset times in standard time, and in daylight time when in effect. If you are, for instance, in an Eastern Standard Time (E.S.T.) zone, add 3 hours to the Table times to obtain E.S.T. To obtain Central Standard Time (C.S.T.), add 2 hours; and for Mountain Standard Time (M.S.T.), add 1 hour. If you are in England, add 8 hours to the Table times to obtain Greenwich Mean Time (G.M.T.); add 9 hours to obtain Central European Time (C.E.T.), and so on. If

25 July	24 Aug.	22 Sept.	22 Oct.	20 Nov.	20 Dec.	
11:26 p	10:24 a	8:09 p	5:27 a	3:08 p	1:47 a	1
2 Aug.	31 Aug.	29 Sept.	28 Oct.	27 Nov.	27 Dec.	9
12:04 a	4:50 a	11:18 a	8:43 a	9:47 a	2:29 a	7
8 Aug.	7 Sept.	7 Oct.	5 Nov.	5 Dec.	(4 Jan. '73	2
9:26 p	9:29 a	0:09 a	5:22 p	12:25 p	7:43 a)	
15 July	13 Aug.	12 Sept.	11 Oct.	10 Nov.	9 Dec.	
3:58 a	6:19 p	7:18 a	7:11 p	6:29 p	5:36 p	1
22 July	21 Aug.	19 Sept.	18 Oct.	16 Nov.	16 Dec.	9
7:59 p	2:24 a	8:12 a	2:35 p	10:36 p	9:15 a	7
29 July	27 Aug.	26 Sept.	25 Oct.	24 Nov.	24 Dec.	3
10:59 a	7:26 p	5:54 a	7:17 p	11:56 a	7:08 a	
4 July	2 Aug.	1 Sept.	1 Oct.	30 Oct.	29 Nov.	
4:42 a	7:59 p	11:27 a	2:40 a	5:21 p	7:12 a	1
12 July	11 Aug.	9 Sept.	8 Oct.	6 Nov.	6 Dec.	9
7:30 a	6:48 p	4:03 a	7:47 a	6:50 p	2:12 a	7
19 July	17 Aug.	15 Sept.	15 Oct.	13 Nov.	13 Dec.	4
4:07 a	11:02 a	9:46 p	4:25 a	4:54 p	8:25 a	
23 June	22 July	21 Aug.	20 Sept.	19 Oct.	18 Nov.	
8:56 a	9:31 p	11:50 a	3:52 a	9:08 p	2:30 p	1
1 July	31 July	29 Aug.	28 Sept.	27 Oct.	25 Nov.	9
8:39 a	0:51 a	3:22 p	3:48 a	2:09 p	10:54 p	7
8 July	7 Aug.	5 Sept.	4 Oct.	3 Nov.	2 Dec.	5
8:11 p	3:58 a	11:19 a	7:24 p	5:05 a	4:51 p	

daylight time is in effect, an extra hour must be added in any case. Thus to obtain Eastern Daylight Time (E.D.T.), add 3 hours plus 1 hour (net effect, 4 hours), and so on.

> *An Example.* Find the times at Los Angeles for the first and second meditation sessions based on the full moon of April 28, 1972. The Table tells us that this full moon occurs at 4:47 a.m. P.S.T. Sunset occurs at Los Angeles (34° N. Latitude) at 6:35 p.m. P.S.T. on April 28, 1972. Meditation Session No. 1 occurs, by our rules, at the nearest sunset to full moon less 2 days, plus 3 hours 42 minutes, or at the sunset nearest to 8:29 a.m. P.S.T. on April 26, that is, the sunset of April 26, 1972, at Los Angeles; and in this case the same date holds for all the United States.
>
> Meditation Session No. 2, by the rules given, occurs at the sunset following the time of full moon, which in this case is the sunset of April 28, 1972—a date also good throughout the United States. It is advisable thus to calculate in advance all ten sessions dates for any given monthly cycle.

SIMPLIFIED WAY TO FIND RESONANCE-MEDITATION DATES

Obtain the date of the current full moon. Then the 4th day before that date is Session 1. For the other Sessions, in order, simply add days to full moon date as follows: for Session 2, 1 day; Session 3, 2 days; Session 4, 3 days; 5, add 5 days; 6, 7 days; 7, 8 days; 8, 9 days; 9, 11 days; and for the 10th Session, add 13 days. Time of sessions may be on waking, at sunset, or before sleep, whichever is most convenient. Face west if possible. At Sessions 5 and 9, most powerfully during 9, infinite dimensional forces enter our cosmos most easily and intensely. By these rules, for example, the June 1973 Sessions in order fall on June 11, 16, 17, 18, 20, 22, 23, 24, 26, and 28.*

Whenever Daylight Saving Time is in effect, add one hour to

*The same shortened rules applied to the current *new* moon date yield *waxing* moon meditation sessions, which may be applied to gain time-resonance power for *external* activities. See *Journal for the Study of Consciousness*, vol. 5, no. 2 (1972). Incidentally, dynamic resonance meditation requires renewed attitudes and feelings. Mere mechanical motions are not enough. Evolutionary acceleration is not an automated affair. The original and shortened rules were developed by Dr. C. Muses. When all the waxing sessions are included, a different set of session numbers comes into the picture. For further details the interested reader may write Editorial Offices, *Journal for the Study of Consciousness*, 844 San Ysidro Lane, Santa Barbara, California 93108.

the times obtained from the Table because you would then ordinarily be using times of sunset given in Daylight Saving Time, as in newspapers for example.

Ancient Sources

These sources are given in some detail in the following section explaining the numbered figures. Here, however, we wish to supplement those facts by a remarkable passage in Dante's *Divine Comedy* and by the story of Isis in Phoenicia. More material on the unusual history that leads up to the presently given meditation technique can also be found in Chapter 23. Both that and this chapter are essentially indebted to the as yet unpublished lectures and notes of Dr. Musès, without which they could not have been written.

In lines 62-72 of the first canto of the *Paradiso* Dante exclaims, recalling his first contemplation of Beatrice,

> Nel suo aspetto tal dentro mi fei,
> qual si fe' Glauco nel gustar dell'erba
> che 'l fe' consorto in mar degli altri dei.
> Trasumanar significar per verba
> non si poría; però, l'esempio basti
> a cui esperienzia grazia serba.
>
> Gazing upon her, I felt within
> as did Glaucus when he tasted the magic herb
> that let him enter the ocean of the gods.
> *Transhumanize* is an experience, not a word;
> and this example is enough for him
> whom Grace sends such a gift.

That remarkable word "transhumanize" was coined by Dante. The reference is to Glaucus, surnamed *Pontius* "the Bridge-Maker" or "Connector," traditionally figured as a merman (see Chapter 23, Figs. 1*f*, *k*, *n* and *o* and 2*c*.) He was the builder and pilot of the Argos, the ship that led Jason to the Golden Fleece, symbol of the radiant Robe or higher body; for Glaucus, having already gained the higher body knew how to find it for another. His name, as well as the word Argos, means shining or bright, and he is in fact to be identified with the Argos itself, often

symbolized as a great sea dragon. In Chapter 23, Fig. 2*b*, Jason is seen being transported by the dragon form of Glaucus to Athene who inspired and blessed the entire quest. She controls Glaucus as Dante's Beatrice (literally "She who makes blessèd") controls the great griffon (figured on Athene's helmet) in Dante's poem.

Ovid tells of Glaucus' transformation into a god in the *Metamorphoses* (xiii, lines 904-949). Atheneus and Pausanias furnish the further information that the magical herb (cognate to the Vedic soma plant and the Sumero-Babylonian plant of immortality)* that transhumanized Glaucus was planted by Kronos or Saturn, god of time's potential for man and that Glaucus was often identified with the ancient Phoenician divinity Melkart, also a sea god and the protector of Tyre, from Tyro, mother of Pelias, the king who first hid the Golden Fleece and sent Jason after it. Pelias became transformed in the Celtic legend of the Arthurian Cycle into the Fisherman King Peleas or Pelles (in Welsh *Pwyll*, lord of darkness), the ominous power that Jason must overcome to gain his heritage of immortality.

In Canto 33, lines 49-51, of the *Purgatorio*, referring to

*The idea that a plant conferring the essence of life or immortality could be gained through the power of a great bird was a tradition in the most remote times. Sumerian civilization, with its borrowed roots as seen in the oldest place names and god names—in some proto-Celtic Mediterranean culture, preserves this idea in the legend of Etana, who was borne on the back of a great eagle to a magical mountain where the plant of life grew—in this already corrupted case, a mere fertility drug. Iranian tradition recounts the tale of the Simurgh, the great raptor who guarded the white *homa* (soma) plant of life that grew beneath the sacred gokard tree. Although a physical manifestation of soma is, according to the latest identifications, a psychoactive mushroom (the white-spotted, red "fly agaric" or *amanita muscaria*, according to R. Gordon Wasson), the true meaning of soma was far more than that, for soma was a universal life power dispensed in greatest abundance during the waning moon, and able to be absorbed directly by man in meditative states without having to ingest any plant whatsoever. Since plants, however, were held particularly able to collect and store soma to high degree, certain plants—especially those with power to change the state of human consciousness when eaten—were regarded, sometimes deifically, as sacred on that account. But the divine soma itself was always far more than a plant, and its highest form was the subtle energy that could be utilized by man directly in certain meditative states at certain times. To materialize soma into a mere psychoactive mushroom as Wasson has tried to do is seriously to misinterpret the meaning of the highest Vedic teaching. This chapter is about the real soma and how to obtain and use it.

Ovid vii, Dante confirms that the naiads, another form of sea divinity, will solve completely the riddle of the sphinx as to the nature of man, the solution being that of Glaucus: trans-humanization. This passage in Dante has never been understood, as shown by the incorrect attempts to change Dante's and Ovid's *naiads* (in two independent sets of manuscripts) into *Laiad*, a name of Oedipus, which would be a non-sequitur in the context of Dante's theme—the attainment of immortality.

That there were stages of evolution beyond man was a very ancient doctrine merely being further transmitted by Dante, who was not at all the conventional follower of orthodox Rome that he is too often misstated to be. Thus Dante mentions that the Rome of his day was not worthy to have Christ as a citizen, and heresy for Dante was only the fifth of twenty-two subdivisions of hell, there being thus seventeen worse kinds of sin.

Just before Dante first experiences the feeling of godhood as he gazes upon Beatrice, he speaks of following her beyond the sphere of air (which in turn lay beyond that of the water and globe of our earth) and into that of the celestial fire and aether, at the entrance to which is the orbit of the moon. And then Dante tells us, in Longfellow's translation, of those "footprints of the Eternal Power, which is the end whereto is made the law" by which all natures "move onward unto ports diverse o'er the great sea of being . . . each one with instinct given it."

This power "bears away the fire towards the moon, this is in mortal hearts the motive power, this binds together and unites the earth." Dante then compares the divine power to a bow (cf. Chapter 23, Fig. 4*a*) that shoots forth the life impulses of all creatures and "bears us away the virtue of that cord which aims its arrows at a joyous mark," the ultimate aim of the divine power always going toward joy. But there is always free will to choose a value system or ideal—or to relinquish one. Many times, as we slowly learn better, our choices are wrong. Then, Dante continues (translation of Lawrence White), we "will fail to harmonize with the design. . . . Then from its course the creature deviates; for though impelled toward highest heaven, it has the power to bend in other ways."

We turn now to Isis. In the thirtieth canto of the *Purgatorio* Dante quotes from the *Song of Songs* (iv,8), which stems from the ancient love liturgies of Ishtar for Tammuz and of Isis for Osiris:

> Veni sponsa de Libano—
> Come, my spouse, from Lebanon

which in the later Roman Christian liturgy was repeated three times, followed by the choral response, *Benedictus qui venis, Blessèd be he that comes*, who in ancient times was none less than Osiris the god of the conquest of death by resurrection. It is beginning to be clear how Jesus, speaking functionally (not personally) as the Divine Christos, the Way-Shower of Immortality, could say "Before Abraham was, *I am*." That Power verily always was, and is.

The ancient Egyptians called every deceased person a potential Osiris, and we must all literally re-member or re-form our true selves, as Isis reassembled Osiris, when we shall break forth as Horus from the egg of luminous embryonic fire that surrounds our higher potential—thereafter not to know death again. Isis was long connected with the moon, as was Osiris himself whose members were collected during the days of the waning moon when that orb returns to the sun to be revivified.

In old Egyptian tradition, the members of Osiris, whose body, brought back by Isis from Byblos, was scattered by Set, and hence of the ritually observed phases of the moon, were given at from fourteen to sixteen, and we have already encountered the number 240 (Chap. 23, Fig. 1*a*) which is 15 times 16, sacred in both ancient Chaldean and Egyptian doctrine, and referring to the 16 divisions of each of the 15 days of the lunar fortnight ($29\frac{1}{2} \div 2 = 15$ in whole numbers). Hindu tradition also recognizes sixteen as the number of "digits" or sub-phases of the moon. Sir John Woodroffe's *Introduction to Tantra Shastra* (2nd edition, Madras, 1952) referring to the text of the Mahanirvana Tantra, refers to the sixteen digits (related to the sixteen vowels of mantra yoga, and to two sets of 16 consonants each) of the Chandramandala or moon disc which is

"above the Sun-Circle, the Guru [higher intuition] and the Haṁsa a swan or goose, representing the soul in the pericarp of the thousand-petalled lotus (sahasrāra)." Within the sixteenth digit is the highest of all, the seventeenth—the lunar crescent (symbolizing the seed of eternal self-renewal) called the nirvāṇa-part of the disc. These same numbers are given by the division of the Sanskrit alphabet into 51 letters or $3 + (3 \times 16)$ or 3×17, called also the Garland of the Goddess or Divine Mother, each representing one of her powers as "one moon reflected in countless waters" (Brahmabindu Upanishad).

Again, in the Ānandabhairava of Premadāsa (ed. by M. Bose, Calcutta, 1932) we read of the transhuman realm to which the sixteenth digit of the moon leads:

> From this world it cannot be viewed. It is the place of the hidden moon, and can be known only through inner consciousness.

The very word *soma*, the elixir of immortality in ancient Vedic tradition, is a name of the moon, whose power granted it.

The most ancient form of the lunar orbital dragon, still preserved in the *draconic* month of astronomy, was bird-like, with wings and a great bird's head (Fig. 1*i* and its explanation). Poised at the joining of the spheres of air and fire defined by the intersecting orbital planes of earth and moon respectively, the lunar bird-dragon was thus identified with the self-renewing fiery Phoenix—source of the old geographic name "Phoenicia," thus associated with immortality.

It was in that "Land of the Phoenix" (the present Lebanon) that the goddess Isis found the body of her beloved Osiris, slain through Set's treachery, and began to exercise her regenerating and immortalizing powers using a divine fire with flames that brought not death but life. The tale is thus told by Plutarch and other ancient writers:

> Isis at that time was accompanied by the god Anubis in dog form (cf. the other lunar goddess Artemis, and her pair of greyhounds, representing Anubis and Anpuat, his consort). He told her that the coffin-boat of Osiris had floated down the Nile and along the

Mediterranean coast, to be washed up on the Phoenician shore near the city of Byblos, where it became caught in the trunk of a cedar tree, which was then cut down by the king Malkandros [a corruption of Semitic and Greek, meaning "King of men"] to serve as a pillar in his palace.

Then Isis went to Byblos. She met the Queen's handmaids, and stroked their hair so that they became so wondrously fragrant that the Queen Saosis asked to see the mysterious stranger who could thus dispense ambrosia. Thus Isis became one of the Queen's intimates and was appointed royal nurse to the baby prince, whom she nourished with her finger instead of breast. During the night Isis called forth a lambent flame to burn away what was mortal in the child and make him as a god. At these times she, in swallow form—a hieroglyph which in Egyptian means "greatness"—would fly about the flame-enwrapped child chanting laments for Osiris.

One night, Saosis, having heard reports from a servant of strange goings-on, posted herself and kept watch. But when she saw her child with a radiant flame surrounding him she ran out crying in alarm. The goddess then assumed her divine form, rebuking the Queen that she had now interrupted the process and deprived her child of the benefits of the death-vanquishing flame.

Isis then requested and obtained the pillar which housed Osiris, which she wrapped in fine linen perfumed with fragrant oils, after having removed the coffin of Osiris. The pillar she gave as a sacred relic to Malkandros, where it was preserved, Plutarch recounts, to his day in the Temple of Isis at Byblos (Much as certain religious buildings in our day preserve purported relics like the Buddha's tooth or a fragment of Jesus' cross or robe.)

Then Isis wept over Osiris' coffin and took it away on a ship. At the first place she could come ashore again she opened the coffin, laid her cheek on that of Osiris, wet with her tears. Later, after many other vicissitudes, she restored Osiris, and united him with their son Horus, who thereafter kept Set at bay and worsted him.

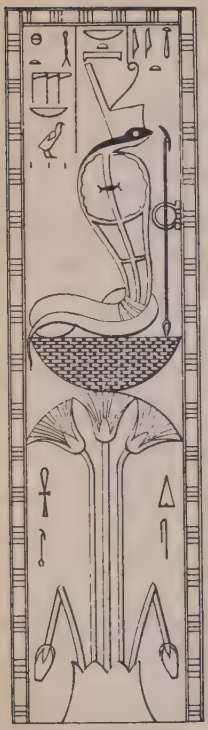
We begin to understand why Dante quoted the *Aeneid*, Bk. IV. Virgil, tapping the same ancient tradition, says in Dante's paraphrase, *Agnosco veteris vestigia flammae*: "I recognize tokens of the ancient flame." This is the undying flame of Isis that grants immortality and that is so intimately bound up with lunar affinities, as we have seen.

Explanations for Figures

Fig. 1: The Lunar Power

Sub-figures *a* and *c* are from bas reliefs of the tomb of King Seti I of Egypt, as drawn by Belzoni who first discovered the site in the nineteenth century. In sub-figure *a* the serpent is seated above the lotus plant as its lord, and wears the red crown of Horus; in *c* the serpent is similarly seated above a papyrus plant and wears the white crown of Osiris, with the red crown adjoined, making the so-called double crown, and to its symbols is added the *ḏeḏ* (the telephone-pole-like hieroglyph)—symbol of eternal stability and power to endure despite all change, another form of the same theme of the vanquishing of time in its Gorgon-like or Ahrimanic aspect (cf. Chap. 23, Figs. 5 and 6*a*).

Sub-figure *b*. Ancient Near Eastern emblem surviving in the trademark of the early sixteenth century Swiss scholar-printer, John Froben, friend of Paracelsus. Here the two (papyrus and lotus) aspects (the ida and pingala of Hindu yoga) join to climax in the central (sushumna) channel at the apex of which is the Bird-Power again, the power that can free man from mortality with even greater individuality than he enjoyed before; *d*, *e*, *f*, and *g* further illustrate this idea. Sub-figure *f* is from a Near Eastern cut gem (F. Lajard, *Culte et Mystères de Mithra*, Paris, 1847, Plate LIV-C, 6) and shows the divine bird on the lunar crescent (a form suggested also by the open loop formed by the two crowned serpents' heads at the top of the caduceus of *b*), thus connecting this caduceal bird with the bird-dragon's head and tail nodes of the lunar orbit (see *i*). Sub-figures *e* and *g* are watermarks from sixteenth century book papers and again show the tenacity of ancient ideas to survive in obscure but persistent ways. With regard to sub-figures *e* and *g*, see Chapter 23, Fig. 1*b*. Sub-figure *e* is of immediate special interest as the bird of immortality (hatched from the ankh-egg) surmounts what remains of the ankh: a tau-cross. To show this more clearly, a typical ankh (sub-figure *d*) has been placed to the left of the bird of sub-figure *e*.


a

b


f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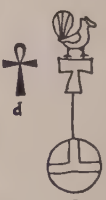

d e


g


h


i


j

Fig. 1

Fig. 2

This bird of immortality is also called the Fire-Bird or Phoenix (*j*), from a sixteenth century paper watermark. Design *h* (an eighteenth century printer's device) shows the amalgamation of the ancient Phoenix-Agni-Horus with a Christian aura-surmounted Pentecostal-type bird. In an Old-French quatrain—stemming from ancient sources preserved by manuscript tradition, and given by Pierre Moët on page 14 of his now rare Paris, 1660, edition of *The Twelve Keys of Basil Valentine*—the ageless Fire Bird, bearer of immortality, is succinctly and beautifully described:

> Ce Phoenix nompareil auec sa tresse blonde,
> Que Phoebus nous enuoye de la race des Dieux,
> Compassant tripl'en un, qui descend des hauts lieux,
> Pour le voir icy bas victorieux du monde.

which is to say

> This Phoenix without par, with tresses of blond fire,
> that Phoebus, the Immortal Sun, sends from the race of gods:
> Three powers unified, descending from on high,
> to give to us still here below the conquest of the mortal world.

In sub-figure *i* we see the intersection of the moon's and earth's orbit in the two nodes or intersections, called the Dragon's Head—Caput or Rahu (the ascending node, as the moon crosses the earth's orbit into north declination) and the Dragon's Tail—Cauda or Ketu—where the moon crosses to below the earth's equator. The design itself is at the end of chapter 43 of Francis Barrett's *Magus* (London, 1801), a curious work which he compiled from old books at the British Museum, unfortunately never giving the sources whence his notes and drawings were taken. Barrett, undoubtedly paraphrasing the old book whence he had copied the illustration (*i*), tells us:*

> They [the Egyptians, Indians, and Chaldeans] made also the image of the head and tail of the Dragon of the Moon, namely, between an aerial and fiery circle, the likeness of a serpent with the head of a

*The source is the early English translation, available to Barrett, of ch. XLV, 2nd book of Henry Cornelius Agrippa's great compendium *De Occulta Philosophia*, Cologne, 1533. Both the above cited passage and Fig. 1*i* are there. K. A. Nowotny's researches on Agrippa indicate ancient sources.

> hawk . . . for the Egyptians and Phoenicians do extol this creature above all others, and say it is a divine creature, and hath a divine nature; for in this is a more acute spirit, and a greater fire than in any other, which thing is manifest both by his swift motion without feet, hands, or any instruments; and also that it often renews its age . . . and becomes young again.

Sub-figure *i* definitely adds to an already rich identification of the Winged Power with the lunar power, in turn the harbinger of a supercelestial transcendent sun, from which the moon was held to signal a spiritual "light" by synchronization, whereas the light of the visible sun was physically reflected by the lunar orb.

Fig. 2: The Secret Lunar Alchemy

The designs of this figure center about "the crayfish formula" (design *b*)—famous among *cognoscenti*—first unearthed by Marcelin Berthelot among the old Graeco-Egyptian alchemical manuscripts at the Bibliothèque National in Paris. Indeed sub-figures *a, b, c, d, g, h, j, k* and *o* are all from Berthelot's published collection of manuscripts (Paris, 1887). Sub-figures *c, f, i, m, l,* and *n* lend interesting confirmation from other sources, as follows: *c* and *i* are fifteenth and sixteenth century book-paper watermarks; *f* is from an old Maltese coin as shown in A. Caruana's 1882 report on Maltese antiquities, cited also in Chapter 23, in the explanation of Fig. 3; sub-figure *m* is from a seventeenth century printer's device, enshrining much older symbolic thinking; sub-figures *l* and *n* are from Lajard (*op. cit.*), Plate LXXI, and are respectively from a Mithraic statue found in Rome and now at the Villa Albani, and from a gilded bas-relief from a Mithraic temple at Ostia, now at the Chiaramonti Museum—both in white marble. Both are interesting forms of Figure 6*a* of Chapter 23 (see previous explanation), in that we see by the crescent in sub-figure *l* that this lion-serpent form of cyclically transforming change was held to be lunar power; in *n*, the venom or bitterness of the time-serpent contributes an ingredient to the elixir of immortality in the ambrosial vase below, that vase being equatable to

the alchemical oven of sub-figures *b*, *j*, and *o*, the same symbol appearing in sub-figure *g*, and below the bull in Chapter 23, Fig. 6, the lion-serpent personage being there shown as two separate creatures. Our mistakes and their inherent pains and bitterness can also—when rightly regarded and understood—not only benefit us psychologically, but help in the compounding of the actual power that can transform us to a higher state where we no longer need, or need to undergo, the death experience.

We now turn to the most ancient extant descriptions of the aim and process of alchemy, which the Egyptian Zosimos, writing in Greek, explains as nothing less than the central goal of the ancient Egyptian religion: the attainment of individualized immortal life on the part of man, no longer subject to death. One of Zosimos' most significant treatises is his "Authentic Commentaries on the Letter Omega," which Berthelot speaks of as a mysterious formula, reputed to contain a concise summary of all alchemy. Omega itself, as the last letter, connotes the final attainment of the goal. Berthelot, though sensitive to the fact that Zosimos speaks not merely of chemistry but of human potentials, contents himself with a purely chemical explanation of the formula, neglecting the fact that all chemicals, as used in ancient alchemy, denoted psychodynamic processes or powers.

Hence Berthelot also misses the zodiacal sequence of the admittedly also chemical signs (2) through (13)—Aries through Pisces, the last being written like (3) or Taurus, since Venus ruled the latter and was "exalted" in Pisces—in the Crayfish Formula, Fig. 2*b*. Sign (1) symbolizes the *ouroboros* (shown large in Fig. 2*a*) or central cyclical process. Note the light and dark portions of the serpent, the dark or waning portion culminating in the head—the New Moon point. Sub-figure *d*, already current in Sumero-Babylonian times, shows how 2*a* is also a version of the lunar crescent (the 8-pointed stars refer to the 8 principal phases, to be described shortly), as well as of the Lunar Dragon or Griffon (Fig. 1*i*). The Chinese ideograph for "dragon" says literally: "Great Dragon standing (or based) on moon," showing that the idea had also penetrated China in antiquity. Externally, sign (1) in Fig. 2*b* signifies "note

well—something important here," but the reason it means that is as explained above.

Once we realize the formula contains a zodiacal sequence, we can identify the principal and largest sign (4) as representing Cancer (symbolized by a crayfish as well as by a crab in the older zodiacs), the thirty degrees of the zodiacal band governed by the moon. We have no space to trace the detailed connection between chemical and astronomical symbolic contexts in the formula. Suffice it to say that an eight-legged (Berthelot also notes this number) crayfish is directly linked with the eight primary phases of the Moon: new; waxing crescent, half and gibbous moons; full; waning gibbous, half and crescent moons. The same symbol, with an unmistakable capital letter omega on the head (thus linking it to the line of students of Zosimos' tradition) is found in sub-figure *i*, with another version in *c*—both ancient emblems being preserved as watermark designs used by European paper makers through the seventeenth century.

That the eightfold cycle of lunar phases (shown also by the crab in sub-figure *f*, from an ancient Maltese coin) connoted a psychological process is shown in the alchemical printer's device (*m*) with its eight principal rays centered on the human heart, shown burning, as a symbol of the living individual consciousness.

The crab, regarded as walking backward (actually it is more sideways), also could symbolize a cyclical process which by going forward in fact returned to the form of a previous stage, and so really went "backward." Interestingly enough, this is the central process, even when interpreted in terms of external chemistry, of the Crayfish Formula and the related old descriptions of the alchemical "oven" and its component vessels or chambers (sub-figures *h*, *j* and *o*, together with *g* and *k*). Berthelot himself summarizes this reflux-type of process, saying of this apparatus that it was designed for "a retrograde operation, that is one in which the products fallen to the bottom in melting re-ascended to the upper part of the apparatus by volatilization" (p. 150). In this connection, Berthelot misunderstands the word (in the MSS) *ithm''*, saying

"this word seems to be an abbreviation, with addition of an iota, meaning *ēthmos*, a cover pierced with holes" (p. 151); whereas there exists the perfectly good word *ithma*, a step, a motion; the double short stroke in the MS word signifies the plural, i.e. a process of steps, motions and hence *phases*, since the process was recurrent.

The "oven" or sublimation vessel thus is more like a bain-marie, and housed a cyclical purifying process, hinting at how the nature of man might be uplifted through periodic meditation properly synchronized with certain phases of the lunar cycle, already explained in the first part of this chapter. This is the egg of the human heart (consciousness, including the supraconscious), out of which, aided by the Great Dragon-Bird Power, the similarly immortal "bird" of the higher self of man hatches and can "fly away" (translated to a more profound region of higher, more comprehensive objectivity) even before death, if the process be thoroughly enough undertaken. This is the significance of the ancient Egyptian liturgical formula "I am in my Egg," assimilated to the restored eye of Horus (the left or lunar eye, which restores immortal life to the dead or mortal Osiris) This is the meaning of the "re-membering" (reassembling by recalling significance) Osiris.

The sublimation vessel—signifying the human heart, where the Great Work of alchemy is done—has characteristically three legs (sub-figures *h, j,* and *o*), suggested also in the three-lobed tail of the crayfish in sub-figure *i*. The most basic division of Agni, the holy transhumanizing fire linked with soma (the divine elixir) and hence the Moon (one of whose names is Soma) is a threefold one, appearing in later doctrine as the three gunas or modes of awareness, likened to light (sattva), fire (rajas), and darkness (tamas) in which there is a higher light, as a man's thinking in an outwardly dark room, or to change the image, his building better than he knows with his conscious mind.

The vessel of transformation—the human heart or consciousness (sub-figure *m*)—is thus symbolized as an alchemical vessel of sublimation and also as the vase (sub-figure *n*) in which the cyclical lunar distillation and sublimation process takes place, that vessel finally becoming the cup or grail containing the elixir, the divine nourishment—like a kind of royal jelly—that

induces the growth of a higher-type body characterized by freedom from disease or death. That body is symbolized by a winged creature—mostly a bird, but sometimes a butterfly, the true psyche or soul, clothed in its "winged" form, able to "fly" to a higher order of reality. Thus the crab or lunar process matures the butterfly or higher state (sub-figure *e*).

The fourth of the *Oracles of Zoroaster* in their earliest recension reads, "Do not strive to make your fate grow," or, in Indian terms, Do not thoughtlessly increase undesirable karma for yourself. This ties in with the ancient Hindu veneration of Mitra as greater than Varuna, for Mitra ruled the waning moon (by which one is liberated from the wheel of karma by its decrease), whereas Varuna ruled the waxing moon and worldly victories, with their entanglements of added fate. The waning moon was the time when all living things begin to be filled with the immortality-granting soma, the moon-distilled nectar of higher energy that, if regularly taken, would transform the body and free the immortal man in a new, radiant and almost infinitely more powerful vehicle.

The process is to be likened to that of the pupal transformation into the mature winged form. The larval organs are actually destroyed by dissolution within the pupal shell. But certain groups of cells, the seeds of the higher winged body (using the analogue of the butterfly), are not touched by the metamorphic dissolving process. They then germinate and, using the now malleable and dissolved larval body, transform it into their own nature. So in man, the ancient doctrine went, there are groups of cells—primarily in the brain—which are capable of germinating the higher body. But these can be stimulated by regular meditation and fasts at the right times, just as the larval caterpillar encloses itself within cocoon or chrysalis and abstains from its previous activities during its period of higher transformation.

A Modern and an Old Illustration

A contemporary and extraordinary instance of how archetypal images and thinking enter conscious awareness through inspirational states is afforded by the clearly vatic poem (recently

spontaneously written and heretofore unpublished) by Alan Brilliant, entitled "*Lapis Angularis*: Cornerstone." The poet did not know why this piece had been selected to be quoted, nor had he known the thesis of this chapter, nor studied the field, nor discussed any aspect of it with either author or editor. The original text follows, and then is repeated as prose, with running commentary in square brackets or, more properly, a symbolic decipherment, with a key familiar to those who have studied alchemical imagery. The poem illustrates the universality of access—with some distortion—to certain states of consciousness on the part of some motifs in this and Chapter 23.

> These are the steps before the flesh decomposes
> the blood turns to water and the bones to dust:
> The woman must mate with her son
> The viper must enter the home
> The days in the home shall be three thousand
> The black rose of eight petals
> must entrap the serpent
> The blood must separate
> from the flesh.
> Then on the wind the poet's song from before birth
> shall return to him and dust be banned from the world.

Now the interpretation:

[The cornerstone of a regeneration to eternal life is thus described.] These are the steps [to be performed] before the flesh decomposes, the blood turns to water and the bones to dust [i.e. *before* death]:

The woman [the psyche or soul] must mate [amalgamate] with her son [the new and higher self, born out of the old]. The viper [the serpent power or cosmic energy] must enter the home [the body]. The days in the home shall be three thousand [the threefold development of Head, Heart and Hand—thought, feeling and deed—a thousandfold, i.e. to high degree]. The black [i.e. in the unmanifest] rose of eight petals [the primordial eight cosmic powers in the goddess-component of the seed of the higher body—cf. Figs. 2*b*(5) and *m*] must entrap the serpent [the *Logos spermatikon* or god-seed, sparking higher growth]. The blood [life] must separate from the flesh [the mortal body].

Then on the wind [the swift bird-like power from on high] the poet's [initiate's] song [the joy of a pre-mortal state] from before birth shall return [be restored] to him and dust [death] be banned from the world [by the attainment of the immortal state].

In James O. Halliwell's great antiquarian collection *The Nursery Rhymes of England* (4th ed. London, 1853) there is a remarkable rhyme that goes back to ancient sources and that shows the power of persistence in the human mind of the important idea of a method of transcending death. It runs, with the interpretation in parentheses:

About the bush, Willy,
  About the bee-hive (i.e. on the other or
    beyond-death "side" of our busy, buzzing world),
About the bush, Willy,
  I'll meet thee alive (i.e. in the immortal state
    at last, fully regenerated—fully alive),

Then to my ten shillings
  Add you but a groat,
I'll go to Newcastle,
  And buy a new coat (i.e. to the Castle of New
    Life to obtain a new and higher body, cloak
    or vehicle for the expression of consciousness).

Five and ten shillings,
  Five and a crown (i.e. the crown coin worth five
    shillings symbolizes the crown of deathlessness,
    "five" being the number anciently associated
    with resurgent life and also symbolizing the
    *quint*essence, fifth substance or ether—the
    deathless portion of the four material elements):
Five and five shillings,
  Will buy a new gown (the immortal body,
    the seamless "robe of light").

Shakespeare, the greatest poet of them all, summed it up in his deepest sonnet, the one hundred forty-sixth, which concludes, in agreement with this chapter, that

So shalt thou feed on death, that feeds on men,
And death once dead, there's no more dying then.

Working with the Hypernumber Idea

26

Charles Musès

The concept of number is at once familiar and paradoxical. With the growth of cities, house numbers became a necessity, and in many cases street numbers as well. No longer is even a personal number familiar only to a convict, for now every person is saddled with some kind of governmental Big Brother computer number, the better to keep an eye on us.

We practically could not live without telephone numbers, and there never has been civilization without some kind of calendar numbers to designate the passing of time and the recurrence of weeks, seasons, years, and groups of years such as centuries and millennia in our system. All prices are marked in numbers, and we add them up almost daily in grocery bills.

Despite all this humble ubiquity, there remains something intrinsically mysterious about the number concept, and people everywhere are ready to accept the fact that mysteries also are lodged in numbers and their relationships. This dual role of being at once the most ridiculously familiar and the most sublimely recondite has lent number an ambivalent quality. Numbers are at once obvious and most forbiddingly impenetrable. Some people, especially those who have been taught by rote instead of by understanding, have even found numbers and their doings terrifying. So much so that a blankness of apprehension arises like a monstrous apparition at the very mention of the word mathematics.

Most of these reactions are eloquent testimony to the repellent quality and methods of most current mathematics

teaching and presentation. Actual models are hardly ever given, nor useful, enlightening analogies, nor interesting human anecdotes from the past or the present.

The hopeful fact remains that educators at large are beginning to realize many of the repulsive features embedded in the prevailing methods of teaching and writing about mathematics, which is after all one of the keystones of twentieth century culture and achievement. So it is natural to predict that in the coming decades there will be a much greater penetration by more people than ever before into the treasures of number.

The persistent and fruitful human intuition that numbers conceal powerful mysteries of comprehension and insight will be more than justified as men work with new and higher kinds of number—the hypernumbers already mentioned in our chapter on the exploration of consciousness. New powers will thereby be released not only adding to man's ability to do things but also increasing his ability to heighten, deepen and illuminate awareness beyond what he previously imagined was possible. This idea is inherently exciting, and although some may find some of the following pages demand close attention, they all belong to the same idea, are all part of "the same bag."

The following results are too relevant to the heightening of human awareness to be allowed to remain in the comparative oblivion of books or periodicals of specialist élites.

This chapter is for those who have read the passages on hypernumbers and the world of simulacra in Chapter 8 and want to know more—or for those who are simply curious.

The Flawed Process of Making Scientific History

Since the most archaic times a prime characteristic of man was his use of numbers and his insight into their meaning through the symbolic manipulation of them, called arithmetic and algebra.

But the idea of different *kinds* of number, each with its own nature reflected in a different and characteristic arithmetic, was acquired slowly and rather painfully. Even negative numbers

were called by the Greeks "nonexistent." There was the inevitable historical routine of first decrying or even attempting to deny the existence of the unfamiliar—as those who refused to look through Galileo's telescope for fear they would see something to upset inflexible and limited prejudgments. The second and more modern phase of this routine—borrowed, however, from time-honored ecclesiastical and political practice—is finally to accept the new finding and then to assimilate it so thoroughly into the established views as often even to change its name, so as to hide the fact that the same group that now accepted it had before denied it or ignored it by conspiracies of silence.

Thus at the turn of the century, the genius of Oliver Heaviside discovered how to use a whole new class of functions—the infinite impulse functions—which he formed by taking the derivatives of the step functions he had also discovered. The mathematical and scientific establishment of his day would have none of it—but later, as it became more and more evident that Heaviside's impulse functions were indispensable in electronics and quantum physics, they were admitted—but not honestly, as derivatives of Heaviside's step functions. Rather the new masking and really inapplicable term "distributions"—some less kind would call it gobbledygook—was invented for them, and Heaviside's name in this important connection could remain consigned to an oblivion of really petty and unforgiving conspirational silence. He had compounded his great error of joining no establishment cliques of his day by very able satire against those cliques. Now he would be "punished" by a continuing series of smaller and envious minds, until enough generations had elapsed to forget to be unfair.

But, "murder, though it have no tongue, yet speaks with most miraculous organ." And the attempted historical murder of men's reputation and genius is no exception. Sometimes, as in the cases of Evariste Galois (whom the mathematical establishment virtually forced into a tragic death at age twenty) and Nicolai Lobachevski, the establishment has made good. In many other cases, as in Paul Gerber's 1898 discovery and prediction

of the exact amount of Mercury's perihelion shift,* it never has made good, to the dishonor of official history. In Heaviside's case, it only partially made good, and his own discovery of the derivative of his own step function is still called "the Dirac" delta function. Paul Dirac, despite his other ample claims to fame, sad to say, never publicly protested the misnomer.

Luckily, in every establishment there are gifted men of integrity who do not follow the usual censorship tactics of controlling groups—in the recent past, men like William James in psychology, G.H. Hardy (who rescued Ramanujan from oblivion) in mathematics. Their number, however, seems to be even smaller than the number of self-taught men who break into the establishment more through felicitous series of circumstances than through any generous-minded effort of acceptance or welcome. As Freud once well said, if the jealousy between adult males could be eliminated or even markedly lessened, human society would speedily blossom.

Beneath the surface of late twentieth century mathematics a thus far fairly quietly burning controversy is becoming more insistent because of the mounting evidence that hypernumbers (openly symbolized as such) *beyond* $\sqrt{-1}$ should be admitted by the reigning establishment even if some face be lost because of prior failures to recognize that the explicit presence of such hypernumbers was demanded by a deeper analysis of the assumptions of arithmetic and the nature of number.

This is a very recent subject, and before the investigations of the present writer, the existence of only the first hypernumber beyond $\sqrt{-1}$ was known or suspected. Many fundamental properties of this hypernumber were unknown and it was even denied (as late as 1968) that it could have a square root.

Hypernumbers beyond $\sqrt{-1}$ (which can be considered the first hypernumber) are just beginning to be accepted and

*Gerber's equation for the perihelion shift is exactly the same as Einstein's equation, announced a few years later, early in the twentieth century. (See Paul Gerber, pages 93-104, *Zeitschrift für Mathematik und Physik*, vol. 43, 1898.) Sir Edmund Whittaker in the second volume of his history of theories of electricity and the aether has partially rectified the Mercury perihelion oversight, but the great bulk of the literature has not.

recognized. Even $\sqrt{-1}$, commonly symbolized as i, had a hard uphill fight and even Carl Gauss, the leading mathematician of his day in the early nineteenth century, hesitated because of anticipated conventional criticism, to use it in geometry, where it elegantly and usefully leads to non-Euclidean or non-flat, that is, curvilinear, geometric ground surfaces and ground spaces. Fashion in the late nineteenth and early twentieth century then veered to the other and equally incorrect extreme of believing "non-Euclidean" geometries a total break with Euclid, failing to see how every such geometry could be included in the perfectly bonafide Euclidean geometry of one higher dimension. One of the great lessons of the history of mathematical discovery is the law of the unification of all reality, in the sense that only relative and never absolute discontinuities exist.

Equations demonstrating the arithmetic and algebraic existence of $\sqrt{-1}$ (such as $x^2 + 1 = 0$) had been well known at least since the Italian Renaissance, but it took about a half a millennium more for these so-called imaginary numbers to become accepted by men at large, when it was found that without using $\sqrt{-1}$ satisfactorily, simple representations of electromagnetic phenomena and effects were not possible. As Professor Wigner makes clear in his chapter, $\sqrt{-1}$ enters quantum physics as a physical fundamental and not merely as an elegant technique.

How Hypernumbers Started

So let it be with hypernumbers, which really got into their stride when William Rowan Hamilton in 1843 found higher orders of $\sqrt{-1}$ which no longer followed commutative arithmetic, but were sensitive and reacted differently to multiplication from the right or from the left. Such numbers (which Hamilton called "quaternions" because they were based on four mutually perpendicular number-axes) thus could not be "commuted" or interchanged as factors with impunity, as ordinary numbers can.

Less than one year later in 1844, Hamilton's friend and fellow

mathematician, John Graves, discovered still higher orders of $\sqrt{-1}$, which Hamilton's genius correctly surmised would no longer follow the associative rule of arithmetic, wherein (xy)z indicates the same product as x(yz). Arthur Cayley, who had attended Hamilton's lectures, and was *au courant* with the Graves' discovery, a year later expanded these results into a full-blown "nonassociative" algebra.

The early twentieth century saw these algebras completed by Adolf Hurwitz's discovery of the 24 fundamental units of Hamilton's noncommutative algebra, Leonard Dickson's proof that every number in the Cayley-Graves nonassociative algebra had a finite reciprocal, and H.S.M. Coxeter's demonstration that the 240 units of the latter algebra were isomorphic with the centers of the 240 equal 8-dimensional spheres that could maximally be packed around a central 8-dimensional sphere. Previously it had been found that the 24 units of Hamilton's algebra were isomorphic to the centers of the 24 equal 4-dimensional spheres that could just be packed around a central 4-dimensional sphere. In 1964 we published in preliminary form the finding of the first nondistributive algebra, and later showed it must necessarily involve non-ordinary or "non-real" forms of $\sqrt{+1}$, in addition to higher forms of $\sqrt{-1}$, and that it contains 24 instead of the expected 16 or 32 elements.

Hypernumbers in Physics

William Kingdon Clifford in the latter nineteenth century first speculated that there should exist a kind of number, which would be a hypernumber, let us call it ϵ, such that its square was +1, although ϵ itself was neither +1 nor −1. Little was done to work out the arithmetic and algebra of such a number, although Eduard Study at the turn of the century did some work using it in projective geometry. Up to 1968 it was believed that this number had no square root, in fact no even roots at all (see Appendix to this and the previous section for details).

Modern quantum physics really brings ϵ to the forefront of

use; ϵ enters quantum physics not by anyone's choice but by observational necessity, through (see addendum to this section in Appendix):

(1) the Pauli spin operators
(2) the Dirac spinors
(3) the projection operators
(4) the neutrino operators
(5) the proper square roots of zero used in Dirac's quantum field theory

in all of which ϵ appears disguised in matrix forms.

In all these categories the basic building blocks are the mutually associative but noncommutative members ϵ_1, ϵ_2 and ϵ_3 (the first three hyperforms of $\sqrt{+1}$), from which all the other hyperforms of $\sqrt{+1}$ appearing in quantum physics are derived. The numbers a and b are noncommutative if the product $a \times b$ differs from the product $b \times a$; and a, b, c are associative if $(ab)c = a(bc)$. Also $\epsilon_1\epsilon_2 = -i_3$, $\epsilon_2\epsilon_3 = -i_1$, and $\epsilon_3\epsilon_1 = -i_2$, where i_1, i_2, and i_3 are Hamilton's quaternion elements. (All these have matrix forms, given later in this Appendix.)

Hypernumbers Beyond $\sqrt{+1}$

Calling the unit (± 1) of the ordinary or real number axis r or "u_1," i.e. the first kind of unit, we can term $\sqrt{-1}$, "u_2" or i; and the proper $\sqrt{+1}$, "u_3" or ϵ. We are now in a position to ask how much farther we may go in this way. (At the end of this chapter, in the addendum "Number Fauna and Flora," a table of hypernumbers, their orbits and their behavior, will be found.)

It is clear that what we are doing is elaborating the very core of mathematics itself, since every new kind of number brings with it another species of arithmetic, and hence of algebra and function theory. Also, neither projective geometry nor topology is independent of the number concept, although this has not always been realized.

Already Cayley, following the lead of Poncelet, was able to show that projection geometry was intimately bound up with the arithmetic and algebra of $u_2 \equiv \sqrt{-1}$; and topology requires numbers to specify its basic concept of *genus*,* as well as that other topological concept, *dimension*. To specify the units of negadimension (negative dimension), we require $\sqrt{-1}$, as Hermann Weyl showed early this century. We have also found that ϵ as well as i enters into the concept of a *fractional* dimension, which is no more a broken dimension than a half-formed baby is a baby cut in half. The geometry of fractional dimensions involves, we also found, very fascinating wave and frequency forms, and shows that all the geometries of integer dimension possess a wave-like microstructure.

Hypernumbers and Cosmology

As Chapter 9 has already made clear, the factor of consciousness enters fundamentally into the most recent physics. The physical world seems to be a sort of iceberg, the vast hidden portion of which involves the nature of consciousness.

It is not surprising, therefore, that as we proceed up the ladder of the hypernumbers we should find that more and more we are enunciating the mathematical representation of the operations of the mind. Some of these interrelations the reader will find mentioned in Chapter 8, where we noted that mathematics maps not only the nature of the physical cosmos but of the inextricably related bio-psychic cosmos as well. (Hypernumbers beyond ϵ or u_3 devolve almost wholly on the latter.) We use the word cosmology here in this deepened and very modern scientific sense.

This is not the occasion for more details, and the interested reader will find some in the Appendix. Suffice it now to say, it appears that the fourth form of number (u_4) is able to map the nature of attention focus and intensity; and that u_4 is likewise

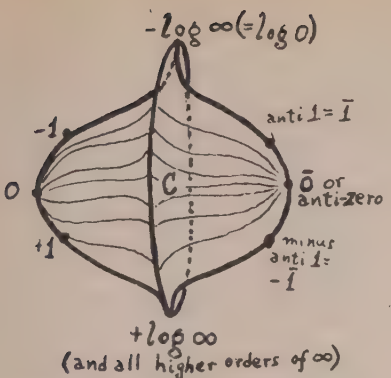
*A sphere has genus zero; a doughnut, genus 1, because it requires one cut to turn it into a form of genus zero or "simply connected."

relevant to the nature of the selectivity, conditioning and cueing of attention, and hence to the process of suggestion and the consequent altering of states and levels of consciousness; that u_5 can map memory processes, including transconscious memory; that u_6 relates to ecology, feedback, and the stability of systems, including their type of entropy: positive, null, negative, or hyper (e.g. *i*-type entropy); and that u_9 bears on the constant integration through time, which is characteristic of selfhood or individuality. (The actualizing of the potential of this selfhood for evolutionary and metamorphic transformation, i.e. for self-transcendence, is mapped by u_7.) Zero turns out to be u_0 or ϕ, the zero realm of infinitesimals, or potentialities; whereas u_1 is the unit of ordinary numbers for measurement in the sensory world. For each kind of number (zero included) there is an anti-number, on the opposite surface of the hyper-number solid (Fig. 1). It will be noted that minus infinity ($-\infty$) and anti-infinity ($\bar{\infty}$) meet, as do ∞ and $-\bar{\infty}$. Note that $u_9 u_1 \equiv \sigma u_1 = u(t) = t$, or *time*, where $u(t)$ is the unit step function, but $\sigma u_8 \equiv \sigma v = e^t$, or super-time, sensed in Milne's cosmology; w or u_7 enables the transition since $v^4 = w^2$.

In many ways, u_7 or w is the most extraordinary of all the axial forms of number, for it alone represents what can lead out of the superhologram screen-world of simulacra (see Chapter 8) to the source (C) whence that world is projected (Fig. 1). Thus u_7 or w, and u_8 or v, relate to the mathematical representation of processes of insight and self-transcendence.

Algebraically, as the addendum on w at the end of this chapter shows, w possesses an extraordinarily rich contribution

FIGURE 1*a*. The superhologram screen of the physical universe is shown as the region of curved surface in the figure bounded by the profile arc running through +1, 0 and −1 and the circular arc of the "rim" encircling the figure through the points $+\log\infty$ and $-\log\infty$. The similar surface on the right-hand side of the figure is a similar anti-world screen, the common source of the two sets of projections being at C (cf. Fig. 1*b* and its explanation), the emission point for projection images from an entire super-objective universe beyond ours. Number axes are ultimately curved (though the radius of the curvature is very large), and they may have cusps at $\pm\log\infty$, as shown. Each hypernumber orbit (see caption for Fig. 1*b*) with a cusped axis (and one, that of w, without cusps) contains a separate antipodal orbit in a neighborhood beyond infinity, in addition to the ordinary orbit in the neighborhood of zero. Beyond infinity can be considered as anti-zero, the other pole of zero. To harmonize this walnut-type of figure with the spindle-type number-solid of Fig. 1*b*, a 7-dimensional metaspace curved in a flat 8-space is required. In such a space Figs. 1*a* and 1*b* are simply two views of the same meta-solid. In terms of cosmology (which



the hypernumbers map), at the sharp cusp of the figure the velocity of all wave energy slows down and approaches zero, and consequently the time needed to do the same task infinitely expands (to keep Planck's action–Energy × Time–a constant), thus making the cusp an unbridgeable barrier by any effort that seeks to cross it directly.

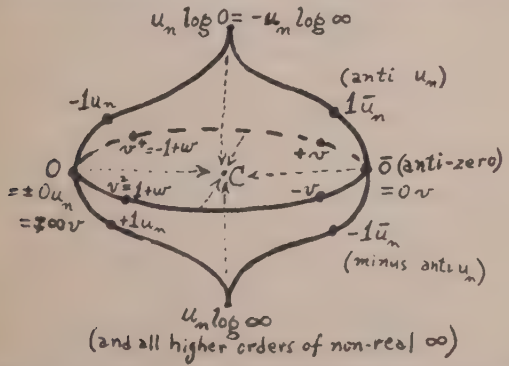


FIGURE 1*b*. The shared v and w axis (forming the central circle showing as an ellipse in the figure) and its intersection with the other (hyper) number axes at zero and infinity. Those mutually perpendicular (hyper) number units (u_n) whose axes have thorn-like cusps (Fig. 1*a*) at $\pm u_n \log \infty$ are: u_1 or r, the unit "1" of the axis of ordinary numbers; u_2 or the elemental (i.e. uncompounded and non-composite) square root of the negative unit, i.e. $+\sqrt{-1}$, sometimes called i; u_3 or ϵ (not +1); u_4 or p, the proper elemental square root of zero; u_5 or Ω, the proper elemental infinite root of zero, is the hypernumber which has left- and right-hand Cornu spirals for its power orbit; u_6 or m is the hypernumber with a complete system of Cassinian ovals as its power orbit. For u_7 (w) and u_8 (v), see Fig. 1*c*. The orbits of u_1 through u_4 are

described in the Table of Hypernumbers in this chapter. The logarithms of infinity ($\log\infty$) and of 0 ($\log 0 = -\log\infty$), respectively the positive and negative forms of the lowest or zeroth order of infinities, form the two sharp cusps above and below in the figure. Only the orbit of u_8 or v (note that though v and w share the same axis they have different orbits) can negotiate the passage from 0 to $\bar{0}$ (anti-zero) without meeting the cusped rim or discontinuity shown in Fig. 1*a*; the hypernumber u_9 or σ (which may run along any axis), and its first negative power σ^{-1}, refer to the integration and differentiation processes of time or duration, with respect to which change occurs. On the v orbit, time is modified so as to enable v to reach infinity from zero without meeting the cusp or rim of Fig. 1*a*. The circular, uncusped axis of v runs through a metaspace higher than the combined spaces of all the kinds of number from u_1 through u_4; v or u_8 is the only hypernumber that can represent the modification of time by affecting the amount of available energy, and hence the duration needed to achieve a given outcome—while maintaining that amount always high enough so that the time needed for the event never exceeds a well-manageable value. The hypernumber counterpart of negative entropy is thus v. But without the w orbit we could not orbit to v from the axis of ordinary numbers, and thus w is the vital link in the transcendent metamorphosis represented by the passage of v from the finite realm through infinity.

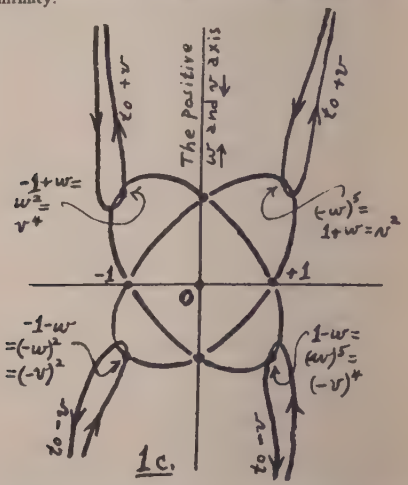


FIGURE 1*c*. The unit power orbits of w or u_7 are the pair of perpendicular ellipses given by $x^2 \pm xy + y^2 = 1$ in Cartesian form. The orbit of v or u_8 consists of the four comet-like curves shown, whose Cartesian equation is $y = \pm(x^4 \pm\sqrt{x^2 - 1}\,)$, with x the axis of ordinary numbers and y, the v axis, shared also by w. At infinity, the four v-curves all join at the point $x = 0$, $y = 0v$. (None of the drawings of Fig. 1 are exactly to scale.)

of new functions and phenomena. In physics w enters fundamentally into the vast differences found by modern quantum physics to exist between an observed and a pre-observed particle. Observation or awareness changes the complexion of the world's probabilities.

We will end these necessarily brief observations with a prophetic quotation from Ludwig von Bertalanffy's first volume of *Theoretical Biology**:

> When we remember that completely new mathematical developments [i.e. the differential and integral calculus for classical physics, and group, matrix and complex-variable theory for quantum physics] were necessary for treating the most elementary physical systems, developments that challenged mathematical physics up to exhaustion, it would seem rather improbable that for the treatment of the most complicated systems in nature—the biological organisms—a mere application of routine physics and physical chemistry should suffice.

That these remarks apply *a fortiori* to psychological processes is evident, and we predict that the completely new mathematical developments here needed will fundamentally involve hypernumbers beyond $\sqrt{-1}$ or $\sqrt{+1}$.

In all this let us not forget the wise comment of the mathematician J.L. Synge who noted that "mathematicians, of all scientists, present to their colleagues in public the most austere and unrevealing mask. Behind that mask there are quick jumps of intuition and much mental stumbling and confusion. As a rule [and this is highly unfortunate] the smooth presentation of a finished paper shows neither one nor the other"; and "when a new idea of penetrating generality is introduced, it is not enough to trust its future to a few papers. All sorts of particular and elementary applications have to be worked out before the new idea is accepted into the circle of mathematical familiarity." (*Scripta Mathematica Studies*, No. 2, pp. 20 and 24.)

*Cited by us previously in the *International Journal of Bio-Medical Computing*, vol. 1 (1970), p.167 in an article on higher operators in biology. This chapter and appendix, together with *Journal for the Study of Consciousness* (vol. 5, no. 2, research note on algebras and hypernumbers, 1972, and vol. 5 no. 1, 1972) update the 1970 article.

The mathematician C.C. MacDuffee, bringing us back to the first remarks of this chapter, mentions (*ib.*, p. 30) even more clearly "the unreasoned criticism which is usually meted out to authors of unorthodox discoveries." Such short-sighted criticism, often simply erroneous, can halt progress for more than a generation, and is but a form of the same unreasoning aggression that man is now so desperately seeking to weed out from his political life. It must not be allowed to remain in his cultural life either, for it perversely attacks the most creative minds and obstructs originality. Its elimination, even in some significant measure, would bring untold benefits of new insight to the race. We are now living through a time in history where such insights may well be the sole way to the survival of intelligent life on this planet.

Hypernumbers beautifully illustrate what may be called the *other edge* of "Occam's razor": a new concept, however unfamiliar, is not to be barred from consideration when it is demanded by a gap in a chain of implication or when it makes a reduction in previous hypotheses possible, or shortens existing proofs.*

Appendix

Addendum to How Hypernumbers Started

In February 1968 we showed that the explicit form of $\sqrt{\epsilon}$ was $\pm\frac{1}{2}(1+\epsilon-i+\epsilon i)$,* and later showed that the operator $\epsilon i \equiv i_0$ plays an essential part in transforming from the circular trigonometry of $\sqrt{-1}$ to

*The principle of parsimony, otherwise called "Ockham's (or Occam's) razor" after the very astute medieval logician William of Ockham, states that when two assumptions can fully explain something, don't invoke three or four; that in general, hypotheses should not be multiplied without explanatory need: *Essentia non sunt multiplicanda praeter necessitatem*.

*Note that the square root of ϵ requires a 4-dimensional space, whereas ϵ itself requires only 1-dimension. That the square root of a number may require a space of more dimensions than the number itself needs, is a phenomenon that occurs also in the square roots of quaternions. Thus $+\sqrt{i+j} = 2^{-1/4} + 2^{-3/4}(i+j)$, which needs a 3-dimensional representation space, whereas $(i+j)$, itself requires only a plane. Again, the positive square root of the 3-dimensional number $(i+j+k)$ is the 4-dimensional number $(\sqrt[4]{12}/2) + (i+j+k)/\sqrt[4]{12}$.

the hyperbolic trigonometry of ϵ, which may be called the proper square root of unity. Note that i_0 is a form of $\sqrt{-1}$ that is *commutative* within the entire system formed from ϵ_0 ($\equiv 1$), ϵ ($\equiv \epsilon_1$), ϵ_2, ϵ_3, and the corresponding quaternions $i(\equiv i_1)$, i_2 and i_3. That is, $i_0 x = x i_0$ where x is any one of the seven operators of the system just specified. The only other commutative operator in the system is 1 itself, which in this notation can be written as ϵ_0 as already given. Thus only the zero subscript denotes an operator commutative in the system.

We also showed that there is a fundamental *counterpart* of DeMoivre's formula for $\sqrt{-1}$: $e^{\pm n\theta\epsilon} = (\cosh\ \theta \text{ b } \sinh\theta)^n = \cosh\ n\theta \pm \sinh\ n\theta$ thus avoiding all the previously used cumbersome binomial expansions and the use of equally awkward and laborious formulas of hyperbolic trigonometry.

Addendum to Hypernumbers in Physics

These noncommutative hypernumbers, like their corresponding quaternions i_1, i_2 and i_3, have distinct and unique elementary matrices, as follows (all i_n are forms of $\sqrt{-1}$; and all ϵ_n, of $\sqrt{+1}$):

$$i_1 \equiv i = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix};\quad i_2 = \begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix};\quad i_3 = \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$$

$$\epsilon_1 = \begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix};\quad \epsilon_2 = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix};\quad \epsilon_3 = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

These last three hypernumbers turn out to be the Pauli spin operators that govern the spins of elementary particles such as electrons and protons. The 2×2 matrices containing i as an element may be made into real 4×4 matrices by substituting for i its real matrix $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$.

To these must be added the hitherto unrecognized operator and its matrix, the *commutative* form of $\sqrt{-1}$, $i_0 = \begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$, to which corresponds the other elementary Jordan matrix: $1 \equiv \epsilon_0 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ The operator i_0 is fundamental to spinor and neutrino theory, though that fact has remained implicit since the commutative operator i_0 was not explicitly recognized or identified. Note that if $n > 0$, $i_0 i_n = i_n i_0 = -\epsilon_n$, which can be verified by matrix multiplication. For those who have not done this, we recall that the product of the matrices $\begin{bmatrix} a_1 & a_2 \\ a_3 & a_4 \end{bmatrix}$ and $\begin{bmatrix} b_1 & b_2 \\ b_3 & b_4 \end{bmatrix}$ in that

order, is the matrix $\begin{bmatrix} a_1b_1 + a_2b_3 & a_1b_2 + a_2b_4 \\ a_3b_1 + a_4b_3 & a_3b_2 + a_4b_4 \end{bmatrix}$ Hence the square of the matrix $\begin{bmatrix} a_1a_2 \\ a_3a_4 \end{bmatrix}$ is the matrix $\begin{bmatrix} a_1^2 + a_2a_3 & a_1a_2 + a_2a_4 \\ a_3a_1 + a_4a_3 & a_3a_2 + a_4^2 \end{bmatrix}$ This last result enables us to verify by matrices that $\epsilon_n^2 = +1$ and $i_n^2 = -1$ for all n. The elementary matrix of zero is $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, and is, for instance, the product of $(1 + \epsilon_n)$ and $(1 - \epsilon_n)$, even though neither factor is zero.

Operator rules, which allow us to dispense with the labor of matrix multiplication, and even do what it could not do are:

1) If $i_a i_b = i_c$ (and if $a = 1$ or 2 or 3, $b = 2$ or 3 or 1 and $c = 3$ or 2 or 1 respectively), then $\epsilon_a \epsilon_b = -i_c$ and $i_a \epsilon_b = \epsilon_a i_b = \epsilon_c$. Also $(xy)z = x(yz)$, where x, y and z are any of these operators taken separately at random; and $xy = -yx$.
2) $i_0 i_n = i_n i_0 = -\epsilon_n$, whence $i_0 \epsilon_n = \epsilon_n i_0 = i_n$, and $i_n \epsilon_n = \epsilon_n i_n = i_0$.
3) $\epsilon_n^2 = +1$ and $i_n^2 = -1$ for all n.
4) $e^{\pm\theta i_n} = \cos\theta \pm i_n \sin\theta$.
5) $e^{\pm\theta\epsilon_n} = \cosh\theta \pm \epsilon_n \cosh\theta$, which extremely simplifies hyperbolic trigonometry.
6) $\epsilon_n^k = \cos^2 \frac{\pi}{2}k + \epsilon_n \sin^2 \frac{\pi}{2}k - \frac{i_n}{2}(1 - \epsilon_n) \sin \pi k$, which furnishes a whole infinite set of hitherto unknown roots of unity, since k may be any number, including i_n or ϵ_n.
7) Hence $\sqrt{\epsilon_n} = \pm\frac{1}{2}(1 + \epsilon_n - i_n + \epsilon_n i_n) = \pm\frac{1}{2}(1 + \epsilon_n - i_n + i_0)$, thus correcting the 1968 statement that $\sqrt{\epsilon}$ "does not exist" (by a Russian mathematician, there having then been no other opinion voiced, our finding having been made in early 1968 and published the same year).
8) $\cosh\theta\epsilon_n = \cosh\theta$; $\sinh\theta\epsilon_n = \epsilon_n \sinh\theta$.
9) $\cos\theta\epsilon_n = \cos\theta$; $\sin\theta\epsilon_n = \epsilon_n \sin\theta$.
10) Where $n > 0$, $\log_e \epsilon_n = -\frac{\pi}{2} i_n (1 - \epsilon_n) = -\frac{\pi}{2}(i_n - i_0) = +\frac{\pi}{2}(-i_n + i_0)$. In matrix form:

$$\log \epsilon_1 = \frac{\pi}{2}\begin{bmatrix} i & 1 \\ -1 & i \end{bmatrix}$$

$$\log \epsilon_2 = \frac{\pi}{2}\left(\begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix} + \begin{bmatrix} -i & 0 \\ 0 & i \end{bmatrix}\right) = \begin{bmatrix} 0 & 0 \\ 0 & \pi i \end{bmatrix}$$

$$\log \epsilon_3 = \frac{\pi}{2}\begin{bmatrix} i & -i \\ -i & i \end{bmatrix}$$

Note that n must be less than 4 and greater than zero in rule 2 above, as well as in the second equations of rules 7 and 10. If n equals or exceeds 4, then ϵ_n is not a matrix, nor is i_n.

Thus the nature of $\epsilon_n \equiv u_3$ is intimately connected with and derivative from the nature of $i_n \equiv u_2$, the preceding hypernumber, much as a rectangular hyperbola $(x^2 - y^2 = a^2)$ is derived from a circle $(x^2 + y^2 = a^2)$ by the transformation of $y \to yi_n$. The exponential of θi_n is a circle whereas that of $\theta\epsilon_n$ is a rectangular hyperbola.

The projection operators are specifically $\frac{1}{2}(1 \pm \epsilon_n)$, which is to say zeroth powers of divisors of zero and hence divisors of zero themselves. The Dirac spinors imply also a wholly commutative $\sqrt{-1}$, usually given by a cumbersome matrix, but which is actually the hypernumber i_0. Its properties other than commutativity are expressed by the equation $i_0 i_n = \epsilon_n$ where n is other than zero. Its simplest matrix form is $\begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$, where $i \equiv i_1 = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ effecting in the r, i_1 plane a 90° counterclockwise turn. The proper square roots of zero mentioned last in the above list, when freed from their cumbersome matrix expressions, turn out to be based on hypernumber operators of the form $(i_a \pm \epsilon_b)$, where $a \neq b \neq 0$, that is where $i_a\epsilon_b = -\epsilon_b i_a$, and thus $(i_a \pm \epsilon_b)^2 = 0$, since for instance $(i_a + \epsilon_b)^2 = i_a^2 + (i_a\epsilon_b + \epsilon_b i_a) + \epsilon_a^2 = -1 + (0) + 1 = 0$.

Addendum on *w*

It can be shown that the real powers of w (that is w^k, where k is any positive or negative number) lie on an ellipse in the w-plane with center at zero and with major axis along the diagonal running from upper left to lower right; the intercepts on the w-axis and on the real axis are $\pm w$ and ± 1 respectively. The Cartesian equation of this ellipse is $x^2 + y^2 + xy = 1$, and thus the absolute value of every power of w is unity. Thus the square root of w is $\frac{1 + w}{\sqrt{3}}$, the absolute value of which is $\left(\frac{1}{\sqrt{3}}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2 = 1$. In general, the absolute value of $Rw^k(= a + bw)$ is $+\sqrt{a^2 + b^2 + ab}$. The natural logarithm of w is given very approximately by $-0.6 + 1.18w$.

From the remarkable characteristic properties:

$$w^2 = -1 + w; w^3 = -1; w^4 = -(w);$$
$$w^5 = 1 - (w); w^0 = w^6 = 1$$

and

$$(-w)^2 = -1 + (-w); (-w)^3 = -1; (-w)^4 = -(-w) = w;$$
$$(-w)^5 = 1 - (-w); (-w)^0 = (-w)^6 = 1$$

it will be noticed that although for ordinary numbers (and even for some types of higher numbers), $(-x)^2 = x^2$, yet for w this is not so. Thus $(-w)^2 = -1 - w$ and $(w)^2 = -1 + w$. Hence $+(-w)$ and $-(+w)$ are not in general the same in the context of multiplication; nor are $-(-w)$ and $+w$. With ordinary numbers $-(-x)$ is always x and $+(-x)$ and $-(x)$ are both $(-x)$. The powers of $(-w)$ lie on an ellipse at right angles to the ellipse of $(+w)$, mentioned above. The Cartesian equation of the $(-w)$ ellipse is $x^2 + y^2 - xy = 1$; the value of $w(-w)$ is always decidable from context.

Number Fauna and Flora

All of us are familiar with the common kinds or species of number: fractions, whole numbers or integers, the so-called irrational numbers like $\sqrt{2}$ or $\sqrt[4]{17}$, and the negative and positive values of all these. Most of us also know, since $(+4) \times (+4)$ and $(-4) \times (-4)$ are both $(+16)$, that hence the square root of $(+16)$ is either $(+4)$ or (-4), and that therefore the square root of (-16) can be neither $(+4)$ nor (-4). If we know this much, we know also that the square root of (-16) can be either $(+16i)$ or $(-16i)$ where i, the square root of (-1), is thus shown to be a new kind of number.

In fact $\sqrt{-1}$ or i is the first hypernumber unit, and as we have just seen, it obeys an arithmetic differing from ordinary numbers in that its square is always negative instead of positive.

There are other kinds of hypernumbers, as the reader of this book has gathered, and all of them possess their own distinctive arithmetic. Calling 1 (the ordinary unit) u_1 or r, and calling i (the second kind of unit) u_2, we can proceed to give briefly the symbols and distinctive properties of some of the hypernumbers, and these are tabulated in the following list. The heading *Unit Power-Field or Orbit* refers to the geometric form of the path generated in a suitable plane (usually the plane formed by the given hypernumber axis and the axis of ordinary numbers) by the powers of a particular hypernumber unit u the power u^k meaning the value resulting from multiplying u by itself k times, where k is an ordinary number. Even if k is any kind of an ordinary number, whether fractional, negative or irrational, definite values can always be found for u^k.

As k increases (or decreases) from a starting value of zero, it always generates a convex curve, which closes on itself when k attains a certain

TABLE OF HYPERNUMBERS

(Hyper) Number	Symbol	Arithmetic Laws	Order or Power Period	Unit Power-Field or Orbit	Unit Orbital Equation	Simplest Cartesian Form
u_1	$r \equiv r^1 \equiv 1$	$r^0 = r^k = r = 1$	0	pair of points (± 1)	$x^0 = x^1 = x^2 = 1$	
u_2	$i \equiv i^1 \equiv \sqrt{-1}$	$i^2 = -1; i^0 = i^4 = +1$	4	circle in the ir-plane	$x^2 + y^2 = 1$	
u_3	$\epsilon \equiv \epsilon^1 \equiv \sqrt{+1}$, where this is not ± 1	$\epsilon^2 = +1; \epsilon^0 = \epsilon^2$	2	4 tangent circles perpendicular to the ϵr^2plane	$\pm(z_1^2 + z_2^2)/2xy = 1$ where $x = y = \frac{1}{2}$ hence, $\pm 2(z_1^2 + z_2^2) = 1$	
u_4	$p,q \equiv p^1, q^1$ $p \equiv p_1$ $q \equiv p_2, \perp p_1$	$p^3 = q; q^3 = -p = p^5; q^5 = -q$ $p^0 = p^2 = 0; q^0 = q^2 = 0$	8	quadrifolium	$(x^2 + y^2)^3 = (x^2 - y^2)^2$	
u_7	w	$w^2 = -1 + w$ and $(-w)^2 = -1 - w$ $w^0 = w^6 = 1$ and $(\pm w)^3 = -1$	6	pair of intersecting ellipses	$x^2 \pm xy + y^2 = 1$	

integer value. For i, this value is 4, since both i^0 and i^4 are equal to (+1). This cyclical integer—the power period—is given in the following table for each kind of number listed. Moreover, the shape of the i power-field is found to be a circle in the ir-plane, that is, the plane formed by the mutually perpendicular i-axis and the axis of ordinary numbers.

It is of great interest that the power-field of u_7 or w is an ellipse rather than a circle. Simply varying k continuously sends the number w^k in an elliptical orbit around zero in the wr-plane making its first return to its initial point as k varies from zero to 6. The integer 6 is thus the power period of w. The value $(-w)^k$ is similarly sent in an elliptical orbit of the same shape and period, traversed in the opposite sense and axially perpendicular to the elliptical orbit generated by w^k. The simple laws of squaring, $w^2 = -1 + w$, and $(-w)^2 = -1 - w$, are sufficient to define the remarkable elliptic motions just described. In reading the Table, the reader should bear in mind that not all the kinds of hypernumbers are listed there, and that some are listed, which were not fully discussed in the text, in order to demonstrate their unique arithmetic.

We have investigated higher kinds of hypernumbers (through u_9 or v), and also the exceptional hypernumber u_0 or Φ (which is non-axial or non-ordinal,* and includes the entire set of cardinal numbers). We have reason to believe that no other basic forms of unity exist than these ten elemental number species, described here as u_0 through u_9. The length, "norm" or extension of all the elemental hypernumbers is one unit.

Remarks on the Table

The unit of ordinary numbers is u_1; all u with subscript greater than 1 are hypernumber units. (This set of cardinal, nonaxial or absolute numbers is denoted by ϕ or u_0.)

The Cartesian correspondances in the above orbital equations to the various forms of number shown can be concisely tabulated as follows.

Number Type	u_1	u_2	u_3	u_4	u_7
x-correspondance	r	r	r	p	r
y-correspondance	—	i	e	q	w
z_1-correspondance	—	—	i	—	—
z_2-correspondance	—	—	ei	—	—

**Ordinal* numbers must always be considered as arranged on some line or axis and hence in some sequence, giving rise to the terms "first," "second," "third," and so on. *Cardinal* numbers, on the other hand, do not have this necessary linear reference and point only to quantities as such, like "one," "two," "three" *et al.*, regardless of any sequence of their units in space or time.

The orbital equation of a number u is not to be confused with the geometric form of its exponential, $e^{\theta u}$, although in the case of u_2 or i, the power orbit and the exponential ($e^{\theta i}$) coincide. In other cases they do not, as with ϵ or u_3, whose unit exponential ($e^{\theta\epsilon} = \cosh\theta + \epsilon \sinh\theta$) in Cartesian form, is given by $x^2 - y^2 = 1$ (see the preceding discussion in this chapter), whereas its unit orbit is, in Cartesian form, $\pm 2(z_1^2 + z_2^2) = 1$, the correspondance for x and y in both equations being respectively the r-axis and the ϵ-axis. The ϵ power field, like w in this respect, has a separate orbit for negative values and the entire power orbit of ϵ consists of two pairs of parallel circles in a four-dimensional space (generated by r, ϵ, i, and ϵi), each pair being tangent and perpendicular to the other.

The *i*-Circle and the *w*-Ellipses

There is an important relationship between the two hypernumbers i and w, whose power orbits are a circle and an ellipse respectively, with Cartesian equations $x^2 + y^2 = 1$ and $x^2 + xy + y^2 = 1$. The difference between i and w is further accentuated by the fact that $-i$ has the same power orbit as $+i$ whereas that of $-w$ is given by $x^2 - xy + y^2 = 1$, an ellipse whose major and minor axes are respectively perpendicular to those of the ellipse for $+w$, given just before. Moreover, the two distinct hypernumbers w and i are also perpendicular both to each other and to the axis of ordinary numbers. The power orbit of the hypernumber $k(\pm i)$ is given by the circle $x^2 + y^2 = k^2$; and that of $k(\pm w)$ by the ellipses $x^2 \pm xy + y^2 = k^2$. The eccentricity of the pair of w ellipses is $\sqrt{2}/\sqrt{3}$ or slightly less than 0.8164, with a projective or eccentric angle of arc tan $\sqrt{2}$ or slightly over 54° 44′. These are the only ellipses that can generate hypernumber orbits.*

The complex number $\frac{1}{2}(1 + i\sqrt{3})$ or $e^{\frac{\pi i}{3}}$ is the basis of a remarkable set of numbers called Eisenstein numbers after the mathematician who first observed that their properties were noteworthy. They are the basis for the hexagonal and corresponding triangular "tilings" or tessellations of the complex or w plane, and they also play a fundamental role in the structure of the elliptic modular function so important to the theory of numbers.

The basis of these Eisenstein numbers is the hypernumber $i^{2/3}$ or $\frac{1}{2}(1 + i\sqrt{3})$, which can be considered as the "shadow" of w on the complex plane; and the hypernumber $i^{-2/3}$ or $\frac{1}{2}(1 - i\sqrt{3})$, as the similar shadow of $-w$. These shadows or special projections are by no means

*Just as the only hyperbolas that can serve as the exponential path of a hypernumber are those of eccentricity $\sqrt{2}$, i.e. rectangular hyperbolas.

equivalent to their w-objects. But they are equal to them up to a point which we shall now define. Using the symbol $\doteq$ to mean quasi-equal in the sense of "equal up to a point," we have, then,

$$+w \doteq i^{\frac{2}{3}} \quad \text{and} \quad -w \doteq i^{-\frac{2}{3}}$$

Thus $-(+w)$ is not equal to $-w$ in general, nor is $-(-w)$ equal to $+w$ in general. This fact w-algebra has already demonstrated in its own way, because we saw that $(-w)^2 = -1 - w$, but $-(+w)^2 = 1 - w$, which is a different value. At the same time, however, we have

$$\| +w \| = \| -w \| = \| \frac{1 + i\sqrt{3}}{2} \| = \| \frac{1 - i\sqrt{3}}{2} \| = 1$$

where the double vertical bars denote "norm" or length. We also have $(\pm w)^3 = \left(\frac{1 \pm i\sqrt{3}}{2} \right)^3 = -1$, where the full equality sign is warranted.

The significant use of this quasi-representation of w in terms of Eisenstein numbers is that the more familiar algebra of the latter may be used to derive the formulas for fractional and irrational powers of $(\pm w)$, presently to be given.

It must always be kept clearly in mind, however, that $\pm w$ are perpendicular to both i and 1 and that the Eisenstein numbers, like $\frac{1}{2}(1 + i\sqrt{3})$, are not. Also, the plane containing the powers of the latter cuts at right angles the plane containing the powers of $\pm w$, as was explained at the start. To use Eisenstein numbers without w-algebra where the latter is called for is like remaining in Ptolemaic circular epicycles instead of going on to Keplerian ellipses in astronomy and ignoring that the latter, not the former, are used by nature.

Finally, the new formulas that make w-algebra operational are (there is no space on this occasion for derivations):

$$kw^{\theta} = a + bw$$

where, given a and b, we may find k and θ as follows:

$$k = \frac{b\sqrt{3}}{2} \csc \frac{\pi}{3} \theta$$

and

$$\theta = \frac{3}{\pi} \operatorname{arc\,cot} \frac{2a + b}{b\sqrt{3}}$$

Or, given k and θ we have then:

$$a = k\left(\cos\tfrac{\pi}{3}\,\theta - \frac{1}{\sqrt{3}}\sin\tfrac{\pi}{3}\,\theta\right)$$

and

$$b = \frac{2k}{\sqrt{3}}\sin\tfrac{\pi}{3}\,\theta$$

whence it follows that for all real powers of w rational or irrational, the points given by the real coordinates (a,b) all fall on the ellipse $a^2 + ab + b^2 = k^2$; and for all such powers of $-w$, on the ellipse $a^2 - ab + b^2 = k^2$.

Finally, the natural logarithms of $\pm w$ are given by

$$\log(\pm w) = \frac{\pi\sqrt{3}}{9}(-1 \pm 2w)$$

whence

$$(-w)^{\pm\theta} = \left(\cos\tfrac{\pi}{3}\,\theta \mp \frac{1}{\sqrt{3}}\sin\tfrac{\pi}{3}\,\theta\right) \mp \frac{2w}{\sqrt{3}}\sin\frac{\pi\theta}{3}$$

whereas

$$(+w)^{\pm\theta} = \left(\cos\tfrac{\pi}{3}\,\theta \mp \frac{1}{\sqrt{3}}\sin\tfrac{\pi}{3}\,\theta\right) \pm \frac{2w}{\sqrt{3}}\sin\frac{\pi\theta}{3},$$

showing, by setting $\theta = 2$, that $(-w)^2$ is not the same as $(+w)^2$, and hence that $(-1)(w)$ is not in general the same as $(-w)$. With the aid of w-algebra, we can, by the above formulas, send a point around an elliptical orbit without the need of elliptic functions, but using only the simple circular functions of sine and cosine.

For other applications of hypernumbers see the present author's article "Cybernetics Today and Tomorrow" in *Kybernetes*, vol. 2 (1973), Gordon & Breach, London.

Epilogue: Man at the Evolutionary Crossroads

In witchery the crossroads is a place of spells. Center of the cardinal directions, it is where ordinary laws no longer hold. The 1970s is such a place for Man. Willy-nilly, time's incantation is cast over him and the primal powers unleashed, which he must now negotiate. This spot is thick with destructive one-way cul-de-sacs, plus the probably added handicap of no turn-about beyond the halfway point. These are the times to re-assess where we want to go lest we get where we really do not want to be or cannot stay as human beings—or even merely stay alive as something less than men.

Ideologies—ethnic, religious or political—and lately ecology, have provided the principal themes for mustering men to act. The ideological conflicts, however, have never lost a certain provincial, often fanatical flavor that makes them far less relevant to the present global crisis. The ecological question goes much deeper, overriding ideologies, pointing up the key fact that man's universal historical attitude towards nature and his fellow living creatures on the planet was over-whelmingly the destructive one of conqueror, subjector and predator. That this basic attitude should overflow into man's relations with his own species, showing up as the brutal violence and cynical deceits of recorded wars and peace, is not in the least surprising. The ideological strife—no matter how rationalized by intellectual apologetics—flows from the same uncontrolled and immature drive to dominate instead of to excel.

Seen in this light, conquest is a frustrated substitute for the release of creativity, which also is a heritage of man and which alone can confer the needed conviction of individual importance. Having that sense, men need no longer be the dupes of paranoid leaders, no longer be so easily psyched into accepting tyrannies or mobilized into mutual hatred, egged on by power seekers. At this juncture those who create in some way or who are lovers of life or nature are in fact the only free people today. With the artists are the great Jesters and the great Seers. With the lovers are the saints, as often uncanonized as not.

The task is clear, and there's to *do*, not to say. We are

drowned enough in meaningless logorrheas today, worshipping communication *per se* and having forgotten almost completely that *what* is communicated is the point—it might be anything from a happy thought to the bubonic plague! . . .

Teaching today in all countries, under whatever ideology or persuasion, is for one prime (and wrong) purpose: to mould young people into effective tools of the reigning political establishment. That purpose is wrong because it uses people as means instead of recognizing that they are ends in and of themselves, which is what human dignity is all about. The political state exists for human beings, not human beings for the state. This realization practiced by enough people is the way to lasting peace.

The best way to begin that new world of happiness instead of misery—as now—for most people, is to begin to realize independent and self-reliant, non-conditioned thinking. The word "brainwashing" is really a misnomer, for to brainwash someone is to fill his mind with mucky logic and sullied premises—to darken the vision and muddy its clarity, to "wash" it with mud! Reversing the process must then be mind-clarifying and above all, heart-warming. For without affectionate confidence and enthusiasm from some source, there is little development of human growth and insight.

Then let us begin to be ourselves and become our own best hope. Then will the 1970s have marked a sizable evolutionary mutation to the truly Human, a king salmon's leap done by each. That leap will be principally negotiated by a deep change in human consciousness, signs of which are already on the horizon. So will Consciousness make new Reality. *C.M.*

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