

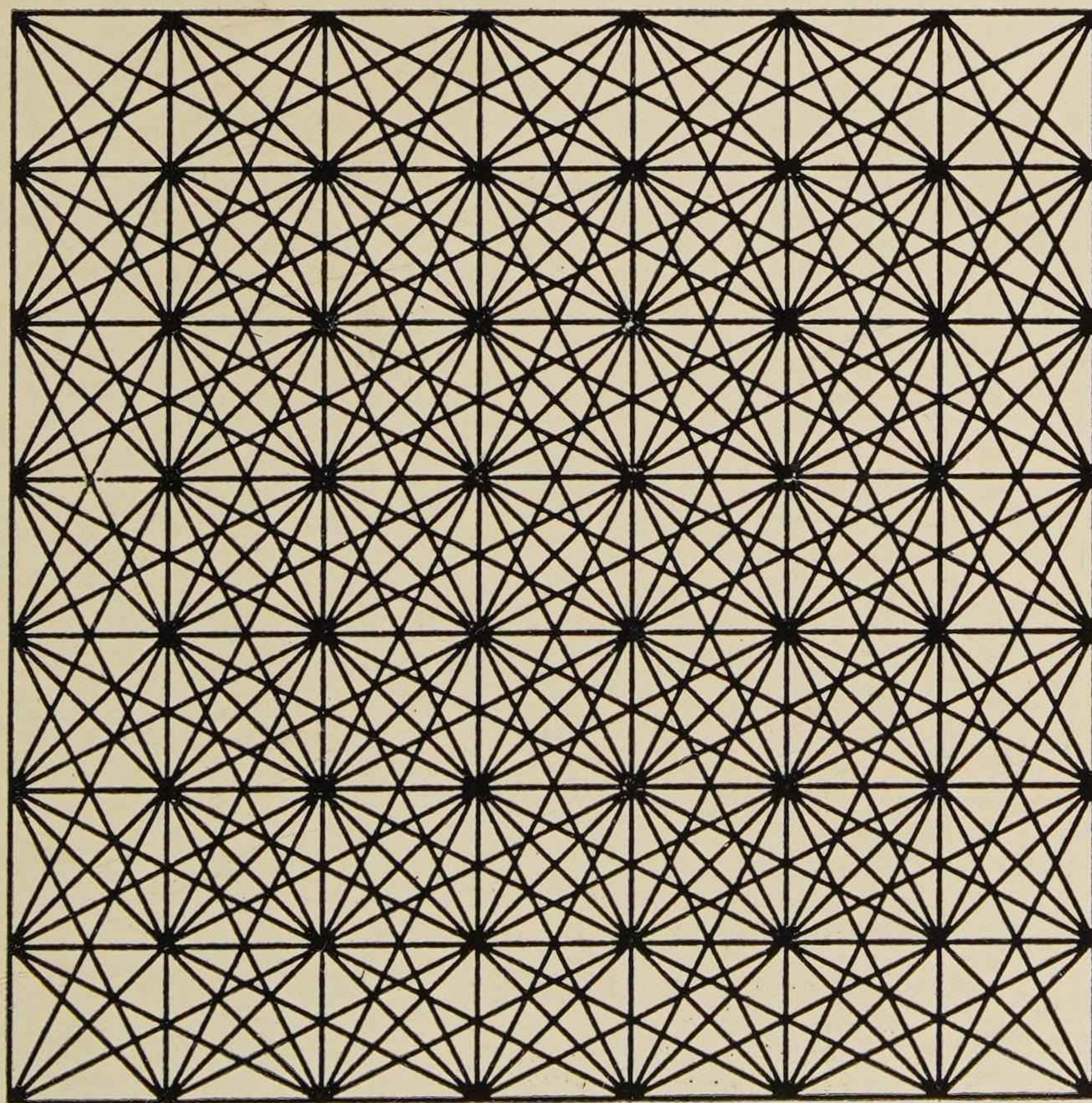
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THEORIA to theory

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THEORIA

to theory

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Editorial

A case has again to be made for what someone called our perverse and apparently ineradicable concern with Christian devotion, because it seems inappropriate for a group which is about to run a colloquium on the problems of the assessment of way-out research.

Apart from what could look like the whimsicality of sticking to tradition for the sake of tradition, we might seem to be in danger of prejudging several fundamental issues by having a special relationship with one particular religion, and that Christianity.

When we started, more than five years back, "The Christians, a declining band, pointed with monitory hand" at the then Bishop of Woolwich and his pals "and said, you mark my words, something will happen to those birds."* Those possibly, however, were the reactionary remnant who still had the quaint idea that Christianity is meant to be fundamental truth about the world. They were shattered, though, by the attack. We sided with them. We took the line that if one had enough faith (Faith!) to think scientifically about the universe of mystical fact then one would be nearer to having a reasonable picture of the whole of things than if one accepted a science limited by the atomic picture of separate units distributed in a classical space as the reality to which our thought had to reduce everything.

Now things are different. One way or another this scientific paradigm which held sway for so long and imposed its particular metaphysic, invulnerable to rivals by presenting it as common sense (which has no rivals), is no longer the tyranny it was. (Its tyranny consisted in its making no sense to discuss alternatives.) Scientists must now keep a straight face when talking of acupuncture and water-divining which had long been dismissed as fairytale, and many people have the thought of reincarnation as a possibility somewhere at the back of their mind. For many, this thought is a buffer between them and ultimate meaninglessness.** In the new climate Christians have happily relaxed with the thought that in

*With acknowledgments to Hilaire Belloc.

**There is something odd here, though. In the Buddhist East the notion of a succession of lives goes with a sense that this is a pointless kind of existence, and the point is to learn the way of getting released from it. In the West people are taking up the notion that this life may be preceded and succeeded by others as giving it a point.

some way that they need not bother to formulate, they had been right all along.

However, to make the case for Christianity being the peculiarly appropriate tradition for a world newly obsessed with "inner space" is not our present aim. We have rather to make the case for taking some single tradition, at its deepest, as a necessary complement to the scientific investigation of the universe of mystical fact. The scandal of particularity (to adapt a phrase) that we seem to be inviting with this proposal is really a concession to the limited powers of human comprehension. We make the best of a bad job. The person surveying the mystic scene has two rôles; first as the external observer describing what he finds, and second as the experimental animal. Somehow these two rôles have to be integrated, but here lies the difficulty. Excellence in these two directions has only ever been achieved through training in two quite separate kinds of discipline – one philosophic (in the old general sense) and the other directly experiential (the person with the greater mastery communicating as best he can with others so as to bring them to his condition).

The second of these kinds of training, where you use whatever form of communication serves your purpose in an almost pragmatic way, has been the background against which the devotional languages of the religious traditions have evolved. One aspect of this growth of devotional language is its widespread involvement with personalism – the attribution of personality on a human analogy to general or universal powers. It seems possible that human mental facilities are so well adapted to dealing with other persons, without thinking what mechanism they are calling into action, that much the easiest thing that the mystical trainer can do is to utilise this very accessible facility in designing forms of meditation. There is an analogy in the way subjects have acquired the ability to meditate by deliberately cultivating those sensations which produce the same electroencephalograph pattern as that exhibited by an experienced meditator. If it works, fine, but we do not expect any simple relation between learning how to meditate and the objective description of the phenomenon of meditation. Christianity particularly has tried to jump the gap between the two forms of training by reinterpreting its metaphysics in terms of personalities. (Uncreated energy, logos, pneuma become God the Father, God the Son and God the Holy Ghost.) And in the past in this journal we have fulminated over the "sermon talk" which results when

this enormous jump is treated as though it did not exist and this kind of language is taken for granted without explaining its use.

Our contention is that the human race is not in a position to replace the pragmatic devotional language by real understanding and so to draw together vision and experience. The Christian faith may hold the promise of an ultimate *visio Dei* where this imperfection is transcended, but all it or any other faith can offer that is firm is a second discipline of development of the personality which can be seen to lead far beyond what is generally considered normal.

Madame Vinay, who has known Simone de Beauvoir from childhood, writes in this number about the latter's view of old age, as given in her book which has recently come out in an English translation and received wide attention. Madame Vinay is not just confronting humanist assertions about human life with Christian ones. She is saying that this humanist view, even in such an exceptionally intelligent humanist, shuts its eyes to actual facts about what remarkable old age can be like. (See our discussion of this in T. to T. V iv, particularly the note by Julia de Beausobre.) So to take account of the religious dimension is not just to introduce a prejudice. It is to call attention not only to transcendental possibilities, but to facts – empirical facts – which the humanist is ignoring. In situations like this science is too important to be left to the scientists.

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Our cover design was supplied us by I. J. Good. It shows a functional chess board, where the lines will be found to represent the possible moves of the pieces.

Discussion: *Personal Factors in E.S.P.*

George Owen, Director of New Horizons Research Foundation, Toronto. Paul Beard, President of the College of Psychic Studies, London.

George

About two decades ago investigators were saying, "If only we could get some high scoring subjects". It seemed to me they had at the back of their minds a genetical theory with extra-sensory perception as an individual characteristic like having red hair or blue eyes, but rather more rare. A few years later people were saying "We could make some progress in understanding extra-sensory perception if we had a way of making people into high scoring subjects", and the way they had in mind was either meditation or the use of some special chemical or drugs. Well, somehow all this did not quite come off. A lot of things were said at the time, such as that under hallucinatory drugs people did have more abundant parapsychological or E.S.P. experiences, but in my view such evidence as was ever quoted was very anecdotal, and has really not been scientifically validated. In any case there were several undesirable things about that movement; firstly it seems to me quite wrong to use for one purpose a drug which is taken for quite a different purpose; if they wanted to advance this they ought to look for a tailor made drug that did not have other effects. It also seems to me that the argument was mixed up with another traditional point of view that depended on an entirely different theory – namely that extra-sensory perception is correlated with a particular state of consciousness. This is a very old tradition, and it goes back a very long time; some of the earliest work on clairvoyance was done by the mesmerists and then by the hypnotists who introduced the idea that extra-sensory perception functions best in certain states of consciousness. Then again there was the theory that medication or biochemistry might be the clue – an idea very closely related to the old theory of spirits of consciousness. The drug episode in our culture was very interesting but has a lot of hazards of its own, so there is a general move, quite apart from parapsychology, to find a substitute for the drug experience. Where I live now – Toronto – is a great centre of drugs, unfortunately, and a great centre of mystical and meditational func-

tions. A lot of people are very sincerely looking for religious experiences of a mystical or meditative type. Meditational techniques and mystical religion are being seen as substitutes for the drug experience. This has saved many young people from getting involved in that, and is a less harmful way of perhaps getting some of the positively good insights that some people do get with drugs. People are looking for hope in promoting extra-sensory abilities from things that roughly could be called relaxational meditative techniques. There are a lot of courses to teach people to get into states of mental relaxation at will, and this of course is mixed up with the interest in the alpha waves. When you are in a sufficiently relaxed state your brain goes into a particularly elementary sort of electrical wave which is called the alpha wave. This of course correlates again with the old state of consciousness approach to E.S.P. and there is a general observation that a great many people's spontaneous E.S.P. experiences, telepathic, clairvoyant, occur of course during sleep but also in states when they are slightly absent minded, or very tense. So one of the things we are just beginning to nibble at is testing whether the techniques of some of these groups that are teaching things like mind control, or mind dynamics, or alpha wave methods, don't actually conduce to extra-sensory ability. I think this is a promising field.

Paul

That is a very nice survey to start us off. I am not a scientist and therefore necessarily have to be less concerned with experiment. I am really more concerned with *experience*, and particularly in trying to find out how far the experience of E.S.P. and its contents can be related to various levels of consciousness and, of course, how a discarnate person or the evidence of discarnate persons comes in. My own view is that I accept the hypothesis that we survive death and – a quite different thing – it is my personal belief we do and that it is possible to make contact with discarnate persons, and I look on this as a delicate and difficult and highly interrupted form of human relationship. Nevertheless I feel that it is a form of human relationship which has great possibilities. I am extremely concerned to try and make the best of this evidence. I certainly feel that the recipient plays a larger part in this experience than is usually supposed. After all he is one end of the human relationship. In the middle you have a person in the shape of a sensitive as a professional. Ideally of course one would hope to extend one's level of

consciousness in whatever way is found to be appropriate, and then have a direct communication. I take the view personally that there is no hard and fast line between ordinary social sensitivity such as we all practise every day and simple E.S.P. of a telepathic kind, passing on perhaps to wordless telepathy, something nearer to communion between one person and another, and then passing on again from that to something nearer to true mystical experience. That is the sort of scale in which I am interested, but of course it is an extremely frustrating and difficult field to work in. One feels, you know, that in the convent or monastery where telepathy, I understand, is a fairly common sort of by-product of the meditative discipline, one gets a lead in seeing the importance of the purity of these meditational activities, as well as the general purity of outlook of the person concerned with this field as a highly important factor. Just as you are likely to get a more refined work of art from an artist who is essentially refined, so the same thing is likely to happen in communications of this kind. A lot of our problems arise from having to use professional sensitives who are trained with something of a show biz outlook. This I find wholly deplorable and I would like to try to do something to lessen it if I can.

George

You have brought in discarnate entities. Could I have a bash at saying where I stand on that? I am not fully convinced of the existence of discarnate entities. But, if they exist we communicate with them by E.S.P. Looking at the problem the other way round, is all extra-sensory perception mediated by discarnate minds? I know a number of professional sensitives who believe that they are in touch with discarnate entities. If asked, "How did you get that message?", they say "O well the spirits told me". We know a Canadian sensitive, Mr. Wilkie. When he stays with us, he signs the visitors' book "James Wilkie and Rama", because Rama is so real to him. Sometimes you ask him a question, which he answers correctly and he will say, "I knew that by clairvoyance". On other occasions he says, "I will see if Rama can tell me". Later on, he will produce the answer.

Paul

Who is Rama?

George

Rama is a sort of spirit guide, he is a discarnate person – a deceased person.

Paul

Does he make heavy claims for himself?

George

Not very, no – relatively mild ones. In fact Rama is a bit like James Wilkie. They are both rather quiet characters. I know another sensitive who says he gets his information (whether it is called telepathy, or precognition or clairvoyance) from a cosmic source of knowledge, a universal mind. There are other sensitives who say the same thing. They may or may not equate the universal mind with God. Although I try to think within the outlook of scientific materialism, it does seem to me that many of the feats that we ascribe to extra sensory perception may have to be explained in terms of the sensitive tapping-in to a universal source of knowledge. Somehow he plugs in, or the universal source of knowledge plugs in to him. Sensitives seem to have very different methods of setting up the linkage or connection by which they can get information. There is one lady, with whom we are working, who is very good on picking up anything that is relatively homely, commonplace or trivial. She is very accurate on people's names. She will say to you "I get the name Quentin", or "I get the name Darratt", or "I get the name Walter Scott". Very often these will be real names that someone in the room has encountered or will encounter in a completely trivial connection. They will not be names of deceased relatives or important people. It is as if she collects floating flotsam and jetsam of knowledge. Things that are more deep of a psychological nature she just won't get. On the other hand we have a young man who is a very powerful medium with a lot of ability. If he is told a name like John or Peter, then he will proceed to give a description of that person which physically may be somewhat inaccurate. However when he gets on to a psychological description of that person it will be very striking. He will do this on a living or dead person. Now maybe in each case the source of information is really the minds of sitters present with the sensitive. However this difference in the kind of material produced by sensitives gives weight to what you, Paul, were saying, that the psychic person who is the more sensitive in the broad sense supplies a more

insightful kind of reading. How do you feel about a universal mind, Paul?

Paul

I feel that it is a little bit like the civil service, likely to be delegated.

George

I can't improve on that remark !

Paul

I think you would agree, George, wouldn't you, that sensitives are extremely bad reporters about themselves and the professionals particularly tend to be rich in what I would call local folklore as to their methods of working. And it is a great pleasure when you find a reasonably detached sensitive like Douglas Johnson who feels, I think with some justice, that he can distinguish reasonably well between when he is getting his message from a living person and when he has a discarnate contact, and when he is shown to be wrong it does not upset him, he does not get fussed about it or try to defend it with further folklore like so many sensitives do. They are by nature very precarious persons; their profession is precarious and they are ultra-sensitive. They have very poor means of defending themselves, and this is one of the lots we have to put up with when we are dealing with them. I imagine, though perhaps I am quite wrong, that you would say that the nearer the candidates are to the subject matter the more likely it is to be only E.S.P. How do you feel about that?

George

Yes. In the case of the sensitive who supplied trivial information, one cannot really think that it is being communicated by a deceased person. It is probably got by telepathy from one of the sitters. E.g. one lady is very good when my wife is present. So it does vary with the person, yet one feels a spirit would be impartial about that, a spirit would not bother to get trivial information more readily in relation to one person than to another. So I do agree that the depth of what is said does seem to make a distinction between pure E.S.P. and something that may involve discarnates.

Paul

Let's have another look at this chap who does the psychological

information. Now is that confined to a straightforward analysis of the psychological situation or does it incorporate advice on how it should be dealt with? Does it suggest the application of some other mind, living or dead, looking at the situation and commenting on it, or is it straightforward reporting?

George

I think it is a straightforward description of tendencies, the kind of way the person that's being described tends to re-act to life situations. It does not usually involve much advice as to how they should act.

Paul

To put it in terms of spiritualistic jargon, that is what is usually called reading in the aura. Reading in the surround if you like, call it what you like. I think some sensitives start off with this as a sort of pump priming operation and when they have done this they are able to put themselves on to some other source of information. They could clearly be touching on a deeper level than the person they are examining. As long as we don't know the limits of the human mind there always will be legitimate room for alternative theories, I do not see how we can hope to eliminate them completely.

George

I wrote down carefully what a sensitive said about a deceased person and I was struck with the accuracy of it. Some months later I got out this file of readings and showed it to my wife and there were some curious things said which I had quite forgotten at the time, and things I did not consciously know or recollect. This is very interesting. Although I was the sitter, there was nobody else in Toronto who would have known anything about this person who is fairly well known in Cambridge but not very much outside. It was months after that Iris looked at what had been said, and she scored a number of things correctly where I did not know whether they were true or not, and there were one or two things which I feel sure I never had known. So where was he getting his information from? Was his mind somehow through me tuned in to people in Cambridge who had known this person? Or was he getting it from perhaps the person himself? Or was he getting it from some universal source of knowledge? This kind of thing

is susceptible to several explanations always. I am not one of those who believes in over-simplifying parapsychology.

Paul

This question – I do not like to call it a theory – of filching by E.S.P. from unknown living minds seems to me O.K. as a bit of defensive technique, but it does seem to me time that the S.P.R., or some other parapsychological body should set about trying to devise some simple experiments to see if they could produce information in this way. My private guess is that nobody in the S.P.R. really believes it to be true.

George

We have just started doing control experiments in which one gets a layman to imitate what the psychic has done or is doing. This may not be quite the kind of experiment you mean, but perhaps it is a beginning. We are trying to collect together a scratch lot of other people, non-psychics, and then see how well they can do presented with the same stimulus of the name, or the supplementary information. I think this has been advocated by people at various times like Dr. Pratt and others. Of course a great deal has not actually been done scientifically on recording verbal responses of psychics, and it is very hard to score that sort of work statistically, but I think it is important, even though it is laborious to do and very difficult to publish because it tends to be voluminous, and you can't just put a little table of figures. It is much closer to real life; after all, all the really interesting kinds of E.S.P. are in human interest situations, either people going to a psychic for advice, or trying to get in touch with their deceased relatives, or spontaneous thoughts and impressions and visions that come to people not in the experimental situation. It seems to me that this working in the good old-fashioned way with perhaps slightly more modern techniques is an important experimental field for parapsychology and E.S.P.

Paul

I am all in favour of bringing back common human life. I think this is really E.S.P. at its best. It seems to me that if you ask a sensitive to take part in a card guessing experiment you are not giving him material that the E.S.P. faculty, as we know it from observa-

tion, is fundamentally interested in. Would you agree with that, George, or not?

George

Yes, I very much agree with this; I think there are human emotion factors, I mean not bad emotions but valuable human emotions, involved in E.S.P. situations. I came into all this subject about 20 years ago for one very limited aspect, studying poltergeists, and I was interested in their being highly concrete; if something moves, it moves, and one has not got the statistical problems of interpreting mental phenomena, and gradually and inevitably this got me prejudiced on the spontaneous side rather than the experimental side, and I still think you can experiment with spontaneous things if you have experiments which retain opportunity for spontaneity. For instance we have got an informal group where we may get perhaps a dozen people in and then tempt the sensitive to say "come and do an experiment tonight", and we all get together and we try to get a slight spirit of fun, and, although the idea of the experiment may have been carefully put together to some extent to try to get something that the sensitive will enter into and be suited to him or her, it is a sort of hybrid kind of situation, half experimental, half spontaneous, half serious, half fun, and of course the experiment that comes out is never perfectly designed. How could it be, if it involves an impromptu element? On the other hand it is not so perfectly negative as many perfectly designed experiments are; sometimes you learn new things, sometimes you find out things you never thought of before, about new aspects of the subject.

Paul

That makes a much more realistic kind of experiment.

George

It is sometimes said that these powers might be more prevalent if people really did depend on them for communication, in primitive kinds of society for instance where you have not got telephones and all the things that we have and these powers could serve a biological need – do you think there is anything in this?

Paul

I think there could be.

George

I know a friend of mine who was making a film amongst some bushmen – I do not know whether they were bushmen in Africa, or bushmen in Australia, or wherever they have bushmen. Somebody had just gone off for a day in the bush hunting or something, and he was wanted back, so they all sat round in a circle and concentrated – sort of “Come home, Fred, come home”, and after about half an hour this little man came rushing out of the bush with a shout of “Was there something?”

Paul

Could we come back to the notion of a universal mind? If you have got a universal mind, by which you mean a reservoir of information somewhere, that is a bit different from an entity, from a mind, isn't it? A memory bank is not automatically a mind. Of course it is very difficult once you start playing with memory banks, then you find you usually have to put in additional important assumptions like that the memory bank is capable of selecting the information it gives you, in which case you might as well call it a mind. But what is motivating me in this point is that in spite of your saying you were impressed by the richness of the evidence about this field I suppose as a scientist you are concerned to work to economise on hypotheses. You go as far as your given hypothesis will take you and then you are reluctant to import another hypothesis.

George

I am very conservative myself about hypotheses. Perhaps less conservative than others but I am still very conservative though not re-actionary. You make all sorts of new hypotheses when you go from a memory bank to a universal mind – particularly if you are then going, as you, Paul, suggest, by analogy with the Civil Service, to delegate functions to limited minds. The problem seems to me – how do you plug in?

Paul

This was Fred Myers' famous question, wasn't it, after his death (excuse me assuming it was Fred Myers, it is so much simpler). Who selects? This is a very potent query because one of the ways in which discarnates show evidence of themselves is by the kind of

topic they suggest – not only in terms of memories but in terms of subjects in which they were concerned.

George

They choose something of interest to the sitter.

Paul

A topic of mutual concern, of mutual compassion perhaps too. It is hard to deal with the universal mind without importing compassion at some stage of it, compassion on the part of the universal mind itself, or whoever is standing in for the universal mind, towards the human situation on which it is commenting.

George

Oh I see. Well that is imputing a terrific lot of intelligence to it. You could impute much less than that and you would still have to call it a mind; as soon as it is selective at all, then it is a mind and not a memory bank.

Paul

Presumably it could be a memory bank from which a mind selects. Thus if you talk for instance to Douglas Johnson's control, I am sure he would say that if he wanted to consult someone else's part in the Akashic record (which is what some people call the universal memory) he would have to ask permission from the custodians. I think by that he means that there has to be some sort of resonance or some sort of rapport before it can be done. Not everybody can link onto everything else. I suppose many psychics would say this is how psychic work is done, whether it is E.S.P. or whether it is the other aspects.

George

This sounds exactly like a computer design to me. These are just the problems they have to deal with; how do you preserve parts of the store for certain types of use and how much information is available and what are the access times and so on. There was one point that hit me in the discussion when we were talking about interest being a necessary ingredient. Sometimes it seems to me that it is often more than interest, it is some sort of passionate concern for the particular problem which is productive. Of course

kinds of rather disastrous passionate concern produce ghosts and poltergeists; there seems to be some evidence of this.

Paul

We are back in the human situation.

George

The techniques used by the sensitive, and the psychological apparatus that they use, need to be watched very carefully – constructing for themselves alleged discarnate entities may surely be a very important part of the build up, so you have got to be very careful at what point you say there was really a discarnate entity, whereas what is really there is perhaps a very powerful sensitive drawing stuff from all kinds of sources – perhaps even including the memory stores of people who are dead which they fit round particular figures, which possibly are in themselves imaginary, and not real existences at all.

Paul

They are a crystallizing point of something, aren't they?

George

Thinking as an experimentalist, I suggest two fields that I think are very important. One is a question of the effect of distance on communication. An old friend of mine went round the world, to see the effect of distance. That is rather a nice sort of experiment, but it is much simpler and much less expensive to use the telephone. We have started doing that over small distances like 10 miles, 400 miles, and even a telephone call between England and North America – it is not all that expensive, you can get an experiment on for a few pounds. This I think is important because innumerable papers have been written comparing telepathy to radio and as soon as one does any experiments that involve distance, it seems that it is much more like using the telephone. You know there really does not seem to be any effect of distance at all as long as there is some kind of emotional mental rapport between the sensitive and the recipient. It is very much like S.T.D. dialling, I feel, if somehow each end knows the telephone. Another thing I want to say is that really any study of the subject that does not pay attention to precognition somehow must be leaving out a very important piece of the whole puzzle, possibly the most important.

But we can't start on that one now, and it must wait for another time, just as I think your view of discarnates, Paul, is something we ought to go into more closely some other time.

Paul

Much of the richest part of the E.S.P. material – the Leonard corpus, “Swan on a Black Sea”, a good deal in the cross-correspondences – is interwoven with evidence for survival. That is why I don't think you can leave it out for long.

The Neural Basis of Conscious Decision

John Griffith

(John Griffith, Professor of Applied Mathematics in the University of London at Bedford College, died in April. He was a collaborator of our group, and contributed an article on "Brains and Computers" to T. to T. II, i. This present article is his inaugural lecture, given at Bedford College in 1965. We are publishing it, with the permission of the College, as a memorial to him.)

I am often asked : "How can you apply mathematics to the brain?" There are several possible kinds of answer to this. One is rather trivial and is to say that whenever quantitative measurements are made in science, the interpretation of these uses mathematics of some sort. An electroencephalographic recording is a familiar example of a quantitative measurement on a brain and the technique of Fourier analysis is often used on such recordings in order to show the presence of periodic phenomena such as the well-known α -rhythm. Much recording is also done of the activity of single cells of the brain and, in the analysis of such records, the theory of statistics is often necessary. And one could enumerate countless further examples.

But is there any deeper way in which mathematics can assist in the study of the brain? Here I think the answer is yes, that any theory of the brain must be at least in part mathematical and that mathematical intuition and technique must be helpful in the creation and analysis of it. This is not to say, as some do, that mathematics in isolation can contribute much to a theory of the brain. Rather it is that if you wish to understand the brain, I think you are wise to acquire, in addition to as much knowledge as possible of anatomy, biochemistry, neuro-physiology, psychology and such biological fields, also some feeling for the approach by an applied mathematician to complex systems.

With the brain, it is neither obvious what are the central questions to ask nor how to answer them. In this lecture I shall mainly discuss one, which I consider to be an important and an essentially mathematical question. In fact it seems to me to be a key one for an understanding of the general principles of operation of the brain. Then I shall attempt to clarify the question by considering

a specific example. It may be interesting, also, if I expound, in passing, some of the considerations which led me to adopt my present opinions.

Before we pass on to the question, however, let us consider briefly what a brain consists of. The human nervous system, of which the brain is the head-most end, is made up of some 10,000 million nerve cells and also other cells. We will assume the other cells may be ignored for our present purpose.

What is a typical nerve cell like? They all have a central part, the cell-body, which houses the nucleus and much of the biosynthetic apparatus. Then the body has long tubular extensions which grow out from it, dividing and dividing again until all the furthest ramifications may easily run into thousands. The extensions are called axons and dendrites. In some cases they may be several feet in length – for example the nerve cells whose furthest ends reach into and control the musculature of the foot have their bodies in the spinal cord.

The most important characteristic of a nerve cell is its excitability. The cell is bounded by a surface membrane which is normally semi-permeable. This means that the membrane will allow certain ions and molecules to pass through it, but not others. The semi-permeability has certain consequences which can be understood by using the theory of thermodynamics. One of these is that the interior of the cell normally has a negative electrostatic potential of about -70 mV with respect to its exterior. This is called the resting condition. However, if this potential difference is artificially altered above a threshold value of about -60 mV, the membrane suddenly become permeable. A consequence of this is that the potential is then approximately equalized on both sides. This change of permeability is self-propagating – if it starts at one point, it spreads to adjacent points and so on. Shortly afterwards the membrane recovers its original semi-permeable state. Thus a transient and spreading burst of electrochemical activity is generated. It travels with approximately constant velocity along the nerve, and without attenuation. The velocity would be typically between 1 and 100 metres per second.

The passage of excitation along the surface of a nerve cell is rather like the movement of the point of ignition along a fuse, except that the nerve cell may be used again and again indefinitely, while the fuse can only be used once. True to this analogy, we often speak of nerve cells firing.

Once a cell has fired, the activity passes out to the uttermost extremities, which then spew out small quantities of chemicals called transmitters. These pass across narrow gaps, called synaptic clefts, to adjacent cells where they alter the permeability of the membranes of those cells. Any cell will receive a continual barrage of transmitter from the many other cells which are linked to it, and whenever the intensity of this barrage exceeds a certain threshold value, the cell fires.

The nervous system, then, consists of a collection of nerve cells which fire at intervals under the influence of their neighbours. It also possesses "input" cells, such as those of the retina of the eye, which fire under the influence of external stimuli, and "output" cells which control the operation of the muscles of the body, including those which are responsible for speech. These cells are linked together in a fashion partly orderly, perhaps partly haphazard and in a hierarchical manner with the head end dominating the rest.

A typical nerve cell has a number of inputs, from other cells, and outputs, to other cells. Some idea of the relation between the input to a cell and its output may be formed by considering the following simple, but not wholly accurate, description due to McCulloch and Pitts (1943). The inputs to a cell are of two types, excitatory, which increase the probability that the cell will fire and inhibitory, which decrease it. In the McCulloch-Pitts description the cell fires if the number of excitatory inputs which are active, minus the number of inhibitory ones, exceeds a fixed threshold value. The mathematician will note that this means that the relation between input and output is strongly non-linear. This non-linearity is the main origin of the great mathematical difficulties of analysing the activity of aggregates of nerve cells.

You may well ask at this stage: but is the brain nothing more than this, nothing more than a complicated sort of physico-chemical telephone exchange? Where in all this is one to find the spirit, where even the mind? It is necessary for me to state a position on this point, even though I shall not have time enough to try to justify it adequately. Otherwise when I ask how are decisions made, I shall not be able to reject the answer "because the mind makes them", even though I should not understand what such an answer meant. My position then, is simple: yes, the brain may be correctly regarded as nothing more than a lot of nerve cells and other cells obeying the usual laws of physics and chemistry; no, I do not think

we shall find it necessary to include in our theory any non-material entities, now or ever.

To those who find this distasteful, I would say a few things. Although some might disagree, I do not regard my position as having any simple and immediate theological implications. I think we are almost forced, as scientists, to make these assumptions until, possibly, they are proved wrong. It would be infinitely more difficult to think about how the brain might work if we were to suppose it to contain, as well as familiar material entities, also non-material ones of totally unknown character.

Of course, we should not adopt such a position if it were obviously at variance with established fact. I do not think it is. Those who work on telepathy seem to be greatly concerned with providing such fact. I shall not enter into the argument, largely fruitless, about whether telepathy is a genuine phenomenon or not. I could defend my assumptions about the brain by saying that telepathy appears to be normally, at most, a marginally-detectable phenomenon and is therefore unimportant. But that would be logically unsatisfactory. I prefer, rather, to stick strictly to the assumption that the brain contains no non-material entities. If this is so and if telepathic communication can occur between man and man then it can also occur, in suitable circumstances, between animal and animal and – most important – between machine and machine. In other words it is a normal, though rarely apparent, property of matter. From this point of view it seems to me that workers on paranormal phenomena would do much better to try to obtain telepathic communication between two Geiger counters or two computers with some random elements than between two men. Surprisingly, in looking through their literature I have been unable to find any consideration of such a possibility. The advantage, surely, is obvious, namely that one would be freed from the difficulty of dealing with biological material with its extreme and largely unpredictable variability.

But now let me return to my main theme. When I started to be seriously interested in the brain I was struck, and what Mathematical Physicist would not be, with the superficial analogy between the brain with its nerve cells and bulk matter with its atoms and molecules. Matter can be described at two levels, in terms of electrons, nuclei, molecules, quantum mechanics or of volumes, pressures, densities, thermodynamics; the grains of sand or the Pacific shore, as it were. And the two are connected by the theory

of statistical mechanics. The brain, too, has two levels of description, in terms of axons, synapses, nerve cells, physical chemistry, biochemistry, or of stimuli, responses, thoughts, memories, psychology. Can we not create a theory of statistical neurodynamics to relate these, too?

Although I did not at first try to do this in any detail, I was much influenced for a long time by the general idea, and in some ways still am. However, there are difficulties in this programme which are not apparent at first sight, and which I only discovered recently in connection with an investigation of the ferromagnetic analogy to the nervous system put forward a few years back by Cragg and Temperley (1954). They, you may remember, sought an analogy between the co-operation of the individual spins in a magnetic material such as iron, and that of nerve cells in brains. The difficulties may be summed up conveniently by saying that if we create a statistical neurodynamics, with the nerve cells as the fundamental particles of the theory, we cannot assume dynamical reversibility within the theory (Griffith, 1966b). As this assumption is one of the main props upon which statistical thermodynamics rests (Tolman, 1938), it means that the latter cannot be taken over in any straightforward way and applied to the brain.

Not realizing that at the time, I started to ponder about what was the analogy, in the brain, to the behaviour of an isolated thermodynamic system. Such a system passes towards equilibrium, all the macroscopic parameters tending towards terminal, unvarying values. In an isolated brain, therefore, should not the macroscopic psychological variables in any statistical theory also tend to stable, unvarying values?

The same view was suggested to me by thinking of an individual nerve cell as a random variable of probability theory, the value of the variable determining when the cell fires. The brain, then, would consist of 10,000 million random variables and any psychological variable would presumably correspond to some average over these random variables. By the central limit theorem, an average of a large number of random variables is usually, though not invariably, distributed normally with a very small variance. Therefore, unless it is artificially set to an abnormal value any psychological variable should always have essentially the same value, namely the mean of the corresponding normal distribution.

Both of these arguments suggested to me that psychological variables ought to remain fairly constant in an undisturbed brain.

Neither is compelling, for one can construct counter-examples. A third line of argument was to note that it can be shown directly, as we shall see later, that the average activity of randomly connected aggregates of idealized nerve cells will normally pass to one of a very small number of terminal values and stay there. (Rapoport, 1952; Beurle, 1956; Ashby, Von Foerster and Walker, 1962; Griffith, 1963).

But what if the implications of these arguments are true? We have not yet defined our psychological variables and cannot, therefore, yet say anything of their experimental properties. Even the term may be somewhat misleading, for the psychologist is normally concerned with input and output and usually admits to no direct knowledge of the internal state of the brain. Or, as Hebb (1949) says, he is usually interested in the relation of stimulus to response and not in what goes on in between. A simple analogy with a digital computer is instructive here. Many computers, such as Atlas, chatter away happily with the machine operators in 7 bit characters on paper tape. But this does not prove that their internal calculations, or thoughts, are conducted in 7 bit characters and nor, in fact, are they. The internal language of our brains may not match at all closely their input and output languages – for us, the English language.

However, we do have another window into our own brains – the window of introspection. There is a danger here, for who knows what is the relationship between what is really in the brain and our subjective vision of it? Nevertheless, I shall argue that in this window we can see at least one important thing.

The vision in the window is our consciousness. Some would say that one should not consider consciousness in science because one cannot measure it objectively. Others might think it unimportant for a theory of the brain anyway. I would counter both these by claiming that some understanding of consciousness is so important for any theory of the brain that we must consider it carefully in spite of the difficulties of measurement. The reason for this is that, whatever the logical possibilities, it is obvious in fact that the most significant purposive activities of a human being are foreshadowed in the consciousness immediately before they happen. Decisions are usually conscious decisions. People often talk with awe of an unconscious mind; what we should be surprised at is the extent to which matters are conscious. Then again, the things that you remember usually go through the consciousness first. In fact I

once thought of trying to define "consciousness" as "rate of change of memory".

To me, this makes it obvious that one is getting a view in the consciousness of those operations in the brain which are concerned with the highest level of control of modifiable behaviour of the organism. If this is so, then the elements of consciousness are the main macroscopic variables which should be used in a statistical neurodynamical theory of the brain, though we see them introspectively and perhaps, therefore, extensively distorted.

If we admit this, then one psychological variable must be the word. For most thought is at least partly verbal. A specification of a state of consciousness would include, perhaps as its most significant part, a statement of the word which is currently in it. A thermodynamic variable, like pressure, has a continuous range of possible values but a word, of course, takes one of a large finite range. This immediately poses us with a new problem. From the microscopic point of view, to say that the consciousness has a certain word in it is to give a partial specification of the system. In other words there will be a whole series of exact specifications of the states of activity of the 10,000 million individual nerve cells which are consistent with the presence of this word in the consciousness. Or to put it another way, there is no reason to suppose that when you think the same word twice, that on the two occasions the detailed pattern of firing of the individual nerve cells will be the same. Amongst the patterns of individual specifications of activities of nerve cells – and there must be about 2^{10} different patterns – some must correspond to each of the finite set of words in your vocabulary although many, perhaps, may correspond to no word at all. The mathematical difficulty here is that the set of possible patterns is so large that, from a macroscopic point of view, the patterns may, presumably, be regarded as continuously variable. This apparent continuity would be very roughly analogous to the apparent continuity of change which occurs on a cinema screen, even though the change from frame to frame is in fact discontinuous. The words, being finite, and quite limited in number, are not in any reasonable sense continuously variable, and so as you vary the pattern corresponding to some word there must come a point when an infinitesimal alteration in it suddenly alters it into a pattern corresponding to another word or, perhaps, to no word at all. It would seem as if the activity of a single nerve cell could make

the difference between whether I say "I love you" or "I hate you". And this does not seem easily resolvable with the considerable evidence for the robustness of the nervous system to even quite considerable damage.

Another feature of the sequence of words in the consciousness is that there would not seem to be any tendency for a passage to equilibrium. While we are awake, the words continually change and, if we accept our previous argument, this then poses us with a considerable problem of finding a theory in which the macroscopic parameters never have any equilibrium values.

These problems seemed to me, from a mathematical point of view, to be really fundamental and, conversely, it seemed that the solution to them would tell one something really fundamental about the way the brain worked. On the other hand, it may appear to you that these considerations are obscure and unconvincing. Certainly they are not rigorous and should be regarded, perhaps, as an attempt to explain an intuition. Therefore I would like now to reach what are essentially the same problems from two very different points of view.

Sir John Eccles (1965) in his Eddington memorial lecture last year at Cambridge concerned himself with the problem of the unity of conscious experience and that is, in my opinion, very closely related to the problem which worried me. In the course of his lecture he referred to Sherrington's version of this problem (Sherrington, 1946), and this I have found to give a very satisfactory alternative to my own.

Like Eccles after him, Sherrington was concerned with how the multitude of individual nerve cells could collaborate to produce a clear-cut choice of action for the animal as a whole. And with his extensive experimental knowledge of the nervous system, he was able to say: "Where it is a question of 'mind' the nervous system does not integrate itself by centralization upon one pontifical cell. Rather it elaborates a million-fold democracy whose unit is a cell". Once one accepts that the nervous system is a democracy, or even an oligarchy, one has the problem of how are the votes collected and how is the result of the vote communicated as a command to all the nerve cells involved. And Eccles accepts this problem saying: "The antithesis must remain that our brain is a democracy of ten thousand million nerve cells, yet it provides us with a unified experience". I have deliberately referred in detail to these views of a leading neurophysiologist of the past and one of the present.

Inevitably a mathematician with only a few years interest in a field, will not have the same grasp or feel for it as the best of those who have devoted their lives to it, and therefore it should be encouraging to him to see essentially the same problems from his standpoint as they do from theirs.

Thirdly, let us take the argument from psychology and I shall refer specifically here to Lashley's views, which have influenced me considerably. Lashley has constantly emphasised that, in both the relation between stimulus and response and in memory, a large number of cells are involved but that these cells are not necessarily the same in each repetition of the same situation. He said already in 1930, for example, with reference to the visual input (Lashley, 1930): "The same cells may not be twice called upon to perform the same function. They may be in a fixed anatomical relation to the retina, but the functional organization plays over them just as the pattern of letters plays over the bank of lamps in an electric sign". In the same paper Lashley even refers to this as "the fundamental problem of neural integration" and much later Burns in "The Mammalian Cerebral Cortex" puts this problem in a central position in his discussion of memory (Burns, 1958). Of course, Lashley's image of a "bank of lamps" should not be taken too literally and from our mathematical point of view we may interpret it as meaning that corresponding to a complete specification at the macroscopic level of a thought or memory or decision, there are many detailed specifications of the pattern of individual nerve cell activity consistent with it.

I have given indications from mathematics, physiology and psychology of a type of fundamental problem facing one in the construction of a theory of the brain. I was led to it, myself, through introspection, as a question relating specifically to the human brain. But Sherrington and Lashley had versions of it which were applicable to any animal and, for that reason, I think it may be better to consider primarily the question of how the aggregate of individual nerve cells makes clear cut decisions on courses of action. Because the decisions are mainly those which, in man at least, are called conscious, I have used this word in the title of my lecture.

Let us now have an aside on our friend the digital computer. It has a "brain" which makes decisions and has memories and so forth. Furthermore it has an internal construction that we know in detail and so it is worth while pausing to consider our problems in that case. In a digital computer, as normally operated, there is

approximately a 1:1 correspondence between the macroscopic and microscopic description – in a calculation every bit can count. None of the problems we have been discussing arises in any acute form. As far as decisions are concerned, a computer acts on the basis of an order such as “JUMP to a new position in the program if the number in the accumulator is zero, otherwise carry on as before”. We have here a situation very close to Sherrington’s single pontifical nerve cell – only the number in the accumulator decides what happens, in fact only one bit of that number need be used.

Now, I have talked a lot and this is a field in which men have talked endlessly. But that does little more for us than to set our brains in a receptive state; it does not give us any theory that has any precision. None of the problems that I have raised are at all clearly defined and you would be quite justified in arguing that I have given them the wrong emphasis in many ways. The only way one can see them more clearly is to construct a calculable model in which the problems occur in much the same form. A model, in other words, in which the problems can be seen clearly and the solutions are obvious. We now pass on to do this.

Suppose we have n nerve cells, each of which has only excitatory connections with some of the others and no inhibitory ones. Suppose also that the connections are extensive and made at random. Evidently at any moment anything from no cells up to all n cells may be firing. Let us start the mass of nerve cells with a fraction of them active. What happens? Using the McCulloch-Pitts nerve cell model and some non-rigorous mathematics, one may easily analyse the case when the cells have each the same number of links to other cells. The result is simple. If the total initial number which are active is below a certain threshold value, the activity dies away, and all cells become permanently inactive. If the initial number is above the threshold, then the activity increases till all cells are permanently firing as rapidly as possible. No matter how you start it, the mass passes to one of two terminal, stable, states and stays there. This is illustrated in Figure 1a where the results of a computer simulation of such a mass are shown. It is possible to construct counter-examples to this behaviour. Nevertheless, they are rather exceptional and the tendency of the mass to pass into a state of zero or complete activity is characteristic of arbitrary connections of cells which have only excitatory links between them.

As I have described it, once the mass of nerve cells became maximally active, it would stay so for ever. It would, as it were,

have an epileptic fit for all eternity. But we have ignored the effect of the habituation, or tiring, of nerve cells. After a period of activity a nerve cell is probably less responsive to stimulation than usual. If we accept that the habituation is powerful then, if the activity starts above the threshold, it will go first to a high value and then, as the cells tire, fall below the threshold, whereupon it will fade away completely. Two things are now possible: the activity fades at once, or there is a burst of activity and then it fades. A computer simulation of this situation is illustrated in Figures 1b and 1c.

Now we are in a position to construct a very simple theoretical model of an animal – an animal which can make just one decision. Let us equip our mass of cells, which we shall call the brain, with an input and an output. The input might be from a set of sensory cells, such as photoreceptors, which synapsed with the cells of the brain. The output might be to motoneurons, that is cells operating muscle fibres. This is shown schematically in Figure 2.

Let the animal now start with all its cells quiescent. Then suppose there is an input from the sensory cells to the brain. A certain fraction of the brain cells will become active and, if this exceeds the threshold of the brain, all cells become active, otherwise the activity dies away. If the former, then the brain cells excite the output motoneurons and hence the animal makes a response. Here we must suppose that the motoneurons have sufficiently high individual thresholds so that they are only fired when the brain reaches a paroxysmal level of activity. In other words they do not fire when the brain is in sub-threshold activity. This is easy to ensure. The response occurs so long as the brain is in its paroxysmal state. Soon, however, the cells of the brain habituate and the response ceases. When the brain cells recover, the animal is ready to respond again to any further super-threshold stimulus.

What, you may ask, is so special about this particular model of a theoretical “animal”? It is not, of course, that we have used evocative words like “brain”, “response” and “animal” in describing it – we could do that about any device having an input and an output, if we wished. It is this: that this model resolves in a simple and natural way all the problems that we have raised earlier and in a way that might occur in the brain of a real animal. I am not at the moment claiming that it does. What I am claiming is that, in this model, we can recognize and answer our previous problems. This is immensely valuable, in itself, because it removes at once a

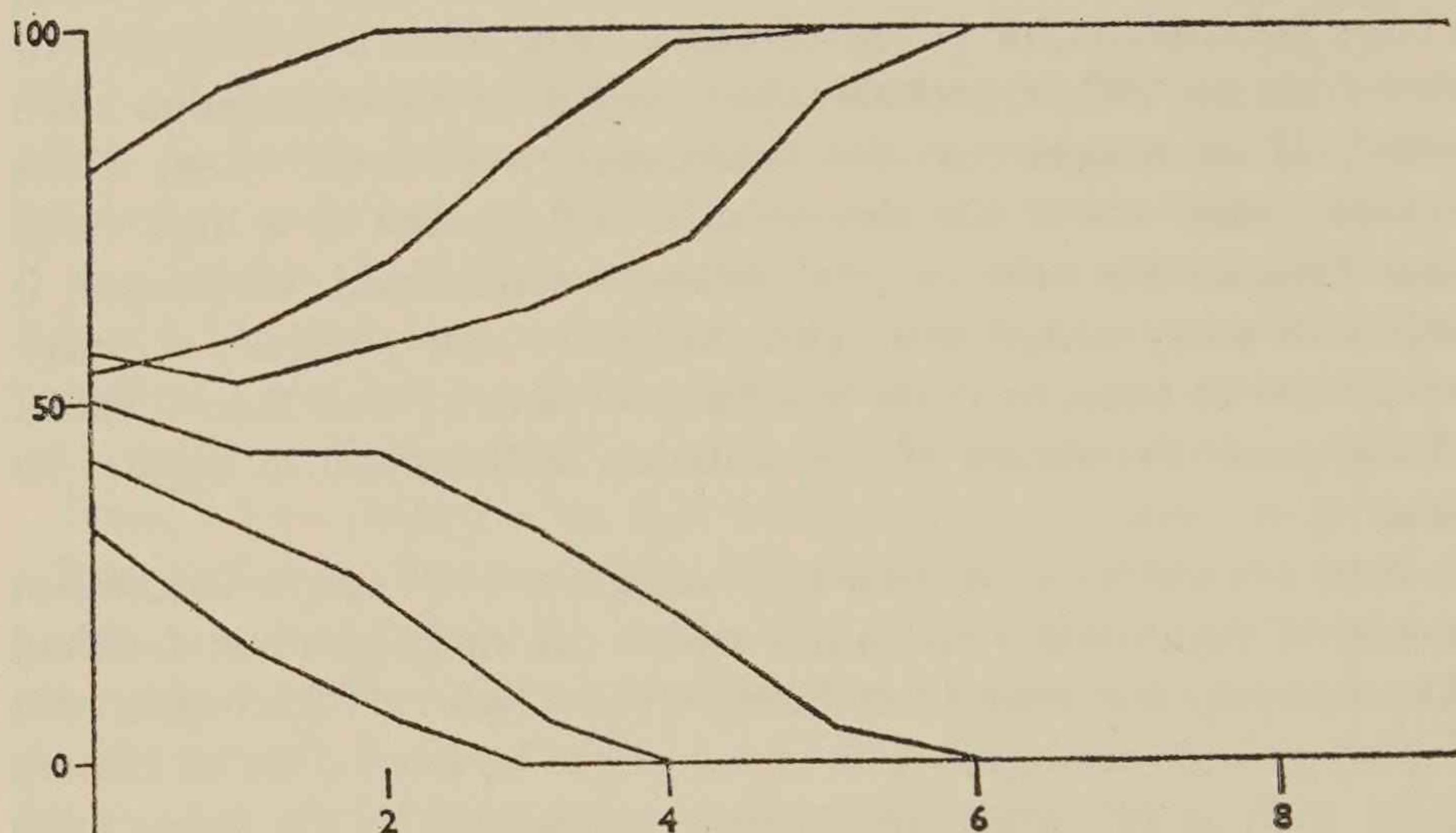


Figure 1a. Activity of various masses of 100 McCulloch-Pitts idealized neurones plotted as a function of time. Typical runs starting with various initial activities. θ = threshold of individual neurone; n = number of links to other neurones; $\theta = 3$, $n = 5$, no habituation.

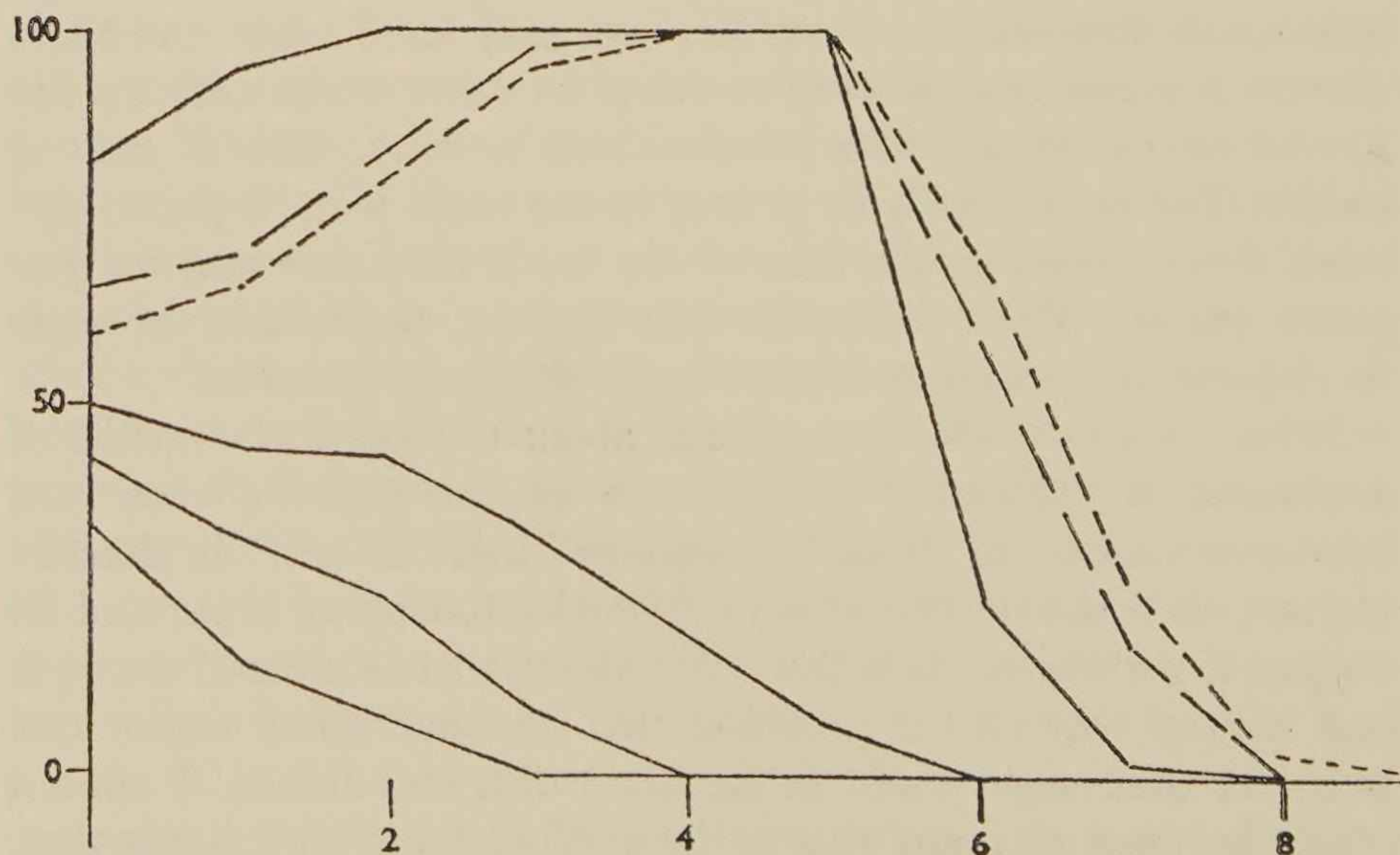


Figure 1b. As in Figure 1a, but with habituation.

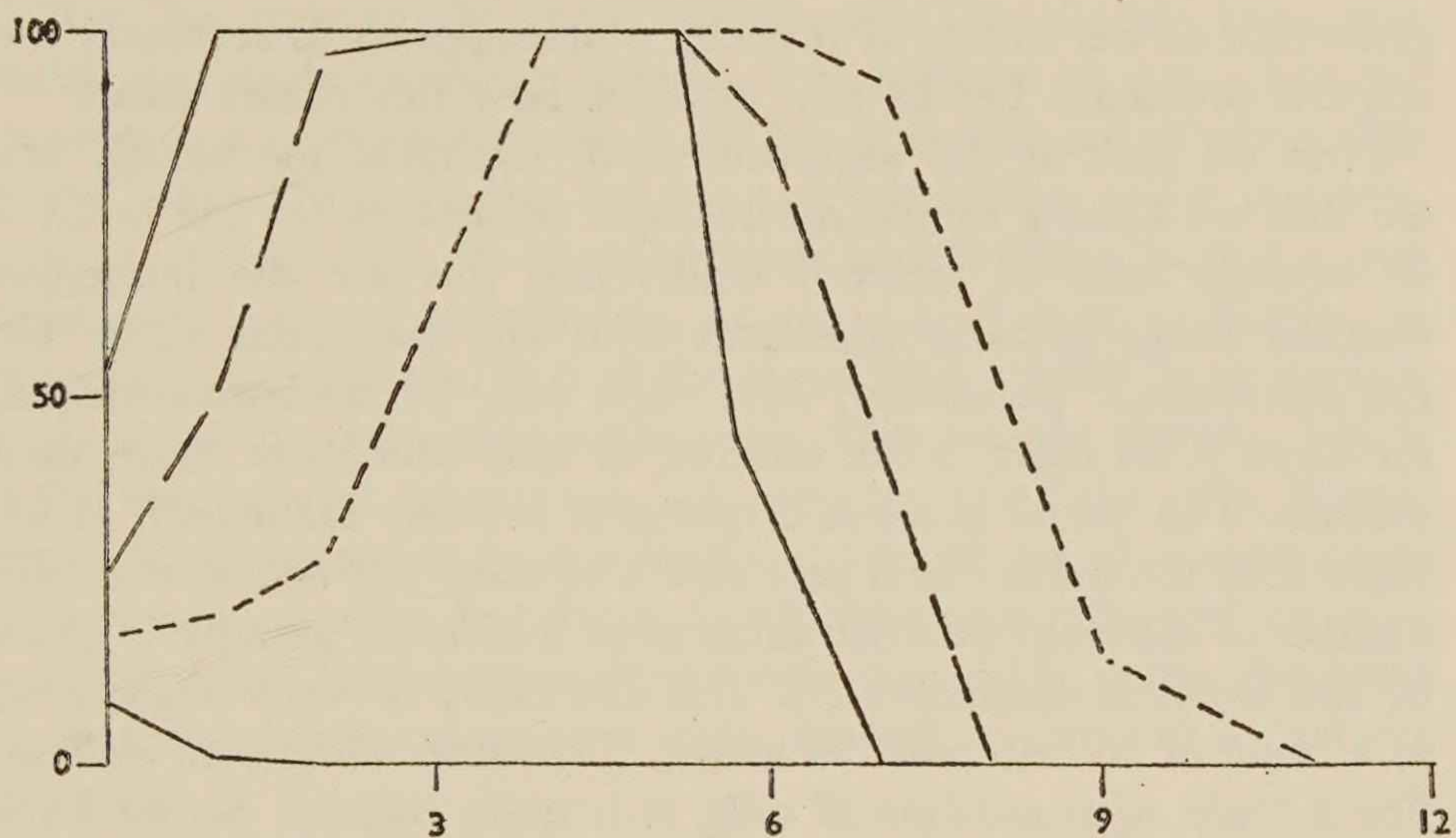


Figure 1c. As in Figure 1a, but $\theta = 4$, $n = 14$ and with habituation.

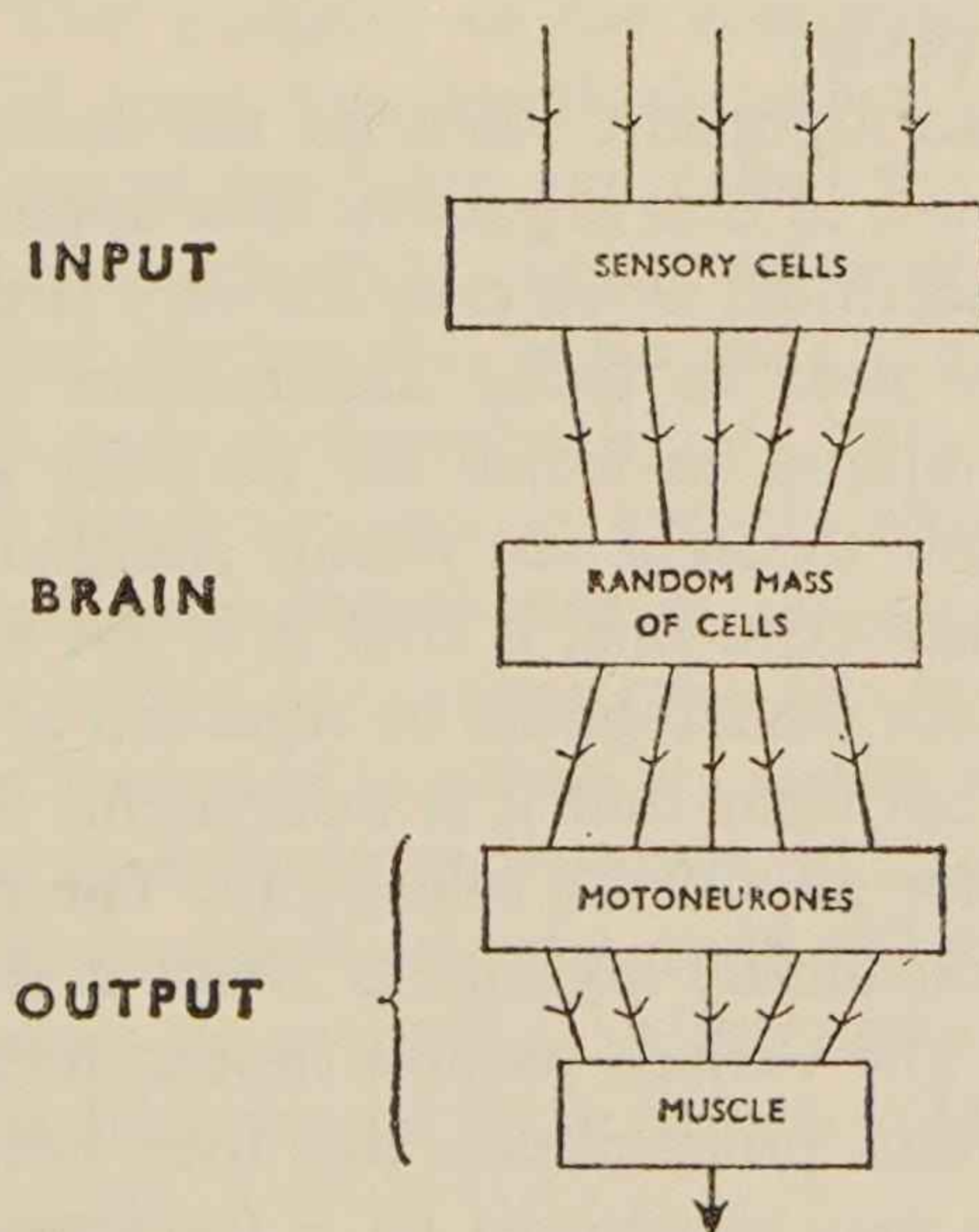


Figure 2. Schematic diagram of the simple theoretical animal.

great deal of the feeling of mystery which appears to surround the original problems. Let us now examine how this comes about.

First we look at the argument from statistical mechanics. We see that we have a simple macroscopic parameter for the brain — its average level of activity. Underlying this are the numerous detailed firing patterns consistent with any particular value for the macroscopic parameter. And these may be numerous indeed, for there is no limit to the number of cells which our brain may contain. The actual number of patterns is easily calculated. If we know that the brain has n cells and x of these are active, then the number of different possible patterns of individual activity is given by the binomial coefficient $\binom{n}{x}$. This can easily be very large; even in a brain of 50 cells with 30 active, it becomes 47 million million. For a brain with millions of cells, it is quite colossal. So we have a simple macroscopic description of the brain which has underlying it a microscopic description which may be extremely complex. There is, then, an analogy with the conventional statistical mechanical situation, although it is really fairly superficial.

Next we note that in this simple brain it is certainly true that the activity of a single nerve cell can change the output from a response to no-response or vice-versa, but only when the input sets the brain extremely close to threshold. Thus our model could be changed from saying "I love you" to saying nothing at all, if one nerve cell failed, but only if it was pretty uncertain about the matter in the first place!

Then we had an argument based on the central limit theorem. Two defects, at least, in that argument now appear. It is clear that the activities of individual nerve cells are very strongly correlated — they are nowhere near to being independent random variables, which is the assumption on which the majority of the derivations of the central limit theorem are based. Another defect, which I think is a very instructive one, is that it is not at all obvious that the nerve cells in our model should be regarded as random variables of any sort. It is not clear that it is meaningful to talk of the probability of firing for any of the cells at all. The origin of the difficulty of using probabilistic arguments about a system of this kind lies in the input. The various possible inputs, or stimuli, may each turn up with certain probabilities. But they need not do so. For this reason, there may sometimes be a fundamental as well as a merely practical difficulty in asking precise questions about animals of an information-theoretic character.

Now we turn to the physiological side. Our simple brain can make one single clear-cut decision – to respond or not – but the decision is a co-operative one made by the whole set of nerve cells in the brain. No particular cell has any over-riding say in the decision; in fact all cells are approximately equal. There is thus a true democracy and we have found, in one special case, a solution to Sherrington's problem. It is at the same time a solution to Eccles's problem of the unity of consciousness. The average activity, which is the macroscopic parameter, is a property of all the cells. It corresponds to the much more complex consciousness of a more complex nervous system. It belongs to all the nerve cells and yet it is a single thing. We see how what seems impossible, when discussed in general terms, becomes easy when we look in detail at a particular model.

Another curious situation appears in the so-called split-brain experiments of Sperry and his collaborators (Sperry, 1961). As you doubtless know, the brain of a man or other mammal is approximately symmetrical. The right half of your face is approximately the mirror image of the left and the same is true of the brain which lies behind. The connections between the two halves are largely nerve fibres – that is, they consist mainly of nerve processes not cell bodies. If they were to be severed, you would expect the brain to be so badly damaged that the two halves would be completely useless and perform no normal activities.

Not so at all. The majority of the connecting fibres form an immense bundle of some two hundred million (see Glees, 1961) crossing near the top of the brain and called the corpus callosum. Men have been born without a corpus callosum and suffered no very apparent defect during life. More than this, Sperry's experiments on monkeys and, therapeutically, on men have shown that the two halves of the brain can be entirely separated to a great depth with only minimal disturbance of normal function. In the monkey, the result is that the animal now has two brains, each of half the size but of comparable capability to the one it had before. The two halves are quite independent and, in suitable experiments, can be shown to learn simultaneously quite different things. If we assign a consciousness or a spirit to a monkey, I think we must say that whereas it had one of these before, after the experiment it has two.

There is a difference between man and monkey which is connected with a matter called cerebral dominance. The two halves

of a man's brain are not equal in status and, in most people, the left half is the dominant one. In fact the important function of speech is normally mainly controlled by the left half of the brain. The left half might be called the clever half and the right half the stupid half. This is unlike the situation in the monkey where there is little difference between the two halves. As a consequence, when you split a man's brain the left half is still about as able as the whole brain was before whilst the right half is moronic. It is sometimes thought that this means that the consciousness has retreated from the whole brain to the left half, because the left half behaves much as the whole brain did before. This, I think, is not the right way to look at it. Rather we should say that where there was one brain and one consciousness before, the surgeon's knife has turned it into two independent brains and two independent consciousnesses. Both of these new brains would, presumably, remember having been the single brain which was there before. One would remember this with satisfaction, at least providing it was cured from the mental disorder the whole brain had had. The other would regret its present stupidity and wish it still had abilities now irrevocably lost. Incidentally, it is possible to communicate with the stupid half and, furthermore, in the normal behaviour of the whole man, signs are sometimes visible of its attempts to assert itself.

Well, of course, all this seems very remarkable, and any brain theory has to account for it. I wish first to consider a comparable matter for our simple brain and then to describe in a rather general way how we might explain it even in monkey or man. If we take our simple brain having n cells in it and split it into two having each $\frac{1}{2}n$ cells, the two halves will clearly be simple brains of the same general type as their "parent". Each half could make one decision, independently of the other half. The whole system would now have two natural, independent macroscopic parameters, namely the average activity of each half. The consciousness of the whole system would change from being described by one parameter to being described by two independent ones.

I believe that this is a true, though very simple, analogy with the situation holding in Sperry's experiments. Another, more picturesque, way of describing this view is as follows. Liken the brain to a pair of pendulums which are firmly tied together with a piece of string. The two swing as one and it would be natural to call the tied pair a single more complex pendulum. Cut the string and there are two separate pendulums, each swinging independently.

Again one has become two. To express this in more mathematical terms, the simplest version of my view about the split-brain situation is to say that in the dynamics of the brain the two halves have very similar equations of motion, but there is a strong coupling between them which ensures that the macroscopic parameters of the two sides are normally constrained to be the same. The coupling would be maintained through the nerve fibre tracts of the corpus callosum and other structures which cross from one side to the other. When these structures are cut, the number of macroscopic parameters is doubled, each side having a separate set.

Now let us turn to Lashley and the question of whether the same nerve cells need be active during successive responses. Clearly they need not, because our simple brain will still behave in the same macroscopic manner even if many of its individual cells are inactive due to habituation arising from their past activity, providing merely that there are enough cells active to exceed the necessary thresholds. Then on successive occasions different cells may be habituated and different cells be active. In fact the active cells might be totally different on two following occasions, even if at the macroscopic level the behaviour were identical. In a brain of this kind, the functional organisation indeed plays over the individual nerve cells.

Well, we have seen that the consideration of a definite model can throw much light upon a number of matters which are, otherwise, rather obscure. We have no time to pursue it any further in order to discuss how it might be generalized to form a possible model for a mammalian brain or how it could be given a memory. I have submitted such a discussion for publication elsewhere (Griffith, 1966c), that discussion being consistent with my hypothesis about the biochemical basis of memory published recently in *Nature* (Griffith, 1966a), but now I have only time to make a few remarks about experimental evidence, before I conclude.

First, I do not know whether this very simple kind of brain exists anywhere in nature. It is true that there are animals which make exceedingly few decisions. The polychaete worm *Myxicola Infundibulum*, which lives in the sand at the low-tide mark, sticks a crown of tentacles out in order to respire and feed. If disturbed, it contracts and disappears completely into the sand, returning passively after a certain relaxation period. It seems that this may be the only decision of which it is capable, to disappear or not, and this decision is completely an all-or-none affair (Roberts, 1962). Unfortunately, however, in *Myxicola* there really is conver-

gence onto a single pontifical nerve cell; a nerve cell which, appropriate to its dictatorial position, is extremely large (up to 1.7 mm across the axon). Of course, this by no means disproves the presence in series with it of the kind of brain we have just discussed, but it does show that it is not necessary in this case.

The example of *Myxicola* can be matched in more complicated invertebrates. In crustacea, for example, many functions are performed by one or two nerve cells, which would be performed in vertebrates by very many cells acting in parallel. The lobster and crayfish tails each contain four giant axons and a single pulse in any one of these will initiate the violet defensive snap of the whole tail (Wiersma, 1961).

However, there is no reason for supposing that the highest level of decision-making in mammals or other vertebrates uses such a mechanism. As I indicated before, I am proposing elsewhere that this is done by a generalization of the simple brain we have discussed earlier. A piece of experimental evidence in favour of this was pointed out to me by Dr. G. S. Brindley, after I had already elaborated such a generalization. In 1960, Burns and Salmoiraghi showed that the action of breathing in is probably controlled by just such a neural organisation in the mid-brain reticular formation. Breathing out is controlled by another similar one.

I hope any professional philosophers present will not consider me presumptuous if I finish with a very brief word about what I consider to be the correct philosophy of a scientific approach to the study of the brain. It is often said that one has a direct knowledge of the existence of one's own mind, but that the conviction we mostly have of the existence of other people's minds is based on plausible but logically unconvincing arguments. It is against common sense to disbelieve in other minds, but it is against sense to believe in them.

In our scientific studies of the brain, will we ever have trouble with this sort of problem? I think there is no reason for supposing that we will. The scientist's basic hypothesis is the existence of an objective world which he attempts to measure and theorize about. This world is made up of bricks called protons, electrons and so on. Out of these bricks are made atoms, molecules, cells and brains. Thus his picture of the brain is inevitably a mechanistic one and may well become, as I believe it can, a complete one without having to introduce any independent undefined entity as "mind".

The consequence of this philosophical position is that statements

like "other men have minds" or "Men can think, and so can machines" contain words like "mind" and "think" which I do not understand in such contexts because they do not have any clear scientific meanings. If definitions were given they would have to be in terms of scientific concepts and in such a way that I would then understand the words as well, or as little, as I do other scientific terms. Furthermore, the truth or falsity of such statements would then become a mere matter of calculation and would depend, moreover, upon the precise definitions adopted.

Of course, such a position does not dispose of the problems connected with mind. It merely applies a transformation to the scene, whereby it removes the fundamental philosophical puzzle concerning other minds and replaces it with a puzzle concerning introspection. We are left, in other words, with a problem which is superficially similar to the classical paradoxes of self-reference.

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More about Mad Quakers

Mary Glover

My first article described how in 1796 William Tuke, a tea-merchant of York, founded an asylum to be run by Quakers for Quakers; and how within a very short time the physician Dr. Fowler, and the superintendent George Jepson broke away from the orthodox treatments of the time – dehydration, designed to drain the body of noxious fluids, and government by fear by which patients were supposed to be controlled. These changes produced a relaxation of tensions; and Jepson built up a new technique of treatment for the mentally ill, based on understanding and sympathy.

Description of the Retreat.

In 1811 Henry Tuke, son of the founder of the Retreat, suggested to his son Samuel that he should write a history of the asylum, which had now been running successfully for 15 years.

Henry was himself a writer, who had in the last decade published four books about Quakerism. His *Principles of Christianity* was much loved; there is a copy of it at the Retreat, a small leather-bound volume, tooled in gold, inscribed by Henry to George Jepson. But he could hardly have undertaken the history of the Retreat himself; he must have been a very busy man. The management of the tea business had by now devolved largely upon him; it had been extended to include cocoa and coffee and the manufacture of chocolate, and new premises had been acquired. Moreover Henry from time to time undertook journeys to visit Quakers in distant places, his interest in religion was very great.

Sam was 27; he took his father's request very seriously, partly because it was his father who made it; he had been interested in insanity since 1804. He forthwith gave up the study of Hebrew, which he had been learning in order to be able to read "at least the poetical parts of the Old Testament in the original" (so he says in his *Memoirs*). He was a great reader and he now set himself to the study of insanity; he read widely and visited asylums. Almost the first thing he did was to invite George Jepson to dine; "we talked about insanity".

These studies were effective. When the book, *Description of the*

Retreat at York, appeared it was widely assumed to be by a medical man. (This must have been gratifying; Sam had wished to be a doctor, but had to go into the tea business as an apprentice when he was 13; he was needed there as at that time his grandfather was much preoccupied at the Retreat.) The book appeared in 1813, the year before his father's death. One might surmise that Henry never rendered a more valuable service to humanity than when he put his son on to writing this book.

Description of the Retreat includes an account of its founding, followed by a chapter on the house and grounds. The house and grounds were an expression of great originality in the thinking of William Tuke. Sam thought then and throughout his life that the design of asylums has a profound effect on the management of patients and the kind of life they lead. He became himself an authority on this subject, wrote on it, and was consulted about it. He did not think the design of the Retreat was faultless; he regretted that the galleries had small rooms on both sides; these provided a number of patients with rooms of their own, but this made the galleries rather dark. Sam welcomed the planning of the asylum at Glasgow, which had windows all along one side of the galleries. He remarks that many asylums have faults of design arising from "excessive attention to safety". "People in general have the most erroneous notions of the constantly outrageous behaviour or malicious dispositions of deranged persons". Then comes a chapter on Dr. Fowler's experiments with the orthodox treatments and his decision that they did no good. There follows a long section on the methods of George Jepson and the theory that arose from them. The book closes with a useful chapter on statistics; and notes on the varieties of mental illness which are, from the medical point of view, quite valueless.

The heart of the book is the section on the work of Jepson. Sam says that "many benevolent men in many places have too long been dissatisfied with the system of management generally pursued, but benevolent theory was powerless when opposed by practical experience", though, as he says, the man of long experience may be narrow and mistaken; but this book is reporting what has actually been experienced in the course of experiment. Jepson, he says, had "by his talents and humanity carried into effect the benevolent wishes of the original promoters of this Establishment beyond their most sanguine expectations . . . had I not been assured of his cordial assistance the work would not have been attempted

... It affords me some satisfaction to reflect that some at least of his knowledge is now communicated". The acknowledgments to Jepson continue throughout the book, "The superintendent says ...".

He politely explains that George himself was too busy to undertake to write up his own work, and this was doubtless true. But it is doubtful whether George could have written a book even if he had had nothing else to do. Such scraps of his autograph as remain are in a small wavering hand, the hand of a man who does not often or with pleasure put pen to paper, quite unlike Sam's racing business copper-plate (though George wrote a lot of letters to relatives about patients).

The theory to which Jepson and Sam Tuke came as a result of the experience at the Retreat was that in insanity the mind is impaired but not destroyed; that treatment should be applied directly to the mind, by appeal to the reason and the affections of patients; that steady occupation is very beneficial; and that by these methods the patients may be nerved to make exceptional efforts at self-control and so contribute to their own cure. (Such efforts must of course have considerably alleviated the task of the attendants, and it is probable that the tranquil management of the Retreat owed quite a lot to patients themselves.)

Results

At the end of *The Description* Samuel Tuke gives some statistics of the results achieved at the Retreat in the years between 1796 and 1811. During these 15 years they had accepted 149 patients, 60 recently ill and 89 who had been ill a long time. Of the 60 recent cases 40 recovered and 8 improved considerably, a total of 4/5ths; of the 89 who had been ill for some time 18 recovered and 23 improved, a total of just under half.

It so happens that these figures can be compared with records kept unofficially at Bethlem.* It was not the custom at this hospital to keep records, but John Gozna, who was apothecary there for many years till 1795, had made notes for his own interest on patients admitted between 1772 and 1787. Some patients at Bethlem received treatment and some did not. From Gozna's records a certain Dr. Black deduced that "Two thirds of all patients in the first

* Bethlem was founded as a priory in 1247; later it became a hospital; by 1403 it was an asylum for the insane; Bedlam is a corruption of its name.

attack will recover within twelve months . . . if left to the unassisted efforts of nature.”† Macalpine and Hunter (*George III and the Mad Business*, p. 299), from whom this information is taken, confirm that this is borne out by general experience. “Of 100 psychiatric patients taken at random one third will recover completely, one third will recover but not to their previous level, and one third will remain impaired or get worse”. Of the total of 149 patients at the Retreat 89 recovered or improved; this is less than two thirds but they had a considerable preponderance of people who had been ill for a long time.

The Retreat figures compare favourably with the Bethlem record. The Retreat patients correspond to the untreated patients at Bethlem, because Dr. Fowler so quickly discontinued all medical treatment. Their figure of 48 out of 60 cases recovered or improved is better than the two thirds of patients in the first attack at Bethlem.

Haslam, the apothecary who succeeded John Gozna at Bethlem, produced more figures for patients admitted between 1784 and 1794, the decade that preceded his arrival. 1664 patients had been admitted of whom 574 had been discharged cured and 1090 uncured. This is a smaller proportion of cured than Black’s figure for those not treated, suggesting that the horrible treatments of Bethlem prejudiced patients’ chance of recovery, and this is likely enough; but it does not follow from the figures, because it may be that only patients who seemed to be iller were treated, and those who were only mildly demented were left “to the unassisted efforts of nature”. Haslam does not distinguish recent from long-standing cases.

However the Quakers at the Retreat were not interested only in the statistics of recovery; they knew that many patients would not recover, especially those who had been ill a long time, and they were concerned that these should have their illness in comfort. Comfort is impossible for those who are suffering from certain conditions, like severe depressive illnesses or paranoia or bad schizophrenia. But the staff were tireless in their kind attention to the hopelessly ill. Sam Tuke comments on these that “many of those whose wits have almost gone are very easily amused, and many hopeless patients become affectionately attached to those who look after them”. One patient came to them unable to use his legs, be-

† See Dr. William Black, *A comparative view of the mortality of the human species of all ages, and of the diseases and casualties by which they are destroyed or annoyed*. 1788.

cause he had for so many years had them in irons for fear of his becoming violent. They removed the leg-locks and taught him to walk; and when visitors came to see him, and asked, "What is this place called"? he answered "Eden, Eden, Eden!" Some patients wanted to stay on at the Retreat for a time after they were recovered because they were happy there.

One of the most striking and beneficent, and also the most obvious, results of the moral treatment at the Retreat was the abatement of violence and the abatement of fear; the two changes went hand in hand, but the initiating movement came from Jepson, when he decided to abandon the regime of control based on fear and severity. The result of this was that patients became quieter. The fearlessness of the staff, "the Quaker contempt of danger", struck Sydney Smith as amazing. Jepson came to believe that most of the violence in asylums that frightened keepers and thrilled visitors was the result of provocation, the chains, abuse, beatings and so on that patients were subjected to by the keepers. The thing that fascinated visitors to the Retreat was the quiet and the calm. This was the foundation on which it was possible to build much more, arrange for steady occupation, engage patients in talk, provide recreation, take them to Meeting, have tea-parties lasting most of the evening and so on.

What this amounted to in the experience of patients, the calm and confident intercourse, the relaxation of tension, can hardly be imagined.

The Succession

The minutes of the Committee of the Retreat record that on October 23 1820 "a serious accident having deprived the Institution of the services of the superintendent, the Institution to be visited daily in rotation by a panel of ten Friends". Perhaps Jepson had a stroke which occasioned a bad fall. The Minute for March 19, 1821 records "Geo. Jepson having recovered from his accident and able to walk about the house, the extraordinary visitation shall cease". And then very oddly there is a precisely similar minute for May 16. In 1823 Jepson resigned. He was 80 and there had been some signs that suggest failing powers; he had of recent years been asked to do fewer jobs and Sam Tuke had taken on more. His wife resigned with him and they went to Leeds. The Retreat gave him a pension of £50 a year for his lifetime; Katharine outlived him

for 16 years and she had then no pension, though she had served the Retreat with distinction for longer than her husband.

In December 1822 William Tuke died aged 90. He had been blind for some years.

Thus the Committee had had ample warning that the two men who had between them created the Retreat must soon be superseded, and it would have been wise for them to groom somebody for the superintendency. This they had not done.

I think they were in a difficulty. William Tuke had originally felt that he needed somebody of his own class to be superintendent, and Timothy Maud was the right man. The superintendent had to exercise authority, not only over patients but over staff; all writers on asylums emphasise the difficulty of getting staff to be diligent enough and pacific enough to look after patients properly; the superintendent had to receive visitors with good manners and do the Retreat credit, this had been done usually by Tuke, and the Retreat had had many distinguished visitors, whose approval meant a great deal; and he also had to have organising ability. Tuke had been very doubtful whether Jepson could measure up to the job, but when he came he was very good and Tuke gave him a lot of help. Now they could not find anybody with the qualifications they were looking for who wanted the job.

A few months before Jepson announced his resignation formally to the Committee, a man called J. Binns, having served for some months on trial, was appointed as attendant. When the Retreat began to make it known that they wanted a superintendent, Binns put in for the job. Shortly after, on May 1, he was given notice to go as soon as the Retreat had found someone to replace him. He left on May 10. One assumes he had been told that he would not be promoted and he left because he was not prepared to continue in a subordinate position. (As he was by now a trained and experienced attendant, his going must have weakened the staff.)

That left the Retreat with a short list of three, only one of whom appeared at all possible. This was Thomas Allis.

Allis had been at school with Sam Tuke at Ackworth. Sam was now on the governing body of the school, which needed a new headmaster. Sam approached Allis about this appointment. Allis had had a school of his own, but was now in business, selling agricultural machinery. He was interested in the school and offered some good advice about the boys' leisure, he thought they needed books and a room where they could read. But he did not want

the headmastership. He did apply for the post of superintendent of the Retreat.

By his own account he had no qualifications for this work. He said his friends had assured him he could do it. He said of himself that he was "a man about 35 years of age, having no medical knowledge" (the Retreat had hoped for a medical man) "whose only approximation to such knowledge is a superficial knowledge of chemistry as a science; professing as he hopes just common rate abilities; with general knowledge and powers of perception and attention and perseverance about on a par with the generality of persons occupying the middle rank in our society, in which rank most of his friends are to be found".

His language strikes one as rather pompous and very dull; but I suppose it was acute of him, as he was a very commonplace person, to take the initiative in saying so himself.

Sam was rather horrified at the idea of bringing a young family to live in an asylum. George and Katharine had always lived *in* the Retreat and shared their meals with the staff and some patients; Allis could not quite see the difficulty. He wrote in October 1822 "I am aware of the tendency to imitation in children, but I presume thou doest not mean that this tendency would be likely to become contagion and produce insanity in the child?" He thinks "he could check such imitation as well as other follies of so many boasting the possession of reason". He had no apprehensions that the screaming or behaviour of the insane could distress children.

In January 1823 he found his business needed a fresh outlay, for which he did not wish to borrow, and now he *wanted* the post at the Retreat. He wrote again to say that his wife's sister lived with them and therefore a cottage near the Retreat would meet their needs and he would like to know "at least the minimum salary in mind". The only reason he could think of for supposing that he was equal to the work was that several of his friends had said they were confident he would be. "It will not I presume be expected that I should have felt any natural predilection for the work; such a predilection I should conceive impossible; tho' I think it very possible for a person entering as he ought on its duties to be so interested in the welfare of the Institution and of the unhappy objects of his care as to become really fond of the employment".

One would have thought he had written himself out. But he was appointed and had a long reign. In 1840 he left the Retreat

and set up his own private asylum at Osbaldwick, taking with him some of the best attendants at the Retreat.

Josiah Rowntree, who had known him well, said that he was "unpolished in manners and appearance, a hearty, vigorous man, a naturalist . . . fond of boys".

All went well. His previous experience suggests that he might have fancied himself as a person who knew how to keep order among the unruly; he had presumably controlled his boys with the cane, and his coming might have meant that the Retreat would be in danger of a return to the rule of fear. (But it is possible that he had not controlled his boys and that was why he gave up schoolmastering.) He was benevolent, and I find I have suspicion that there was in him a streak of idleness; this is a very great advantage to an institution that has a new superintendent who does not know the first thing about his job. He must have had the sense to let the Institution run itself at first. He was appreciated; the Retreat people respected the modest distinction he later attained as a naturalist, and one must remember that at this time people *liked* pomposity in men.

He had a number of people to help him. Sam Tuke in his *Memoirs* says that Jepson "gave him (Allis) advice and instruction", one does not know for how long. Sam, who was his friend, must have helped him a lot. Sam had succeeded his father as treasurer in 1822; later he speaks of himself as one who had for a time "almost *lived* at an asylum" (his italics). He had a house about five minutes walk from the Retreat; (a nice old house it must have been, with space and dignity, but now a good deal mauled about to make a chemist's shop and home combined). It may have been during the early years of Allis that he gave so much time to the Retreat. He remarks that in order to manage lunatics well, you have to overcome "some of the deepest instincts of our nature" (partly because of their almost intolerable insolence). This suggests that Sam had not only helped in the administration of the Retreat but had himself coped with patients and found them maddening.

Another person who must have been of great importance at this time was Hannah Ponsonby. She had come to the Retreat in 1797, to look after her mother who was a patient; later she was taken on to the staff, and worked for years under Katharine Jepson. When Katharine retired Hannah succeeded her as matron. The stories about her that have survived suggest that like Katharine

she had the gift of making life pleasant; the ladies who came from York on Mondays to help her mend sheets found this a very jolly occasion; and she certainly had easy authority.

One must not forget that the patients themselves must have made quite a considerable contribution to the tranquillity of the regime. There were many long-term patients, who constituted with the staff the core of "the Family"; they helped with work and with other patients.

The Committee must have found Allis adequate. Within a few years of his coming they had built him a house; and also added rooms to the Retreat for the seclusion of men and women who were violent. There were more of these than formerly. It is not surprising if Allis had not the genius George Jepson had in sensing rising excitement before a crisis arrived and talking the patient out of it; but fits of violence do not as a rule last long, and the evidence is that not many people were confined for a long time.

So the tradition which Jepson and Tuke had invented and developed did not die with them, but was bequeathed undiminished to their successors. An American physician from New York, who visited England to study asylums in 1863, writes: "The York Retreat . . . hallowed in the memory of everyone who appreciates the spirit of benevolence which originated it and has ever since pervaded its halls, still pursues its mission . . . it was sufficiently apparent that the genius and earnestness of Tuke still abide among his successors." (D. H. Tuke, *History of the Insane in the British Isles*, p. 134, quoting from the *American Journal of Insanity*, Oct. 1863.)

The Impact of the Retreat

Astonishingly the publication of the *Description* excited furious anger in a certain Dr. Best. He was the physician in charge of the York Asylum. (This was the asylum where Hannah Mills had died in 1792.) Best wrote to *The York Herald* (23 ix 13): "When an attempt is made to injure the reputation and interests of any public body . . . it is of little moment to the assailed party whether the measure be accomplished by open libel or masked insinuation . . . In an account of the Retreat for lunatics near York published a short time ago, some highly indecorous and injurious insinuations were thrown out against other establishments for the same purpose, the intended application of which none could miss . . ." he went on and on and signed himself Evigilator. Sam

Tuke replied to say that there had been no intention of insinuating anything against anybody. The press took up the matter and altercation continued; Dr. Best wrote in the same vein several times.

He was unlucky. This outburst coincided with complaints made to a Yorkshire magistrate, Mr. Godfrey Higgins, that a man whom he had sent to York Asylum had been badly treated. Best held an internal enquiry and produced evidence from his staff that there had been no unkindness, and he and the Archbishop of York, who was Chairman of the governing body, and the rest of them hoped the matter was ended. But no. By this time suspicions were widely aroused and Higgins and 19 other York citizens, including Sam Tuke, bought themselves places on the governing body, at the price of a subscription to the Asylum of £20 each; they turned up in force at the next meeting to demand an independent enquiry. This brought shocking abuses to light, in spite of the fact that a great part of the Asylum and all its papers were burnt one night in a fire, when Best was away attending to a private patient. Four patients lost their lives; in the upshot all the staff were sacked and Best resigned (to found a mental home of his own). A fresh staff was engaged, the two Jepsons went over to the Asylum for a few days to help them, and William Tuke was asked to compose a set of rules for the guidance of attendants. The asylum then continued on an even keel.

These events coincided with the rise of public concern about a man called Norris who had been badly treated at Bethlem. He was a foul-mouthed dangerous lunatic, who had been for many years chained by his neck and limbs to a wall. Haslam, the apothecary in charge, had allowed him books and the company of a cat. But this did not help Haslam when the case of Norris and other abuses were the subject of a public enquiry; he was sacked without a pension (and set up a successful private asylum of his own). The two enquiries at York and Bethlem, both leading to shocking disclosures, helped certain members of the House of Commons to demand successfully the appointment of a Select Committee to enquire into Madhouses. This Committee included some powerful personalities including Robert Peel. It reported in 1815 on county asylums and in 1816 on private madhouses. Again the reports were horrible. Some places were not very bad, some of those keeping private madhouses for gain, like Thomas Bakewell, were humane and sensible. But the overall picture *was* very bad. The people appointed to carry out visitations under the 1774 Act, had done

so, but had been unble to do much good, because the law which empowered them to grant licences to madhouse-keepers did not permit them to *withdraw* licences; the law had no teeth.

These disclosures should have led at once to fresh legislation and the House of Commons repeatedly during the next decade attempted to carry a bill, but was always frustrated by the House of Lords; the debates suggest that this body was deplorably lacking in compassion or decent concern. However in 1828 a new bill was passed. This remedied a number of defects in existing regulations; its two most important features were that it gave the Metropolitan Commissioners in Lunacy power to withdraw licences from institutions that they found badly run; and that Lord Shaftesbury became a member and then chairman of the Commission, and devoted the rest of his life largely to the insane. In 1852 he made a speech in the House of Commons reporting great changes for the better and the disappearance of the worst old abuses. He showed himself aware of the work of the Retreat though he did not go there.

Thus the publication of the *Description* helped to spark off very important reforms.

In 1821 John Conolly, a medical student at Edinburgh, visited the Retreat. Tuke and Jepson were still there and Conolly was deeply impressed with what he saw. He was working on a thesis for the MD on the subject of insanity; he determined to devote his life to the insane. After varied experience he joined the staff of the asylum at Lincoln, and here he found that patients were being treated without the use of force. This experiment was on the whole successful, though there were some casualties. In 1839 he became superintendent of the largest asylum in the kingdom, at Hanwell in Middlesex. He determined to follow the methods of the Retreat. It would seem that the Retreat was more successful than Lincoln. D. H. Tuke gives his opinion that the regime of government without force would not have gained the support of public opinion on the basis of Lincoln alone. And it must be remembered that at this time the work of Pinel in France was widely known. Pinel at the Bicetre was conducting the same experiment as the Quakers at York, but they did not know of each other's work, because of the war with France. Pinel learnt of the Retreat from a Swiss, Dr. de la Rive, in 1798; but the Quakers did not learn about Pinel till they aquired a translation of his book, after the Peace of Amiens in 1806.

Conolly wrote several books about the treatment of insanity

and they were widely read. He acknowledged very fully and enthusiastically his debt to the Retreat, but differed from the Quakers on one point. At the Retreat the use of force, in the form of straps, was being gradually reduced. Conolly did not hold with this; his view was that if the attendants were allowed to use force at all, they would have recourse to it too readily, and too often; that any use of force excited the patients generally to alarm and tumult; and that if the use of force was prohibited altogether attendants would use their ingenuity to find other means of control; he did not think it very difficult to get attendants who were equal to this. At the Retreat Jepson believed that it would never be possible to find enough men and women so gifted that restraint could be abolished altogether, but the rule was that if restraint was needed, it must be applied by the Superintendent and assistants were not to have recourse to it themselves. Jepson could persuade a patient to accept straps or seclusion without noise or fighting, or upsetting anybody else; or if a man had occasionally to be overpowered, there would be enough helpers on the job to discourage him from resisting. It was one of the advantages of a small asylum of 60 to 80 patients that the superintendent could be called upon to cope personally in this way. D. H. Tuke (*History of the Insane in the British Isles*, p. 220) says that the Commissioners in Lunacy in their Second Report (1847 p. 224) record that "The adoption of a more gentle mode of management . . . was the result of public opinion and of the example set by the managers of the Retreat near York and (of) the publication of Mr. Tuke's account of the Retreat . . . In the best-conducted asylums restraint is now seldom (and in a few establishments never) resorted to."

Conolly was disappointed that once the practice of the Retreat had become widely known, it did not win universal adoption. But it is not difficult to say why this was so. At a time when there were no very effective drugs for sedation, the non-restraint system made too heavy demands on the numbers and giftedness of attendants.

The ideals of the Retreat were lost sight of, very generally, around the turn of the century. Mental nurses were pressing for changes in their training. This appears from an article by Dr. Walk in the *Journal of Mental Science* 1960. He explains that the tradition set up by the Nightingale School of Nursing at St. Thomas's in 1858 had been extraordinarily successful in raising the prestige of hospital nurses. Mental nurses wished to share this prestige and therefore to have the same training as hospital nurses. These nurses

were aspiring to be on a par with medical students, and therefore their training was being modified in order to be more scientific. Mental nurses were therefore taught, like other nurses, anatomy, physiology and surgery and other subjects, and these crowded out the long experience with patients which could have communicated to them something of what is needed, in understanding and sympathy with the mentally ill, and the skills of this type of care. In spite of the concentration on the mind of the individual, which characterised the work of Freud and Jung and their schools, this emphasis on physical treatment continued. In the 1930s new methods were introduced, which seemed for a time to be much more promising than anything yet tried, especially insulin coma, electrical shock and the surgical operation of leucotomy. Since the war new types of drug have been discovered, which appear to be in turn superseding the methods of the 1930s.

These physical treatments have diverted attention from a consideration of the experience of insanity, which the patient has to endure. It is understandable that you may not see the point of listening at length to the patient's tale of woe about feelings and fears and despairs, if you know you are going to be able to dissipate them with a drug. The patient believes that these interior experiences throw light on his condition which cannot be understood without his evidence about them; the doctor is convinced that the drug will restore normality, and the experiences will pass away like a dream, and have no further significance.

But it is being said that we are now catching up with the ideas of the Retreat.

Meanwhile the Retreat has preserved its own tradition. It has always been in the forefront of new work and experiment, but has not lost the old ideal of "the Family", of caring for individuals. Its present Director and some of the staff are Quakers and a Quaker Meeting is held there during the week, attended, though not in large numbers, by staff and patients. Some patients go to York Meeting on Sunday. Ex-patients still speak with warmth of the sense of loving-kindness which is the key-note of life at the Retreat.

Prototypic Organisms VIII: The Oat Seedling

Rupert Sheldrake

As members of the animal kingdom we can have or imagine we have some understanding of the behaviour of other animals at an intuitive level. But plants are totally unfamiliar. They develop and grow inscrutably. They belong to another living kingdom and obey alien laws. Perhaps partly for this reason the experimental study of plants seems to attract little general interest and is by no means a glamorous science. But the more one looks at plants and wonders how they work, the more interesting they become and the more striking is their strangeness.

Plants can in general only move by growing and, except when they are dormant, they are growing all the time. Their roots grow down into the soil, their shoots up into the air where they bear fruits and flowers and extend the large surface area of their leaves to the light which powers their photosynthesis. These obvious, basic features of plant development depend on the capacity of the growing plant tissues to detect and respond to two major environmental influences: gravity and light. Much of our knowledge and understanding of these processes comes from the study of oat seedlings, whose classical role in plant physiology began with the investigations of Charles Darwin.

The shoot of the developing oat seedling, like that of other grasses, is enclosed in a cylindrical, sheath-like structure called the coleoptile (Fig. 1). This grows rapidly, increasing in length from a few millimetres to about five centimetres within a few days (Fig. 2). At about 20° C the growth of the coleoptile ceases four or five days after the germination of the seed when the first leaf breaks through its tip. The coleoptile is thus the structure which thrusts through the soil guiding the shoot system upwards and towards the light. It is extremely sensitive to the influence of both light and gravity. If a seedling is grown in darkness its coleoptile grows vertically; if the seedling is placed on its side, within ten minutes the coleoptile begins to bend upwards until it is again growing vertically. This response to gravity is called negative geotropism (as apposed to positive geotropism, exhibited by the primary roots

which grow vertically downwards). The response to light, phototropism, is equally rapid and results in the coleoptile bending towards the source of illumination. The curvature is caused by unequal growth on different sides of the coleoptile. Darwin showed that the phototropic response was abolished if the tip of the coleoptile was enclosed in a darkened cap, even though the lower, growing regions of the coleoptile were exposed to unilateral illumination. The phototropic response could not therefore be due to the direct effect of light on the growing cells. He concluded that the extreme tip was responsible for detecting the direction of the light and that some influence passed downwards from the tip which caused more growth to occur below the shaded side.

This conclusion was confirmed and greatly extended in several laboratories in Germany and Holland in one of the most fertile periods of botanical research, the 1920's and 1930's. It was found that removal of the coleoptile tip led to cessation of growth; that replacing the tip enabled growth to be resumed and that asymmetric replacement of the tip led to asymmetric growth, i.e. curvature (Fig. 3). In this way the tip was shown to be the source of a growth stimulating chemical, which was given the name of auxin. This growth hormone was purified and found to be a fairly simple chemical, indole acetic acid, active at amazingly low concentrations: one hundred thousand millionth of a gram is sufficient to restore growth in a coleoptile whose tip has been removed. The growth of coleoptiles in response to auxin is in fact used as a means of detecting and quantitatively estimating auxin and is a thousand times more sensitive than the best chemical methods available.

Auxin was soon shown to be involved in the control of many other aspects of plant development: the initiation of roots, leaf fall, the breaking of dormancy in the spring, and cell division and differentiation. Synthetic auxins are used extensively in horticulture and agriculture, as 'rooting hormone' for cuttings, to control flowering and to reduce premature fruit fall, as selective weedkillers, and, lamentably, in American chemical warfare as defoliants.

Meanwhile, back in the oat seedling the discovery of auxin led to a fairly simple explanation of the phototropic response: unilateral illumination of the tip causes auxin to move laterally towards the shaded side whence it moves downwards causing greater growth on that side of the coleoptile. An analogous explanation accounts for the geotropic response. When a coleoptile is placed horizontally, auxin moves to the lower side of the tip leading to

greater growth on the lower side of the coleoptile producing an upwards curvature. Gravity is detected in the cells of the tip by means of starch grains which roll to the lower side of the cells and in some way which is not understood cause the lateral movement of auxin.

So far so good. But how exactly do minute quantities of auxin cause cells to grow? No one knows. Isolated sections of coleoptiles can be floated on water and in the absence of auxin little or no growth occurs. On the addition of auxin growth begins within a few minutes. This simple experimental system has been studied intensively for over thirty years; at present it seems likely that at least the initial effects of auxin are due to an effect on the membranes of the cell, changing their permeability and thus altering the environment of the cell wall which surrounds the cell. The cell wall (containing cellulose and pectin) is normally rigid and does not allow the cell to expand, but soon after the addition of auxin the rigidity of the cell wall decreases and the cell is able to grow. This decrease in rigidity could be due to enzymic breakage of certain chemical bonds within the wall, or to a change in the salt content, or to an increase in acidity. The idea is that auxin could cause the membrane of the cell to release an enzyme, or to pump salts in or out, or to pump out hydrogen ions creating an increase in acidity, as the case may be. It is surprisingly difficult to devise experiments which unequivocally decide between these (or other) possibilities.

Since auxin plays such an important part in the regulation of growth and development in plants, the way in which auxin itself is produced is of great interest. In general it is formed in the parts of plants where active cell division is occurring: in shoot tips, root tips, developing leaves, germinating seeds and thickening stems. This general correlation between regions of cell division and auxin production led to the hypothesis that auxin was produced by the dividing cells themselves. There has never been any direct evidence for this view, but for thirty years it has been generally accepted. Recently, however, an alternative and radically different hypothesis has been proposed: auxin is not produced by living cells at all but is formed as a by-product of cell death. It is easy to demonstrate that dying cells not only of plants but also of animals, fungi and bacteria release auxin as the protoplasm breaks down. This is because the immediate precursor of auxin is a common amino-acid, tryptophan, present in most proteins; as the proteins break down

tryptophan is released and then undergoes further degradation to produce auxin. But are dying cells present in regions of active growth? They are. In germinating seeds the nutritive tissues (endosperm and cotyledons) break down to supply the growing seedling with the substances it needs for its growth. In root tips, shoot tips, developing leaves and thickening stems new wood (xylem) cells differentiate to form the conducting channels for water which moves through this continuous system of miniature tubes from the roots through the stem and into the veins of the leaves. As the xylem cells differentiate they die: the living protoplasm decomposes and leaves only the cylindrical wall of the cell. Further evidence for this theory of auxin production comes from the analysis of senescent leaves in the autumn. As the leaves turn yellow and die, large amounts of auxin are produced. It seems therefore that dying cells are the source of auxin which then promotes further growth and further differentiation and thus further auxin production. There is an element of positive feedback in this system which may in part explain why plants, unlike animals, are constantly growing. If cells are killed as a result of wounding or injury, the cells around them grow and divide, sealing off the wound. This wound response has been known for a long time to be due to substances released by the dying cells. The production of auxin by dying cells can explain the wound response and enables it to be seen as a different aspect of the same phenomenon which regulates normal cell division in the plant. The only apparent exception to this theory of auxin production is the coleoptile tip: there is very little cell death here or, indeed, cell division. The coleoptile grows by the expansion of pre-existing cells. The answer to this paradox has only recently emerged. The coleoptile tip does not in fact synthesize auxin at all, but auxin from the seed is carried upwards in the transpiration stream through the xylem and accumulates at the tip, whence it moves downwards through the living cells.

The way in which auxin moves downwards from the tip into the lower, growing parts of the coleoptile is by no means simple. The speed of its movement, about one centimetre per hour, is far higher than simple diffusion; the auxin is in fact actively transported downwards by the coleoptile cells. This auxin transport can be studied in sections of coleoptiles removed from the plant. Perhaps the most remarkable feature of this process is that it is strictly polar: auxin will only move downwards and is not transported at all in the opposite direction, i.e. towards the tip. The polar trans-

port of auxin (in contrast to the sideways transport of auxin which occurs in the tip under the influence of light or gravity) is not dependent on gravity : if a coleoptile section is placed upside down, the auxin is transported upwards. The cells must therefore have an inbuilt polarity; they must 'know' which end faces towards the tip, and in isolated sections their polarity persists : even if the roots and tip have been removed the cells know where they ought to be. Auxin is the only substance which moves in this way and the polarity of auxin movement is responsible for the polar behaviour of all higher plants. For example, if cuttings are made from willow twigs, roots form at the basal end and shoots at the apical end not in response to gravity but as a result of the innate polarity of the cells : if the cuttings are placed upside down, the roots are still produced at the morphologically basal end (as a result of the accumulation of auxin) even though this is now uppermost with respect to gravity. The mechanism of polar auxin transport is very mysterious. It may be closely related to the mechanism of auxin action in causing growth, and the solution of one of these problems could shed considerable light on the other.

Phototropism is only one of the responses that plants make to light. It is well known that plants grown in darkness become etiolated : long thin straggling stems are formed. In etiolated oat seedlings the growth of the coleoptile is reduced and instead the stem below the coleoptile, called the mesocotyl, grows to a length of several centimetres, whereas if the seedlings are grown in the light the growth of the mesocotyl is almost completely suppressed (Fig. 2). This inhibition of mesocotyl growth is extremely sensitive to illumination and even a brief exposure to light is sufficient to bring it about. But this effect is based on a different mechanism from the phototropic response : phototropism is caused by light in the blue region of the spectrum, while etiolation is suppressed by red light. This red light effect has the extraordinary property of being reversible by light of a longer wavelength, in the far red region at the limit of the visible spectrum. Thus if oat seedlings grown in darkness are exposed briefly to red light the growth of the mesacotyl is suppressed, but if the red light treatment is followed by an exposure to far red light, mesocotyl growth continues as if the plants had been grown in continuous darkness. A similar set of effects were found about twenty years ago to be involved in the germination of certain varieties of lettuce seeds. The germination of these seeds is promoted by red light but a subsequent exposure

to far red light cancels the response; if the seeds are exposed to alternating periods of red and far red light the quality of light to which they were last exposed determines whether or not they germinate. These experimental results led to the hypothesis of a light sensitive pigment capable of existing in two interconvertible states, a red light absorbing form (P_r) which is physiologically inactive but which on exposure to red light is converted to a physiologically active form (P_{fr}) which if exposed to far red light reverts to the P_r form. This hypothetical pigment, named phytochrome, was eventually isolated and purified from oat seedlings. It is a blue protein and even in the test tube undergoes reversible changes on exposure to red and far red light.

Many other responses of plants to light were subsequently found to depend on phytochrome: for example the measurement of day-length by leaves, controlling the initiation of flowering, and the control of sleep movements in species whose leaves fold up at night. Attempts to explain the effects of phytochrome on the suppression of oat mesocotyl growth in terms of auxin were unsuccessful; it is now clear that P_{fr} can affect the growth of cells directly without the intervention of hormones. Its effects on growth could be due to some sort of effect on the cell membrane; but this is only one of its possible effects and, like auxin, it may well act in different ways in different situations.

The red-far red interconvertibility of phytochrome is an interesting experimental trick; but recent evidence suggests that it may be of considerable ecological importance. It has been known for some time that many weed species begin to grow in woodland as soon as trees are cut down. The seeds of these species remain dormant until the stimulus of light falling on the soil frees them from dormancy. Sunlight has a relatively high red:far red ratio which converts phytochrome into the P_{fr} form and promotes germination. But light which has passed through a canopy of foliage is poor in red light (which is absorbed by the green leaves) and has a low red:far red ratio which inhibits germination. So the phytochrome system not only enables plants to respond to the quantity of light but also to its quality.

Phytochrome and auxin provide two important sets of explanations about the control and integration of plant development. In addition to auxin four other plant hormones are known to exist. The orderly development of a plant must depend on the interaction of these basic control systems with each other and with influences

from the environment. Something is known about these interactions at the physiological level; there is every reason to hope that much more will be found out about the cellular and molecular mechanisms of action of the plant hormones and phytochrome. But we are still far from a satisfactory understanding even of the oat seedling.

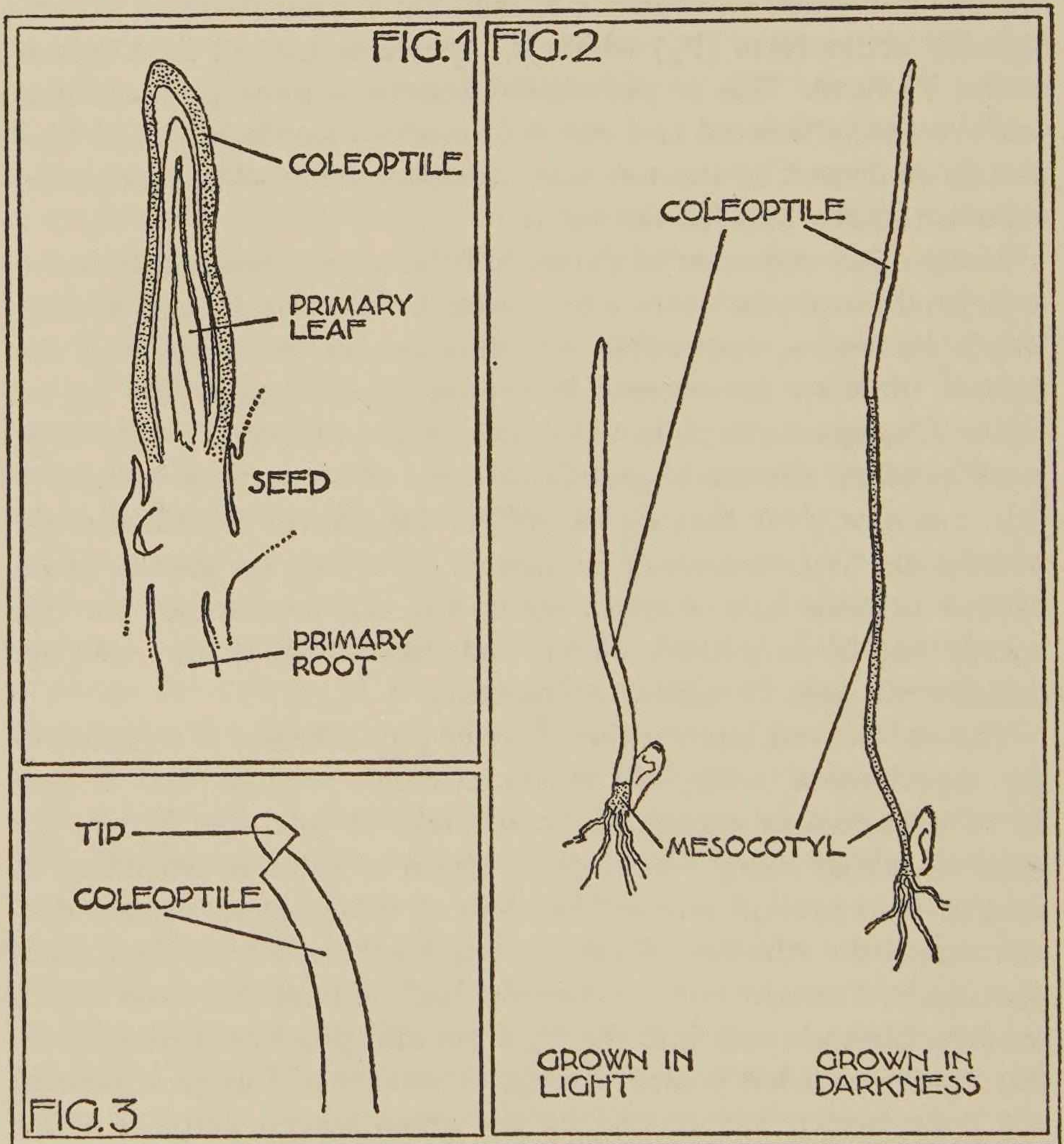


Fig. 1. Longitudinal cross section of a young oat seedling (magnified).

Fig. 2. Five day old oat seedlings, one grown in dim light, the other in darkness. Both have reached the stage at which the primary leaf is about to break through the coleoptile tip. The growth of the mesocotyl in the light-grown seedling has been suppressed.

Fig. 3. Curvature produced in a coleoptile whose tip has been removed and replaced asymmetrically. More growth has taken place on the side beneath the tip.

People need Fires

O. S. Pound

Note by Tim Eiloart

People need fires. No need to be romantic about the wood-fire, the smell of oak-chips, children bringing in fir cones and bits of green which must be accepted despite the spluttering incoherence of the ensuing fire. Wood fires are necessary. How many house-buyers wish they could insist on a fire-place. "It's a bit old-fashioned and makes more work, but we do so like a log-fire; and we can always use the central-heating if Tom feels lazy about the chopping". "They're so lucky. They have a real fire-place – one that draws, too!" In truth we are jealous of those who have such fires. Why? Perhaps it's symbolic. From about 400,000 B.C. when man, caves and fire are first found together (in Northern China), we have drawn more than physical warmth from the hearth – psychic warmth, perhaps? Whether roasting chestnuts or thoughts we can, in front of a log-fire, reflect on transitory things . . . "we are but smoke" . . . or enjoy them. How many assorted kinds of marriage have come about through the glow of a winter fire. Without such fires we become dehumanised, burnt-out human beings. The symbols that bind are mostly gone – the Cross and the Cup barely survive. Must we see the oldest of our symbols, the open fire, vanish into a trellis of wires and armour-plating inside a storage-heater – all for the sake of administrative neatness? People need fires they can see and smell. I wonder how many Ministers and senior Civil Servants unfold the day's left-overs from the Ministry out of a worn briefcase before a good log-fire?

Notice is hereby given . . . in exercise of the powers conferred under the Smoke Control Order of 1971 that a specified area, bounded by a line from the junction of . . . is declared a Smoke Control Area. Does this Order include you and your neighbours? No more smoke and general pollution. Fine! And anyone who has seen, felt, smelt and stowed within his lungs the billowing muck of pre-war Manchester will appreciate this. Even more so now, since the introduction of strict controls throughout what is now a clean city. But despite this vast improvement, one small wisp of disdain for human beings enters in. Wood fires, or more precisely,

the smoke from wood-fires will be forbidden, and only solid smokeless fuels, electricity and oil-heating will be allowed. By all means cut back on dangerous pollutants, but why wood-fires? Are we a nation of Black Forest wood-choppers, or would-be dippers in perpetual wood-stoked sauna baths? Surely the few wood-fires that still fascinate us are too few to justify their inclusion in such an edict, and an evening's well-being in front of a small economical log-fire helps to keep down the potential applicants for Mental Care (note the economy to the N.H.S.). Such an evening calms, soothes, brings together young and old (for television rather than story-telling, but no matter); and all are free in thought before such fires, safe from the world's administrators. A touch of the country has come back to town. Let us re-habilitate our cities by bringing the country back into the city – with the quick flush of pine and the warm glow of oak or beech. We can't all spend our week-ends in country cottages, leaving the city behind us.

Wood-fires are therapy. A note from the concerned organisers of a Retreat Centre in Cambridge. (Where students are gathered together, Retreats are needed.) People come to this Centre to recreate themselves after periods of exceptional stress and strain. The Centre offers quiet, an orchard, and a building mid-town. Splitting and chopping wood is a common activity – promoting shirtsleeve co-operation. And during last winter's power cuts these wood-choppers came into their own. What they had to offer was well within reach of their elbows. Therapy at little or no expense. No one wasting his life growing or providing goods that are soon ploughed under or scrapped for economic reasons. Is the Government to take away this pleasure and therapy under Section 11(2) of such and such an Order, without considering the simple needs of the young whose lives have become distraught through complexity, and the elderly who need to review their lives? All of us need to keep our spirits and bodies warm. We ask the Minister and those responsible for considering these matters to distinguish between belching furnaces and the few wood-fires that keep the distraught active and the elderly in reflective comfort.

All heating causes pollution, whether gas, electricity, coal, coke, or wood. So why include the least of these sinners in such sweeping edicts? Is Administrative neatness sufficient cause? Replace all log-fires with oil-heating – pollution remains, and the therapy vanishes. Is this sound?

A ninety-one year old, Mabel Watson, who died a few weeks

ago, was promised on her death-bed that her most recent poem (written in November 1971) would be published. Perhaps these few lines will increase the wisdom and understanding of those who make convenient paternal administrative decisions about our well-being.

OPEN FIRES

The householder today has many ways
Of warming his cold house in winter days,
There's gas and electricity and oil;
All do the job and minimise the toil.
How wise! How very wise to act like this!
And yet, is there not something that we miss?

When we are old and time is flying fast,
We love to dream of memories of the past,
And settle in a comfortable chair,
And fix our eyes upon the glowing fire,
And watch the dancing flames that rise and fall
And throw their shadows on the hearth and wall.
Ah! then indeed we may relax and rest,
And feel that open fires are still the best.

Note on the technical problems of domestic smoke control.

It is certain that a lot can be done to reduce smoke from a wood fire to a standard which would get past the Smoke Control Order. The problem is how much expense, effort, and maintenance would be involved. The following remarks only attempt to give a sketch of the technical situation. The technical literature which is relevant is vast, since almost every chemical industry has had to come to terms in some way with escaping fumes.

The classes of substances that came into question are:

1. Gaseous acidic oxides (and ammonia). Principally sulphur dioxide.
2. Carbon – soot.
3. Volatile tarry materials.
4. Ash particles.

Classes 2 and 3 are largely eliminated by complete burning of the fumes, thus producing the desirable glowing fire. Class 1 is either not affected, or actually increased, by complete burning.

There are a number of objectives we could now try to reach.

- (1) Meet the requirements of the bill by getting rid of all visible smoke.
- (2) Get rid of other noxious substances.
- (3) Improve the appearance of smoke without aiming at total removal but at least provide a reasonable emission. It is barely possible to see smoke coming from a chimney with a wood fire underneath anyway, so there is something to be said for a device that helps the frame of mind of the householder even if it is still possible with enough concentration to see the smoke.

Unfortunately most systems would probably be objectionable on some grounds to some people. Thus a good water scrubbing system might generate steam at the outlet to the chimney and apparently make matters *worse* on a rainy day. The steam would seem like a white smoke, and it wouldn't evaporate, it would merely disperse slowly. A fan which mixed a fast flowing stream of outside air with the smoke would cost very little and probably make the smoke *quite* invisible. It clearly doesn't actually clean the smoke at all. These are the two extremes, of a totally perfected cleaner which would receive lots of criticism and a totally useless cleaner which would appear to provide an excellent result. In between there are many other possibilities which would each have pros and cons and mostly be too expensive.

The different possible physical effects which have been used to eliminate fumes serve to define the following rough classes of method:

1. Washing or scrubbing with water.
2. Absorption by some chemical other than water.
3. Mechanical filtering.
4. Electrostatic deposition.
5. Deposition by mechanical vibration (usually high frequency sound).
6. Surface adsorption (by active materials, commonly carbon).

A first experiment is to try to make smoke drift up through loosely packed fibres or wool of some material and see how effective this is with soot. Upon the results of this experiment (which is the simplest application of method 3) would depend which additional methods were called in.

One possible design will have a throw-away packing and another might be cleanable with a vacuum cleaner. Yet another system is to use a rotating brush whose bristles are dampened by a fine water jet or by dipping in water. The whole arrangement might be self cleaning with the surplus dirty water running down a drain.

One would hope eventually to have a method which would apply to coal smoke also.

Getting rid of Cement

Irving Anshen

When a person paves his driveway, lays a walkway or perhaps builds a wall with cement he is working with one of the easy to use and relatively cheap building materials. One that is not only permanent but actually grows stronger with age thus ensuring that he has put down an imperishable monument to himself. One that may well be cursed by generations yet to come.

As a result of World War II there are in Britain and throughout the world miles and acres of concrete runways and other areas that are the relics of World War II airfields. The American Air Force alone left 73 airfields at war's end leaving more than 5,000 paved acres (73 fields times 2 runways plus service areas). To this we must add the surplus RAF fields which could easily raise the total to over 7,500 unusable acres. Think of it! Approximately 12 square miles of Britain is covered by concrete! And abandoned! Vitally necessary then – but utterly useless now. Currently there exists a great desire, especially in Britain, to return these lands to agriculture and/or greenery. However present economics makes it financially unsound to justify the labour of breaking up the slabs and runways and the resultant disposal. We have so far not been able to come up with any sort of scheme that would justify these costs. Of course beauty is its own reward – until the bill comes in!

Surprisingly enough in some parts of the world the very act of doing nothing produces something. A giant step is the breaking up of the concrete by nature's methods utilizing the inexorable force generated by the growing of flora. Those of us who have experienced cracked walks and driveways will understand.

Let us consider the first stage, the breaking up of these high slabs of concrete and miles of runways. This can be done very simply by cracking or drilling holes in the concrete and planting seeds in these cracks and holes. Over a period of years nature will pursue her relentless course and these roots of these plantings will break up the concrete. To be sure the process is slow but these runways have been there for some thirty years or more and we should well be able to wait another few. If the proper seeds were planted while this process was going on the concrete would soon be overgrown by "ground cover" plants thereby hiding the con-

crete mess and greatly improving the overall appearance of the area. Of course it could be done somewhat faster by the use of modern equipment – but the important thing is that it isn't now being done at all.

This slow, breaking up by nature's process is now in use in many islands of the South Seas. George Lee, who had been engaged in research in concrete with special emphasis on water resistant qualities under tropical conditions, has seen this procedure at work successfully, albeit slowly. The natives use whatever growth is at hand, in most cases simply permitting the local undergrowth to find its way into cracks that normally develop in hastily laid cement. Beech, Oak and Linden would work best under British conditions, even though almost any type of seed dropped into the cracks will sooner or later do the job. Never let it be said that British roots are not the equal of any on earth.

The disposal problem of the resulting chunks and pieces of concrete remains unsolved. There is not too much that can be done with pieces and chunks of concrete. This is further complicated by the fact that left alone concrete does not deteriorate as a result of weathering or ageing or anything else. There is no known method of disintegrating concrete. It just is! And is going to stay that way! The only apparent use is that of fill and the cost of handling and carting to the fill site makes this unworkable unless public or private monies were available to help defray the costs. To remove from both sight and mind the cement chunks could be carted to a port, loaded onto barges and dropped into the Atlantic Trench – if the same financial obstacles could be overcome. In some types of soil it might be feasible to sink pipes alongside the concrete chunks and flood the area underneath. If the underlying soil could be turned into mud of suitable consistency these chunks should gradually sink to a level consistent with the depth of flooding. Maybe as much as five or more feet. Then cover fill could be spread and the area brought into keeping with the surrounding countryside. This would be feasible only in limited areas where the soil lent itself to such treatment.

There are two lines of attack possible in turning this currently useless acreage into useful, or at least more sightly land. First, perhaps volunteer groups could be formed to deal with this problem similar to the Waterways Recovery Group – a group of young people who devote weekends and holidays to the physical labour necessary to the cleaning out and restoration of abandoned canals.

I am not sure that cement would have the same appeal as an English canal but the young are unpredictable, thank God!

Secondly there is the question of the moral responsibility of an industry to the country and life-style that nourishes it; or failing the sense of moral values there is always the practical one of public relations. It really doesn't matter what motivates an industry to public weal as long as they do perform the public function. The economics of disposing of surplus cementing is such that only public funds can do the job – OR a concerned industry. Now would be the time to begin to re-examine the relationship of any industry to the ecological and environmental being of the community. The after-effects of an industry must be evaluated and re-adjusted to the role that its products will play in shaping and influencing the life style and welfare of the country as a whole. It is no longer excusable to say "I didn't pull the trigger – I only supplied the gun!"

If the cement production industry could raise a fund to help underwrite the costs of disposing of these runways and areas they would gain the advertising value of this public demonstration of the lasting qualities of their product let alone a chance to once again prove their public spirit and high ideals. Perhaps there should be a joint public - private effort under the effective leadership of the cement industry. They would fund the project with their private funds and receive appropriate tax credits from the Treasury. But it is absolutely necessary that this work be performed.

A word of warning! As it now is with cement so shall it be with plastics and the time to fight this future problem is NOW. The Ides of cement are upon us! Beware the Ides of Plastic!

Review Article: *Simone de Beauvoir on Old Age*

Marie-Paul Vinay

(A critical analysis of "La Vieillesse", Editions Gallimard, Paris 1970. English Translation, "Old Age", Weidenfeld and André Deutsch, London 1972. The page references in the article are to the French edition).

This book is a *summa* on old age. Erudition triumphs here. Biography – raised to the level of weighty argument and abstract general ideas – is noticeable at every instant, and at times used to defend both sides of the same theory. Evidently, the material which has been accumulated is constructed on a politically oriented infrastructure.

The first half of the work floods us with cases of lewd, rich and powerful old people, of all periods and all nationalities. Generally, these monsters are seen as a product of societies of exploitation, and the book's conclusion predicts that in an ideal society the individual would be weakened by age but not diminished by it, and that he would die without undergoing degradation (p. 569). It is the system which is the great defaulter . . . But if one recalls the trials preceding the great purges in the Communist régime, one wonders about the gratuitous assertions. However, I share some of Madame de Beauvoir's views while differing from her on the definitions of "Society" and the "System" . . .

These theories on old age bear witness to a vast labour which augurs well for the vigour of the author, but it is more difficult than before for us to believe in her sincerity. How does she not see that what she asserts on one hand, she destroys on the other? In the establishment of this masterly compilation of illustrious old people, these accounts of visits to old people's homes, whose residents represent but a small proportion of elderly citizens, how is it that she never came across a fine old man, the beloved and venerable grand-father, or the good grandpa of our own families? How is it that she never wondered about the way great religious characters grew old and died, people who are renowned for their longevity: for example, the Carthusians? How and why has she not pondered over the typical old age of those among whom the

Church has made its saints? Might the answer be that in considering that world, she would have been in danger of discovering a picture of old age which is peaceful, confident, serene and yet animated by spiritual ardour, leading her to wonder whether the society producing such old people might not be the ideal society?

Do not think that Simone de Beauvoir was not aware of this magnificent counterpart to her work. Rather might one say that her head or heart often leads her in that direction, but quickly, a convulsive movement turns her away from it and she goes back to her former tracks.

Her book, whose incompleteness and contradictions we have just mentioned, starts by destroying current opinions on old age. First the ethical ones, or, more precisely, a caricature of moralists in a manner which suits the author's opinions. Then follow her ideas on the puerile and virtuous manners of behaviour towards the old until they give up the ghost, and, finally, the last blow – intended to cause a sensation – aimed straight at the “bourgeois” class (the Beauvoirian conception of it). From this the author passes on to scholars, enumerating various sorts of work done by them. The review is exact and true to life but the scope of scientific opinions on the subject is, in reality, much more complex and far wider than has been suggested by the author. She gives preference to absolute and sweeping statements. For example, that of Dr. Leach of Cambridge (page 12) who declares: “Everyone over the age of fifty-five must be scrapped”. What to think of this sentence and its synonyms? I wonder if one fine day (“fine” being a figure of speech) all these rejects will be scientifically – as opposed to naturally – helped to find a world which is also called “better” . . . If I were Madame de Beauvoir, I would be very wary of the world, even a socialist one, with regard to this . . .

The definition of old age used in the work is a banal one. It is Lansing's: “A gradual process of unfavourable changes, normally related to the passing of time, becoming apparent after maturity and always ending in death” (page 17). The general point of view of the author – who is growing old – is a very pessimistic one. Throughout the 570 pages of the volume echo the maleficent words of Montherlant, quoted on page 18 – “It is always said that a butterfly comes from a worm. In man's case, the butterfly ends up as a worm . . .”.

One by one the signs of old age are analysed with great application, but as early as page 38, for example, one discovers a quota-

tion like the following: "The singular disharmony between the strength of mind and the weakness of body brought about by old age, always strikes me and seems to me to reveal a contradiction in the natural order" (Delacroix). Although we are told, at the end of the chapter, that the miner has an average life-span of fifty years and the privileged that of eighty years, a little further on we find a table showing the ageing process in decreasing order, in the following way –

Teachers,
White-collar workers,
Manual workers . . .

underlying how the first function tires out its man.

Short incursions on the Yakoutes and other so-called primitive civilisations evoke appalling pictures of "living skeletons, hiding in corners and dying of hunger and cold" (page 53). The customs of those who killed their old folk, sometimes in order to eat them, are carefully listed. But of course there is no mention of the scientific murder, "euthanasia", which is willingly committed on old people in modern societies and of which Madame de Beauvoir seems to be ignorant.

Some interesting but brief pages establish a correlation between the love of parents for their children and happiness in old age. But here too, a dissonance. Parental love, so handsomely rewarded, should be especially shown by permissive attitudes. I am not at all convinced about the future gratitude of children who have had the so-called fortune of having permissive parents. I shall not back that one as an insurance for my old age.

Further on (page 98), we are told that the problem of old people is above all a problem for the adult population, and this permits the author to associate – somewhat vaguely – the conditions of old age and property. The old people who belong to the exploiting caste are differentiated from the others (page 112). But would it not be possible to draw the same distinctions in any age of life?

Literature from Aristophanes to modern times, is thoroughly purged by the author of its patriarchs, heroes, hermits, saints whereas the luxurious, ridiculous or criminal greybearded fogeys are recalled from the dustiest of books. There is certainly a word here and there on Christmas and the Holy Family but simply in order to warn us that these Christian mysteries sanctified childhood and maturity while forgetting old age. (But I used to stand

in fear of the diatribes inspired by a hoary St. Joseph.) We are told that in Christianity the Son dethroned the Father (p. 144). The author should be referred to the Gospel, where the Son states that He does nothing of His own accord but only that which the Father has told him to do, and to the

“Our Father, hallowed be Thy Name,
Thy kingdom come,
Thy will be done on earth as it is in heaven.”

It is understandable that some literature made fun of old people. Many of them have deserved it, but anyway of whom has literature, at one time or another, not made fun? On reading an account of an adultery, am I to say that adultery is the natural result of marriage, regardless of the husband, regardless of the wife? A conclusion to this historical and literary survey is that the ruling class have never sufficiently helped the old (page 228). How right Simone de Beauvoir is, alas! There has never been a surplus of goodness on earth, but to conclude from this that society – in an attempt to justify its savage indifference – has been obliged to devalue old age, is questionable. The devaluation of old age is rather the fruit of modern life, a consequence of the complacent cult of youth. These ideas, nowadays widespread, are in great danger of causing an increase in Welfare aid, in the hospital budgets and therefore in State aid, adding to the troubles of the taxpayer. We dare not envisage, and less so write about, the way this will happen.

Unemployment of people over the age of forty is bravely emphasised as are the consequences of early retirement. But these are vast problems beyond the scope of a treatise on old age.

An allusion (p. 225) to the Theatre of the Absurd, unfortunately too superficial and brief, is more disturbing than the revenge of the child – once oppressed by adults – on those degraded adults whom the old are. Vian's *Arrache-Coeur* is perhaps prophetic, and Beckett in *Fin de Partie* bears witness to the concerted efforts which – by the degradation of the old couple from dust-bin to dust-bin, by their sense of uselessness, of ugliness, of horror imposed on them – will perhaps one day urge them to go forward by their own initiative, not to dustbins, but to convalescent factories, calcium-fatteners. Isn't the aim of present manipulation that of inspiring a desire for self-annihilation among the undesirables? This kind of manoeuvring moreover is used not only with regard to the old.

Dr. Linden, of the Public Health department of Philadelphia,

states, on page 262 : "Among the factors which most contribute to the development of affective problems in our older citizens, must be ranked the social ostracism of which they are the object, the reduction of their circle of friends, the intense loneliness, the diminution and loss of human respect and the feeling of self-disgust [a reflection of that of others]".

These conclusions are weakened in the following chapter, which is relatively well documented, on the efforts made by major States in the area of rehousing old people, for example. Madame de Beauvoir quotes inquiries, figures, statistics, many of which are sympathetic. As always research into the most extreme cases both of those helping and those receiving help, falsify the over-all picture but the work done remains interesting and . . . discouraging. Is it not the case that a statistic of Dr. Péquignot (p. 273) is followed by his conclusion on the vulnerability of old people to transplantation? 45% of the sample died during the first six months and 64.4% had disappeared before the end of the second year after their removal into old people's homes. For her alone, these facts invalidate the movement towards better conditions within such homes. The psychological consequences of retirement are for the second time condemned for being instrumental in hastening the end or the degeneration of old people. It is, all the same, difficult to promote a lengthening of the years of employment at a time when our young people face unemployment. The answer to the problem might be rather in periodical recycling throughout one's adult life and in a process of gradual retirement.

As Madame de Sévigné, quoted by the author on page 305, said : ". . . we go forward day by day. Today we are like we were yesterday and tomorrow like today; thus we advance without feeling it, and this is one of the miracles of Providence which I dearly love". If, by a law of nature, old age arrives in fact imperceptibly, our social means of coping with it would be well advised to respect this condition of progression. This is moreover but one of the aspects of an immense problem whose consequences can be transformed long before they can be fully resolved. The essence of the matter is not the value granted to the old person but the value which he in fact possesses without the crutches of property, authority or organised delusions.

Madame de Beauvoir analyses the psychological problems of old people with as much repetition as perspicacity. The echo of her personal experience, of her movement away from the wall

which faces her, breaks through her analysis. She speaks about the agony of old age for famous men but she frightens us in letting us see what great age is for a woman of her standing.

Her upheaval is such that she returns, mainly under the cover of quotations, to the doctrines of her childhood. On page 327, she quotes Whitman

“To Old Age”

“I see in you the estuary that enlarges itself grandly as it pours into the great sea.” (*Leaves of Grass*).

This ocean seems nearer to the coasts of China than to the Cours Désir [Translator’s Note : the school attended by Simone de Beauvoir] but, with that exception, this quotation contrasts remarkably with the general tone of the volume.

The author feels it, knows it. Perhaps she is less free than she appears to her general readers, for she returns immediately, with outstretched paw, to scrawl at “the moralists”, on page 335. They are accused of claiming that old age liberates the individual from his body, meaning by that in particular from the sexual instinct.

These “hygienic-psychologists” (I prefer this term to that of moralists), are both right and wrong at the same time. The old person is in general liberated from the passions of the flesh but his bodily infirmities hardly give him a feeling of liberation. He appears mainly to be freed from the duty of filling his days with work and innumerable cares connected with making the fastest and greatest profit. This is surely an incontestable liberation. There remains the problem of knowing how to use this mental freedom. The separation of the weakened senses from the external world might well be ordered in such a way that at the end of his existence this earthly chrysalis makes for himself a sort of spiritual organism more capable of passing through death. Might he not also use his forced leisure in the study of the laws of a future world?

Madame de Beauvoir fears that world for she does not stop returning to the old libidinous men punished by it. “It is true that sexuality is not reduced to the genitals” (p. 336). The author then analyses in great detail, but in neither an original nor a specific manner, the various manners used by old people (we would suggest : some of them only) to attain what is conventionally called “pleasure”. The result, not in the best of taste, tends to attribute special behaviour to old age. But, continuing her system of oscillations, the author hastens to declare that sexual offences are less

common in old age than in the other ages of life . . . Various analyses of the love-life of more or less senile old men bring the fifth chapter to a close. One learns mainly that the old age of a man depends on what he was beforehand, in particular on his egoism and his pride. Altruistic old men like virtuous ones are rare in the volumes of this author . . .

However, on page 371, we are presented with this reflection of Schopenhauer's : "It could here be said that the sexual drive once extinguished, the true kernel of life is preserved". These words favour the thesis which we shall put forward at the end of this study. That old people live more through memory than by hope, that they choose to identify themselves with the character which flatters them most, that they are forever this "former soldier" or that "wonderful mother" (page 384), no one will dispute. The people who have allowed society or whosoever of its representatives to decide on their every belief and their every synthetic view of existence are unable to react differently. If you lack space in front of you why not go backwards? Many other ages in life are settled in this way. The observation, although interesting, is too general.

The dissolution of memory which makes the author declare that old people do not have a great past behind them, appears to us to be clearly wrong, for, whether one remembers it or not, the greatness of a lived past is not changed. If the author states that "in the funereal monuments which abound in my history, it is I who am buried" (p. 389), it is only sentimentally or poetically true. The works accomplished continue to live and to germinate whatever the outcome or the memory of their creators.

The culminating point of the volume is this confidence of the author (p. 390) :

"No life, no moment of any life could keep the promises with which (in my youth) I excited my credulous heart . . ."

and

"The present, even when conforming to my expectations, was unable to bring me what I wanted : The fullness of being towards which existence stretches in vain."

Behold the moment of truth in a being who is by nature frank but who, for various reasons, has been obliged, so often and so painfully, to move away from the truth, to abbreviate it, artificially to bring together pieces of it.

From these heights, to which we shall again refer, Simone de

Beauvoir, moves down to the present condition of old people in a society, to the materialisation of which she herself has greatly contributed: "Far from offering the old person a relief against his biological destiny by assuring him of a posthumous future, modern society (which changes so quickly) throws him while still alive back into a past which has been already lived" (402). How could it be otherwise when the human being, considered merely in terms of his social utility or of his personal pleasure, can no longer achieve either one or the other, but becomes a heavy and complicated responsibility? "The science of the wisest among them does not protect them from an increasing ignorance since the quantity of new things to be known far exceeds, in all branches of knowledge, the faculties of assimilation even of an adult" (p. 414).

The author informs us that intellectuals age badly. Which guards us against the intellectual sterility of old scholars. There are many, she says, who would without displeasure see the world destroyed, if not by them, at least at the same time as them. Like those princes buried with women, servants, horses, etc., these scholars would willingly descend into their tombs in the midst of a conflagration as enormous as they imagine themselves to be. But the author is not herself in favour of such destruction. "I need", she confesses, on page 435, "to prolong indefinitely this adventure in which my life is inscribed". Thus, in the last part of the sixth chapter, she studies the refusal and acceptance of death. A distant echo of the *Cours Désir* is audible: "The dread of death has its roots in childhood and adolescence. It is often associated with ideas of guilt." Which is true in itself, true in general, and true of the former pupil of the lay religious order of the Rue de l'Université. How painful, deep down, must be her renunciation of a faith whose care it is to satisfy all hungers, and of a philosophy which nurtures every noblemindedness! How tormenting the countless refusals which she must have made in order to preserve a love, a moderate adulation, a flattering self-image! Already the *Memoirs of a dutiful daughter* and then *The Prime of Life* contained outbursts which left us breathless, for the tragedies of souls move us more than those of bodies. But in the final volume, *Force of Circumstances*, one gets the impression that the "deceived" author has less, or perhaps nothing further, to lose. The life of the creature of superior intelligence, bent in the wrong direction, hurls frightening moaning sounds.

It is useless for her to add "... if the subject is a believer, he

imagines with terror that he is going to be precipitated into hell", for we clearly feel at this point that the subject herself is a believer! She was too well formed not to know that the forgiveness of Life is far more powerful than any human dynamism. In fact, she hopes for this forgiveness in the very name of the subjective greatness of her betrayal and of something else which is part of the mystery of her person.

This declaration, on page 610: "... one can see (for my part, I do not see, but it is not to be disputed that some subjects try to believe that they see) that a prejudice must be absolutely, resolutely, dismissed: that is the idea that old age brings serenity." Granted that Arina Petrovna and with her many others, including the author, lacked serenity, all with good reasons! But how many serene old people in non-Sartrean circles have we known. How many angelic souls like that old couple from Quebec, surprised by the unexpected walkers that we were, one day in Spring, who were alternately reciting the Rosary, and inviting us to finish it with them before resuming a more determined walk. These old people, both with equally blue eyes, in the bareness of a poor farm with neither radio nor television, told us that nothing brought them as near to God and to each other as that simple prayer said by them in the name of workers who were too busy to think about Him. They thought about their new Home to which they were so close and laughed like children as they wondered which of them would be the first to go and lend a hand to the other. The doctor had just told them that their ninety-year-old hearts were at the end of their tether . . .

Madame de Beauvoir's hope shines through again on page 516 when she says "in childhood and youth existence is lived as an ascension . . . the idea of ascension persists in maturity. Suddenly one discovers that one is going nowhere, apart from to the grave. One has drawn oneself up to a summit only to realise that it is the point of departure for a fall. She then recalls how Yeats said life is a long preparation for something that never happens; and again, that if *all* was vanity or a hoax there would be nothing to do but await death. But to concede that life does not contain its own purposiveness does not mean that it cannot dedicate itself to aims. This is to be found on page 517, followed by "There are activities which serve men, among which are relationships where they fulfil themselves, in truth." And, on page 567, "So that old age may not be the derisory parody of our former existence, there

is only one solution, that is to continue to pursue those aims which give a meaning to our life". And finally, "Old age denounces the failure of our civilisation. *It is man in his entirety who must be remade*". Oh how we agree with the author on this the penultimate page!

And what essentially are old people? Surely, the inheritors of the irregular growth of their past, the potential victims of a deficient circulation, but also and above all, beings who have gone beyond the limits of one sort of life and in whom, through and in the death of the first, another life is being sketched. The sensorial doors of their being are closing and, in the chiaroscuro thus produced, other forms of seeing and hearing – which transcend those of this world – are being found. The old person, who does not reject it, understands life and the meaning of life better than he ever did in his youth. Not many truths occupy his mental horizon but they are enough to mould his mind to make him capable of crossing frontiers which are near at hand. Silence, relative obscurity, pain and infirmities which kill pride, make him experience his relativity, favour the flourishing of wisdom. Beneath the shell of interior solitude, repentance and nostalgia meet.

The old person is seen by some as one who is to die first, already marked by death, one who stands between the observer and his own end as a protection and a warning. For those who believe, he is the ambassador, the next intercessor, the friend leaving for distant lands charged with the task of preparing the later arrival of his friends. Whatever his ailments, he is respected with anticipated gratitude and also for his function of representing his time and people in the Last Kingdom. Many beings feel their immortality. They have an intimate experience of it. Madame de Beauvoir is of this number and said so much when she told us of her hunger for existence.

Why does modern society want to destroy and uproot all hopes of immortality? What harm is done by those old people many of whom have lived well in order to die well and to merit a peaceful rebirth? In the name of what maleficent power should we extinguish the hope of those who are going to die? In cutting man off from his roots and from his aims, what is one's intention, if not that of manufacturing a creature-object, a sort of thing ordered for the triumph or pleasure of a minority? The robot-man?

Let us move then in the direction of the account or, better still, the sight of those beautiful deaths full of faith, resignation, filial

love and even ardent curiosity. Where is the man or woman who would want to extinguish in the dying person not just the sight of his eyes but also that of his heart and intelligence? To steal the day, the sun, is to kill. What is this death that our moderns wish to be ignominious and absurd? What is this crime: the theft of a human death which is consoled and consoling? Who would give some the right to commit it?

They cannot excuse themselves on the pretext of interest in the truth, for they do not know where the truth is. The faithful can, by grace, have some light on these matters but the non-believers know absolutely nothing about them. Which of them has experienced a death and resurrection? If they do not know, let them seek and it will be answered them. On which side is the good of man to be found? From whom can society benefit most?

Is it from those who think that however one has led one's life, the end is absurd for everyone, never being a consolation but always a means for despair? Will they therefore not encourage the opacity of mind or the search for the maximum pleasure, the survival of the fittest with its subsequent injustice, tyranny and crime? Is it from those who know or believe in the personal and social value of everyday life and its relation to the loss or gain of happiness in the after life?

Will not both of these sorts at least try to live according to a fixed ideal, try to do unto others as they would be done by? Logic and intelligence are capable of finding a solution to the problems of human life from youth through to old age. Every civilisation contains some individuals who bear this out. Ours too. We therefore reproach Madame de Beauvoir for a silence which is unfair, for a discrimination in her use of statistics, and for a too biased use of her vast intelligence.

It is definitely man in his entirety that we need to remake, a man who would be free to join his life with his own ancestors as much as with his society, free to live according to his beliefs, free to soar upwards at the moment of death towards new abodes built for him by paternal love.

On the other hand, no science would dare to gather together so many observations on man and his old age without suspecting that nature never organised this mess, this absurd disjunction, this perverse effacement of human life in its decline.

Has not every one of us felt himself at some time called upon to transcend his human weakness, his brief terrestrial journey?

Madame de Beauvoir herself confesses to such emotions. Every young person knows that youth is an ascension, every adult experiences his life as a journey on intermediary levels between consolidation and a continuous going beyond his present ambitions. Every old person is gnawed by the certainty of scarcely having begun his life's work and his days seem but a night's dream. He feels that he is promised to a future at the very moment when death touches him. Is man then less than the seed which once sown dries up, wrinkles and dies while shooting towards another mode of existence? Are human wrinkles the only ones not to speak of fecundity? Of germination? Why should the human body have a lesser destiny than the smallest of seeds?

Why should nature, so wise and marvellous in the plan of its crystals, vegetables and animals, be suddenly deaf and blind with its masterpiece: man? Are the forests of dead wood to reflower each year under our eyes without teaching us anything? Perhaps every one does not have religious faith; some reject it; others have fallen away from it; and others again are still at the stage of the way which leads to it. Madame de Beauvoir has a scientific mind, but also a proud soul which refuses to disclaim her past, and perhaps a loving heart which does not want to condemn. In her book on old age, she envisages this journey from the corporeal to the spiritual and even from the relatively spiritual to the purely spiritual, from the worm to the butterfly. In spite of her back-stepping, her denials, her conditioned reflexes, she is still waiting for that fullness of being which is assured for her by a spiritual feeling sharpened by a sincere love of others.

She knows that her existence reaches out for the satisfaction of that need, but such a waiting cannot be deceived because it expresses that order of all-powerful Life of which Knowledge uncovers a greater piece for us each day.

Madame de Beauvoir is still a believer, her book bears witness to it, and she is already moving more humbly towards that face-to-face encounter when every mind, in perfect light, makes its choice between Being and Nothingness.

Hers is a fine book where, amidst lumps of mud, a soul rises up towards the light.

Comment:

Christian Activity and Contemplation

When Damaris says in the Dialogue in T. to T. VI i that "Christianity is a religion for activists" she doesn't mean that it is a religion of action – doing good without contemplative depth (though she might be taken to mean it). Would it be true to say that the contemplation and union go, or can go, so deep that they produce the two things which cause the "activist" movement – sensitiveness, very powerful, to need, and absolute readiness to do whatever may help it, in any direction? It is something like coming out right on the far side of the *via negativa* and working back from there.

It is a *very* good dialogue. All three contribute so much.

A. K. Clarke

St. Ninian's,
Victoria Street,
Cambridge.

"Mao and the Dark Aspects"

Charles Musès, who wrote the comment we published in T. to T. VI i on Joseph Needham's article on "Mao and the Dark Aspects" writes :

"You left out the key sentence (inadvertently, since the hiatus was not indicated) that one of Mao's central dicta is that 'all power flows from the barrel of a gun'. The statement is essential to the argument – all the more so because Mao is quoting Hermann Goering's earlier policy statement: 'power comes out of the barrel of a gun'".

We apologise for this piece of inadvertence. Charles Musès also sends us this further information about his scientific work and interests :

"It would help the reader to know that a forthcoming general survey of the nature of consciousness, with relations to mathematics and physics, edited by Arthur Young and myself will be published by Outerbridge and Lazard, N.Y., June 1972, and that two of my previous books are *Schopenhauer's Optimism* and *the Lankavatara*

Sutra (Watkins, London, 1955) and *Dionysius Andreas Freher: Illumination on Jacob Boehme* (Columbia U. Press, 1951). I also edited *Aspects of the Theory of Artificial Intelligence* (Plenum Press, N.Y., 1962) the proceedings of the first international conference on biosimulation, held at Locarno, Switzerland, in 1960 and chaired by the late Dr. Warren S. McCulloch of M.I.T. At present I edit the *Journal for the Study of Consciousness* and serve on the editorial board of the *International Journal of Bio-Medical Computing* (Elsevier, England)."

Buddhist Meditation

I have followed the discussion on Buddhist meditation with keen interest. I think, however, that one point which Derek Wright made requires rectification. I do not consider that he has properly understood and/or expressed the *raison d'être* of Yoga. He suggests somewhat glibly that certain practices of Yoga which are geared to 'shut out everything' imply 'that the goal of practice is to turn you into a sort of vegetable'.

Besides the obvious fact that this would be a total physical impossibility – unless one were to interpret his words as referring to a kind of long-term process in the sense of re-embodiment –, it represents a regrettable (and regrettably common) misconception about Yoga. It is quite amusing to see how Freda Wint takes up Derek Wright's howler and throws a few more stereotyped ideas into the conversation: 'a bit extreme' (reluctant), 'They maltreat the body' (definite), 'There's heroism in it' (condescending?).

Having carried out some research into Yoga and related subjects, I have come to accept that any discipline or system by which a change of consciousness is aimed at with the purpose of reaching the Core-of-Being, the Self etc., can take either of two directions: it can seek to achieve its goal by stepping out of the empirical universe altogether through realising a kind of Cyclopean existence – or else it can endeavour to realise the goal within the orbit of empirical life. As these two approaches have been delineated and labelled variously by others, I personally am content with a circumscription of their essential character.

It is significant, I think, that whereas these two 'paths' (better :

approaches) have been known and accepted as what they are throughout the long history of Indian spiritual striving – and even a sworn ‘monist’ like Sankara did not reject the latter possibility, *i.e.* of spiritual living *in* the world- – in the West we somehow tend to associate the path that leads *through* the world with ‘right’ and ‘good’ and that which *lies beyond* the world with ‘wrong’ or at least ‘inferior’ or ‘a bit extreme’. To me this appears to be the expression of a certain intolerance born from a fundamental misunderstanding of what each approach means. True, we also find this denigration of values in the Buddhist world where one speaks of a ‘lesser’ and a ‘greater’ vehicle – Hīnayāna and Mahāyāna – the one associated with selfishness, the other with compassionate saintliness. But besides the fact that these terms are late inventions, there is no natural ‘grammar’ which compels us to think that blemishes in another excuse one’s own faults.

Any spiritual practice or experience must of necessity be ‘extreme’, because it is the exact opposite to what is normally done, felt or thought.

Maltreatment of the body has never been advocated by Yoga although there are always those whose over-enthusiasm leads them to become bad advertising for the system they cherish. Yoga is essentially ‘balance’ (*samatva*), as the *Bhagavad-Gita* (one of the oldest Yoga scriptures) says. I think any modern yogin of authority would approve this. However, the scale-division of this ‘balance’ is a twofold one, according to whether the measure is laid *across* the world or whether it is taken as from its ‘antipodes’; and here, I feel, personal preferences ought not to cloud one’s judgement.

G. A. Feuerstein

Yoga Research Association.

A Theophany

Clare Campbell

Sophocles' *Philoctetes* ends with an Exodos which has to my mind been little understood. It consists of a human decision, apparently flatly contradicted by a theophany eight lines afterwards. Nothing happens in a good play, let alone a great one, solely in order to be undone again immediately afterwards. In a recent undergraduate production for which I made the translation quoted from below, we tried to convey a view of this ending as not after all opposing, but profoundly integrating, divine and human values.

The scene of the play is a desert island, as hostile to survival as Beckett's dustbins, though with its own stark beauty (extract g.). Odysseus, a man who does right only if he can reach success that way and treats persons as things or tools (extract c.), marooned Philoctetes here ten years ago because his morbidly unhealing snake-bite in the foot made him sinister company. But a prophecy has said Troy will not fall unless he is "persuaded" to bring his magic bow to attack the city. Young Neoptolemos, third main character in this triple concerto, is Odysseus' moral obverse – "I would rather fail from a good motive than get the desired result by evil means" – but in the opening scene he is perverted by Odysseus into telling a lie that will get the castaway on board ship thinking he is to be taken to his own home. Utterly trustful of a youth who has turned out to be his friend Achilles' son, Philoctetes exhausted by a sudden attack from his wound hands him his bow for safe-keeping. Neoptolemos, disturbed by pity and qualms of conscience, hangs onto the bow but confesses to him when he wakes that in reality he will be taken to Troy. The enraged hero would rather die than do anything that helps those who marooned him (understandable Greek heroic ethics, though they are not left uncriticised), and death because he cannot shoot prey to eat seems inevitable when Odysseus rules that since he will not come with them they will take the bow and leave him behind. By a typical Sophoclean paradox, the loss of his invincible weapon shows us his spirit at its most invincible.

However, Neoptolemos in a moment of insight had interpreted the prophecy to mean that to take the bow without its owner would be useless as well as shameful. And when he is first allowed

to touch the bow he utters a crucial line (surprisingly ignored by commentators, line 673) which in Greek plays on the hero's name*; a man who returns kindness for kindness, he says, is "a stronger friend than any possession". Persons matter more than even magic objects – an ethic Odysseus, who construed the prophecy to the opposite effect, would never understand. So Neoptolemos defies and cows his superior officer and gives the bow back. (He had earlier relied on the S.S. guard's excuse, "if a subordinate does wrong obeying orders, his superior is to blame".)

The crime of the play's temporal action, the theft of the object, is now "undone" (line 1224). But Sophocles' plays tend to contain a greater action which the stage action mirrors. The greater crime against the person, of ten years' standing, is still in continuance. In my view it is this which Neoptolemos goes on to "undo", by an equal and opposite gesture, when he yields to the challenge "take me home" and crosses the stage at the start of the Exodus to side unconditionally with the outcast against those who wronged him. He has everything to lose by doing so; he opts for failure, because it is right, and the heart-warming relief one feels can hardly not be intended and endorsed by the playwright. But the action is like a pendulum swing, containing inherently a momentum capable of carrying both men back with it. It is an act of reclamation, of spiritual healing, which cures the isolation that was worse than the wound, as psychosomatic contrasts in the language throughout have led us to feel (extract e. The dramatic construction secures the same effect, for the snake-bite attack is followed and capped by the scene of horror at a friend's treachery, which rightly acted should seem "sharper than a serpent's tooth").

Now that all is redressed at the personal and moral level, the externals of wound and bow can go forward to their destiny of healing and conquest. And so enter Heracles with perfect timing. He is the archetypal friend who first gave Philoctetes the bow, now deified, and, if one may modernise, now visible because a signal deed of friendship has raised the action to the pitch at which men see gods. When Heracles now says both men should go to Troy, not home, Philoctetes freely agrees – he has been healed in his social nature, so he can accept physical healing, and it is in the logic of his plight that it will happen at Troy, when he rejoins the Greek body politic which had cut him off just as in despair

* *Philos* means friend and *-ktetes* is from a root meaning possess.

he used to want to cut off his own foot. He can trust again; he has been welded with Neoptolemos into the team of two fast friends which is what the gods were waiting for to bring about Troy's capture (extract g.), for the bow is only friendship's tool. Surely all this was a man's doing, even if it took a god to clarify that the hitherto blocked direction of journey was now open. (If Neoptolemos had seen that consequence, his motives would have been impure.) The man who opted for failure has succeeded, where the man who stood for success had abjectly failed. "He that will lose his life shall find it".

There is something of the Jesuit about Sophocles, with his immense cleverness, seeming to urge upon the simpler ones of us with archaic smile that we should believe in the literal truth of miracle and pantheon, while he builds a structure of spiritual truth so self-supporting that it needs no validation but its own.

Our production sought to synchronise Heracles' entry and Philoctetes' words "oh noble choice!" and orchestrate them with light as a single great moment. The god is not seen by those on stage till he speaks eight lines later; but I suspect that existentially there is only one event in the Exodos, not two.

I should like here to pay tribute to the powerful and deeply committed undergraduate actor who took the play's name-part.

Postscript.

Since I wrote this I have been asked to meet comment that its account is moralistic rather than religious, and says little on the intellectual problems of fulfilment of prophecy, the reconciling of divine providence and free will.

This last is an immense issue in Greek tragedy, requiring a whole article to itself. In this play I enlist etymology to interpret P.'s last words "I am persuaded" rather than "I obey", thus linking them with the oracle's "persuade him" and N.'s inference (clear from line 1332) that that meant get his free consent. That takes care of human free will. But if I deny that the god caused anything, exerted force majeure as distinct from embodying a re-think which could have happened naturalistically, have I not argued him away? Assuming as I do that N.'s goodness *caused* the re-think, the moment of illumination, I would still say that its *nature* was a cognition of superhuman reality, and that one should not water down the playwright's meaning there. Does Heracles then mean anything which a modern intellectual can take seriously? I can only reply along Kantian lines. Certainty about what ought to

be done is for Kant always metaphysical, indeed the only form of access we can have to a world more real than the phenomenal. There is much that is Kantian about this play; e.g. that persons are ends and not means, which is, I suggest, offered as a cognition not just a code of conduct – compare the Socratic “virtue is knowledge” – hence if one acts against it the stuff of the universe will prove one in error as it did Odysseus. The liar gets self-defeated in the same way. “Ought” is then rooted in “is”, as one suspects it was for Kant, though it is not for the artist to solve the theoretical problems of the “naturalistic fallacy”. In that case “moralistic” does not work as a pejorative term as it may do when you dichotomise facts and values. If there are anthropologically speaking three stages of religious progress, (1) gods as arbitrary physical power, thunderbolts from a blue sky, (2) gods as intelligible power which behaves consistently, Kitto’s “gods work like electricity”, (3) gods as good, the source and endorsement of human values, then the Greek tragedians were profoundly concerned with whether or not transition can be made from the second stage to the third, and morals and value judgments are consequently crucial for them. All right, the status rather than the content of such judgments may be the key point; it is precisely status, metaphysical authority, that Heracles gives.

Granted, the stuff of the universe also did not want P. to go home. Throughout the play the winds and currents are streaming Troywards, a clear case of cosmic collusion, which looks more like *Realpolitik* than divine endorsement of human values. I have rationalised a lot, but I would not argue this touch away as just poetic symbolism. I think probably Sophocles does believe that discrete parts of the cosmos can cooperate purposively – though they do not always do so under polytheism, for they each have their limited territory of freedom. Sea nymphs may cooperate with Zeus in this play but they defy him in *Prometheus Bound*. The thinking seems to me territorial in the sense that modern biology uses the term; the Greek words for fate mean “allotted portion”, one’s own garden plot within which one is free (if it contains a horrible slough like Oedipus’ territory, one is not free to leave it). The polytheistic universe is one of multiple initiatives, in which individual indeterminacies cancel each other out as they do in modern statistical concepts of natural law. The mutual territorial pressures create a complex pattern of boundaries throughout the cosmos which is fairly stable, an ecosystem, a web of fates or Fate

on which predictions can be based, and to which even Zeus is subject. It is really a system which has much less difficulty over fitting in free will than monotheism; for omnipotence is outside its concepts, though omniscience, the all-seeing eye of Zeus, is to some extent admitted. Many Greek play prophecies imply correct extrapolation of the curves of human behaviour, by an all-seer or allied gods who compare notes, rather than over-ruling of the behaviour. In any case, the prophecy in this play is hypothetical; and so in effect is Heracles' speech, since the present participle in line 1423 "Coming to Troy you will be cured" does not commit itself as between the meanings "when you come" and "if you come". Philosophy at its peril despises niceties of grammar.

Sentences from a new translation of Sophocles *Philoctetes**

(a) The first crime, (b) the second crime, (c) the man for success,
(d) are the gods just?, (e) the wound and the wrong, (f) the man
for failure, (g) nunc dimittis.

(a) the first crime

Philoctetes

*So stricken, those vile men set me ashore
Arriving here by sea from Chryse's island,
Off-loaded me like ballast, boy, and turned
And sailed away.
They rubbed their hands to see me fast asleep
Tired out by long salt exposure,
Stretched on a cliff-ledge; they put food beside me,
Some rags, fit for a tramp, and left me there —
A great concession to my creature comforts,
God grant the same befall them!
Imagine, boy, what that awakening
Was like. To have slept, and wake, and find
 them gone.*

*How I stood there staring, tears
Drenching my face, exclaiming uselessly,
Seeing no ships, where the whole fleet had been
Last night, not one ship left; nobody left,
No-one in sight; no-one to help get food
Or ease my sickness; not a thing in sight
Each point of the compass, nothing bound
 towards me*

*But absolute misery, absolute absence, that
Indeed abounded, son.*

Chorus of Sailors *And this man has done nothing,
Stolen nothing,
He is good to those who are good to him.*

* Translation (copyright) by Clare Campbell.

(We are using these extracts from this translation of the *Philoctetes* as our "Sentences" this time, because we believe that Sophocles was concerned with purity of intention as a condition of visionary and prophetic powers, and that therefore the play falls very much within the interests of T. to T. —Ed.)

*He is stricken without deserving –
 And my heart turns cold
 At the sound of the waves that have pounded
 year by year
 On his weeping head,
 At the tears of his lone endurance,
 How has he borne too much to bear?*

(b) the second crime

Phil. *Is it
 The discomfort that my illness causes?
 You've decided not to have me on the ship?*

Neoptolemos *All is discomfort, when a man betrays
 His inmost self, and acts against his nature! . . .*

Phil. *Your deeds are free of harm: your words alarm me.*

Neo. *Zeus, what am I to do? Must I be shown
 Twice guilty, of hiding the true facts from him
 And uttering the grossest fictions?*

Phil. *I'm no fool:
 This man is going to sail and leave me here.*

Neo. *Leave you, not I! But what I dread is that
 My taking you will grieve you even more.*

* * * *

Phil. *My hands, my hands! what can you do for me,
 Robbed of your friendly bow, and hunted down
 By this man's pack? (to Odysseus) Unwholesome
 brain, whose thoughts
 Aren't fit for a free man, how you have ambushed
 And stolen upon me, using this young boy
 Whom I didn't know, as cover for yourself:
 A use as much beneath him, as he was worthy
 Of me its victim; a boy who's learnt no tricks
 But how to obey orders, and who's now
 In plain distress of mind at what he's done
 And what I suffer. But your evil eye
 Has always looked through peepholes; and despite
 His nature and reluctance, he did well –
 Your coaching made him a skilled criminal.*

* * * *

Phil. *What catch shall I bring home
My wingéd weapons gone,
My hands' grasp empty?
A man's deceitful words
Ungessed, concealed,
Stole underneath my guard –
The planner of that deed,
Let me but know he spends an equal spell
In this my hell!*

Chorus *Destiny, destiny brought
These things to pass,
Our hands at least
Have played no trick on you;
Keep your hateful curses, keep them for others.
We fear for your own sake
You may be a man who pushes away friendship.*

Phil. *By the hoar-white fringe of the sea
He will sit and gloat,
He is there now
Flexing his hands
My secret livelihood,
Which none before held close but me.
Beloved bow,
Wrenched from the hands that loved you,
Do you glance around you pitiably,
Have you some faint power to know
Heracles' friend no longer handles you?
But by vile exchange
A man who plots and plans
Works you in his hands
To witness dark deceits,
A soul I hate and abhor
With his countless wiles
Like those which brought me down
Through you must compass more.*

(c) the man for success

Odysseus *So a stratagem of some kind must be used,
A trap, in fact, to be quite blunt about it,
If those unconquerable arms of his*

*Are to come into our hands.
 Oh, I well understand your reactions, boy.
 I know your inherited character is antipathetic
 To anything that smacks of foul play.
 But steel yourself, you future conqueror
 Of Troy! that will taste sweet; when that day comes
 You'll back my judgment retrospectively.
 Grant me one brief unscrupulous half-day,
 Then live a paragon for your life's remainder,
 And hear yourself alleged the best of men.*

* * * *

Od. *There's a great deal I could say in reply to him,
 If this were the right occasion. One thing shall suffice.
 Whatever kind of man a situation calls for,
 I am that man. When the enterprise in hand
 Demands a just and upright line of conduct,
 You wouldn't find me second to anyone
 In virtuous principles. But it's my nature
 Always to aim at what will bring success
 In each context. – However, as for you,
 I'm prepared to make an exception; I give way . . .
 Why should we need you? Range at your sweet will
 Through Lemnos. We shall leave you. Very soon
 Your prized possession will bring me renown
 Though you were meant to reap it.*

(d) are the gods just?

Phil. *But now for heaven's sake, why didn't Patroclus
 Help you? He was your father's dearest friend!*

Neo. *He too was dead. Here's the short moral for you,
 War never willingly takes rotten men,
 Only the finest.*

Phil. *Ah, I echo that.*

*And what for instance of that ne'er-do-we'el –
 He was clever though, a mischief-maker –*

Neo. *Whom you can mean, other than Odysseus?*

Phil. *The name's – Pappadopoulos? – Thersites!*

Always chiming in

Though never suffered gladly. Is he alive?

Neo. *I've heard so. I don't know him.*

Phil.

He would be!

*Evil's shadow never grows less.
Heaven feather-beds it, shields its little finger,
Makes death-wounds deviate from the practised
villain*

*While just men drop like flies! What can one make
Of the Unseen? Despise it at our peril:
Respect it? – how? while gods do evil!*

(e) the wound and the wrong

Phil.

*Gods and men hate me! Total castaway!
Not one Greek ear harrowed, not worth a rumour,
None of my cries reach home.
And those that crucified me to this spot
Laugh, and conspire with silence, while their malice
Feeds my huge gangrene day by day.*

* * * *

„ *Boy, what a monstrous thing! that Laertes' son
Should hope to work with wheedling words on me
And ship me and show me off to the assembled
Argives!*

*No – rather I'd obey my deadliest
Enemy the viper, who destroyed my foot.*

* * * *

„ *For though life itself
Is anguish to me, let me see them meet
Their just fates, and I'll think my wound has healed
And I have been delivered from my sickness.*

* * * *

„ *Oh foot, foot,
What shall I do with you in the time to come?
Turn back, turn back, good souls.*

Chorus

*What is the use?
Have you repented of your former obstinacy? . . .
Come with us, wretched man; do as we bid you.*

Phil.

*Never, never, never.
Jove's messenger his lightning streak from heaven
To visit me, his thunder's spear enflame me,
I will not come.*

*Let Ilion perish first,
With all encamped beneath her walls
Who cut off from their compassion
This broken limb of me.*
(He goes on to ask for an axe to cut off his own limbs.)

* * * *

Neo. *The pain you suffer is no natural wound,
But supernatural . . .
And listen well, you can hope no release
From your dread suffering, while the sun goes on
Rising on this side heaven and sinking that,
Until you come to Troy – come willingly, in person.*

(f) the man for failure

Neo. *What shall I do? since I cannot persuade you
By any means at all.
I had better give up trying,
You had better live on as you are
In your own way, without recovery.*

Phil. *Yes: let me suffer what I have to suffer.
But what you promised with your right hand pledged
In mine, that is your unfinished business:
Take me home, son. Delay no more.
Forget Troy's very name. That wall of wailing
Has drunk my tears and all mankind's bone dry.*
(a long pause)

Neo. *Final your resolution . . .
Then finally – I join you.*

Phil. *Oh noble choice! (Enter Heracles
Oh nobly reached conclusion! unseen above)*

(g) nunc dimittis

Heracles *And you, Achilles' child, my words are for you too;
For neither you alone nor he alone,
Not one without the other, but you both
Shall need each other's strength to conquer Troy.
Like a twin team of hunting lions
You shall guard each others' flanks in friendship.
But bear in mind, when you destroy the land,*

*To honour their gods' altars. Zeus my father
 Rates this above all other things.
 The godly deeds of men do not die with them;
 Come life, come death, they stand for everlasting.*

Phil. *Oh well-beloved voice, I hear you;
 Oh long lost form, my eyes behold you;
 I will not fail to be persuaded.*

Neo. *Nor I, I give my pledge.*

Her. *Then make no long delay.
 The wind and tide await you,
 The impatient sea chafes at your prow. (Exit)*

Phil. *Now at the parting hour,
 My farewell greetings to this land.
 Cave that kept watch with me,
 Nymphs of the springs and meadows,
 Deep bass growl of the headland surge,
 Whence my head was wetted
 Time and again by the south wind's lashes
 As I cowered in my cave,
 And my own tossed cries from the storm within me
 Broke back off Mount Hermaion
 With a groan for answer;
 God-given water-springs,
 I am leaving, I have left already,
 Embarking unbelievably
 On a ship of hope.
 Farewell, you salt-locked shore of Lemnos,
 Bid me good voyage,
 Bear no grudge;
 I whom vast Destiny
 And the sentence of my comrades
 And the unseen infinite force behind events
 Cast here, and claims again
 In the working out of a purpose.*

Chorus *Time now to leave, for all of us,
 First making supplication
 To the Nymphs of the salt ocean
 To grant us safe return.*

NOTES ON CONTRIBUTORS

George Owen is Director New Horizons Research Foundation, Toronto, Canada. Formerly Fellow of Trinity College, Cambridge, and University Lecturer in Genetics. Author of (1) *Can We Explain the Poltergeist?* (2) *Science and the Spook* (with Victor Sims), (3) *Hysteria, Hypnosis and Healing*. Formerly President of Cambridge University Society for Psychical Research, Member of the Council of the S.P.R.

Paul Beard is President of the College of Psychic Studies, London. Author of *Survival of Death* (Hodder and Stoughton 1966).

Mary Glover after reading Greats at Somerville, was a tutor at St. Hugh's College, Oxford. During the war she was seconded for service in industry. After the war she worked as a W.E.A. tutor, and was director of Social Service training at the University of Keele under Lord Lindsay of Birker.

John Griffith read Mathematics and Biochemistry at Trinity College, Cambridge, and was a Research Fellow at King's College, Cambridge. He was Professor of Applied Mathematics at Bedford College, London. Author of *The Theory of Transition-Metal Ions* (1961), *The Irreducible Tensor Method for Molecular Symmetry Groups* (1962), *A View of the Brain* (1967), and various articles. He died of cancer in April 1972 at the age of 43.

Rupert Sheldrake is Research Fellow and Director of Studies in Biology at Clare College, Cambridge, and Rosenheim Research Fellow of the Royal Society. His research is on the control of plant growth and development in the Department of Biochemistry.

O. S. Pound is a part-time lecturer at the College of Arts and Technology in Cambridge. He has published a book of *Arabic and Persian Poems* in translation (Fulcrum Press 1970).

Irving Anshen operates Skipper Travel Services Ltd., of San Mateo, California, which caters for people wishing to enjoy holidays on the waterways of Great Britain and Ireland, a career which, he says, leaves him never sure whether he is sinking or swimming.

Clare Campbell read Classics and Modern Greats at Oxford, and worked for a time on the *News Chronicle*. She then took a second degree in English and has since been supervising in English for several of the Cambridge men's colleges. She has published a volume of poetry.

Marie-Paule Vinay (née Amidieu du Clos) is married with four children. She is D.és Lettres (France), Ph.D. Sciences Politiques économiques et sociales (Canada), and is Professor of French at the Simon Fraser University in Vancouver. She is the author of (amongst other books) "*Traité d'Hygiène Mentale*" (Collection Psychologique, Quebec 1970).

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