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FAITH and THOUGHT

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A Journal devoted to the study of the inter-relation of the Christian Revelation and modern research

EDITORIAL

We offer our congratulations to Sir Norman Anderson whose knighthood was announced in the New Year's Honours List. Sir Norman has been a Vice-President of the INSTITUTE for twenty years.

We are deeply sorry to learn of the death in a car accident of Dr D.G.Wigmore-Beddoes of Belfast, who was a Fellow of the INSTITUTE and whose views on "suicides in Ireland" we published recently (101,12). His church in Belfast had earlier been bombed three times and rendered unusable, the congregation having joined with another local church. We extend our sympathy to his widow.

"Science and Religion Forum", a new discussion group, has recently been formed. Meetings will be held at least annually for exchange of ideas between members and invited speakers, and it is expected that publication of books and articles will follow. The inaugural meeting was arranged for 10—12 Ap.1975 at Mildert College, University of Durham. The Secretary is Dr A.R. Peacocke, Dean of Clare College, Cambridge, to whom enquiries should be addressed.

We are deeply sorry for the late appearance of Vol. 101 No.3 of this JOURNAL. Arrangements were well in hand for its circulation before the New Year but a series of unforeseen contingencies made this impossible. Some of the type had to be reset and imperfect pages were unfortunately bound up with the issue and the reprinting of 8 pages proved necessary. We apologise to readers.

News & Views

INSANITY & GENETICS

In 1965 Patricia Jacobs claimed that among criminally insane males in a Scotch institution an unexpectedly large proportion had the rare XYY (instead of XY) chromosome combination.

Before long numerous research papers appeared attributing all kinds of nasty traits to XYY. The extra Y chromosome caused aggressiveness, "lack of social reflection", "poor knowledge of the imperatives of social life", deviant behaviour of all kinds including sexual deviations, thieving and murderous tendencies and so on. Claims were also made that severe achne and tallness were caused by XYY.

A few experts, notably in France, were sceptical of these findings. One of them said that he was expecting any day now to hear ot a newly discovsreed chromosome for atheism! However, sceptics got little hearing.

Soon influential journals vied with one another in spreading news of the new discoveries. The British Association and the BBC (see ***Listener*** for 7 and 14 Sept. 1967) co-operated. A former President of

the AAAS (American Association for the Advancement of Science) suggested ways by which science might be called upon to help "rid us of...sex deviants such as the XYY type". Legal experts began to call upon geneticists to provide them with a new line of defence in murder cases, for a man cannot help his extra Y. One mother on learning that her foetus was XYY promptly demaned an abortion. Research funds were directed increasingly into financing more research into the harmful effects of one Y too many.

A number of maternity hospitals in the USA took the matter up. Babies and even foetuses were (and are) regularly screened. Parents of XYYs are warned in advance to be vigilant in looking for traits of asocial behaviour and are offered help in the behavioural problems likely to be encountered as their children mature. (For a fee of course)

Later work has done little to support the suggested XYY—antisocial correlation. In a number of penal institutions in the USA the proportion of XYYs is the same (about 0.1%) as in the community at large. Occasionally it seems that the original work by Jabobs receives confirmation. But there is some evidence that XYY males tend to be rather taller than XYs and it seems that many researchers have concentrated on tall people.

Jon Beckworth and Jonathan King (***New Scientist*** 14 Nov., 1974, p. 474) have started a vigorous campaign to stop research on XYYs which they believe to be wasteful of money and decidedly undesirable because it is likely to create a home atmosphere where the prediction of social difficulties will prove a self-fulfilling prophecy. Indeed, Dr S. Walker is now claiming that one half of the XYY children under investigation are already showing signs of being difficult to manage!

SF CALVARY

Milgram's findings, leading to the conclusion that human beings will do almost anything, however wicked, if it enables them to feel "with it" as far as other people are concerned (see this JOURNAL **101**, 273,278),

have recently received apt illustration in a SF story.

The story, "Let's go to Golgatha" by Garry Kilworth won a £250 prize given jointly by the ***Sunday Times*** and Victor Gollanz. It was printed in the ***Sunday Times*** (15 Dec.'74) and is due to be published together with other stories by Gollancz.

A Time Travel Agency, Pan-Time Tours, offers, by way of holiday, a trip backwards in time to any great historic event of the past. A family with children visit its offices, takes brochures and goes home with them, but find great difficulty in making a choice. Friends drop in and suggest that they should all go to see the crucifixion : it would be helpful to the children "to see exactly what happened so that they had a real understanding of religion and what it means...it might have a profound effect on them. At least I hope it will...as long as one goes with the right attitude I think it is all right..."

Before the start the travellers are lectured. "You will be mixing with the locals" said the clergyman lecturer, so "you must be inconspicuous...You must not appear to be different in any way from the rest of the citizens... I repeat, it is for your safety."

The party join the crowd when the High Priest asks whether Jesus or Barabbas shall be set free. One of the children, having read the story up in the Bible before the start, shouts "Barabbas" and soon everyone else is shouting it too.

Later the party is out in the heat again. One member seeks shelter from the burning sun. But there is no room inside any of the houses: all are quite full of serious looking people. The party follows the cross on the way to Calvary. All hear the crowd chanting and jeering, there are shrieks of laughter and high-pitched catcalls. Then they see the Lord crucified.

Finally it dawns. "Harry. Harry. Look at the crowd. There are no Jews here. No natives. The only ones here are us. The holiday makers." They come from many Time

Time Travel Agencies in many countries. All the Jews are at home praying.

SCIENCE & SUPERSTITION

In an article discussing Justig von Liebig's attack on Francis Bacon (***Annals of Science***, 1974, **31**(5), 373) the author, Otto Sonntag, raises some interesting points.

One of them is the reminder that it was a legacy of the Enlightenment, to which Liebig wholeheartedly subscribed, that as it developed science would sound the death knell of superstition. The German botanist Matthias Schleiden (1904-81) was one of the very few who challenged this view : he argued at length that science could never eliminate the hold of superstition over mankind.

Today we are seeing that Schleiden was right, though anemic attempts (eg. that of Wagne Shumaker, ***The Occult Sciences in the Renaissance***, 1972) are still made to defend the traditional view.

In recent years the revival of occultism (perhaps prophecied by our Lord, Mt. 12:45) is in no small measure due to the support it has received from science, real or quasi. Often enough science can find rational explanations for supposed supernatural explanations of events, but often, too, it fails to do so and its failure is counted as a triumph for occultism.

These remarks are prompted by the seemingly endless contoversies about Uri Geller, the Israeli spoon-bender. Some scientists who have watched him at work under controlled conditions assert definitely that the things he does are inexplicable in terms of scientific principles: a paper to this effect was published in ***Nature*** (**251**, 602). The ***New Scientist*** devoted much space to the subject but opposing sides hardened in their attitudes: in the end investigators were calling one another liars and hinting darkly at legal action... which makes a fair judgment by an outsider distinctly difficult!

Dr Joseph Hanlon's lengthy paper in the ***New Scientist*** (17 Oct.1974) presented the case against Uri and many rejoinders followed. One interesting letter by a philosopher (P.L.Mott of Lancaster) discussed Hanlon's premise that "we must reject all normal explanations before we consider paranormal ones". One normal explanation is that those who appear to possess paranormal powers cheat. But this is irrefutable (and therefore unscientific according to Popper) because if we fail to detect cheating this merely evidences how cleverly it was accomplished. So it would seem that Hanlon is at least as unscientific as believers in Uri's powers.

Meanwhile Uri smiles, enjoys the publicity, charges high fees, behaves in a way which often arouses suspicion and generally makes serious investigation most difficult.

Uri apart, the general public is increasingly becoming convinced that a scientific approach to psychical research confirms that there is at least "something in it". But such a conclusion is certain to increase superstition. If there is much which science cannot explain, why not revive astrology, necromancy, fortune telling, ghosts, poltergiists—in fact the lot! Science has not proved them wrong!

In fact science will never destroy superstitions: those who think it will are those who, ostrich-like (no reflection on the noble bird who does not in fact behave in this way!) refuse to believe in facts which their science will not explain. Superstition dies when man looks to and trusts in God, believing Him to be far more powerful and influential in this life than all the forces of evil, whether or not such forces exist.

WOOLLY-MINDEDNESS IN SCIENCE

Dr C.E.A.Turner (Suppl. to ***Creation***, vol.1 No 7, 1974) draws attention to a lecture on "Social Responsibility in Science in Modern Western Society" given in 1970 by Prof. Sir Ernest Chain, FRS (Nobelist with Florey and Fleming in 1945 for work on penicillin). It is published by the Council for Christians and Jews.

The whole of the Lecture is well worth reading but particularly towards the end Sir Ernst, who is a Jew, has some surprising things to say. "I am convinced and have been for many years, that it is impossible to construct a sort of absolute and generally applicable code of ethical behaviour on the basis of scientific knowledge alone, if only for the reason that our knowledge about the basic problems of life is far too fragmentary and limited and will always remain so." The Bible, he reckons, is a safer guide than science.

Sir Ernst regards natural selection as a grossly inadequate explanation of organic nature : it was "a typical product of the naive 19th century euphoric attitude to the potentialities of science which spread the belief that there were no secrets in nature which could not be solved by the scientific approach given only sufficient time." In biology teleology stares one in the face but this was wilfully ignored. It was obvious that the accepted evolutionary theories were "a gross oversimplification of an immensely complex and intricate mass of facts, and it amazes me that they were swallowed so uncritically and readily, and for such a long time, by so many sientists without a murmer of protest." Chain is glad that a more critical approach is now to be seen.

It is inconceivable, he says, that the units making up nucleic acids and chromosomes could have been "assembled exactly in the right order by accident or by trial and error. The probability for such an event to have occurred is just too small to be seriously considered" given the time scale of geology. Any acceptable interpretation will have to involve directive forces in the origin and development of vital processes.

QWERTYS EVERYWHERE

In a recent book (***Computer Worship*** , Pitman Pubs., 1973) Dr Ivor Catt, who writes with a wide inside knowledge of the computer industry, tells how, carried along in the computer craze, level headed industrialists often lose their heads and act with crass irresponsibility. One firm (Viatron), bankrupted in 1971, lost 40 m dollars with sales total of only 3 m. Barclays

Bank installed terminals in every branch to be linked to a central computer in London. The bill (100 m dollars) was paid but three years later the computer was still unavailable. Staff began to realise that terminals could be made to serve as fabulously expensive but excellent typewriters! Meanwhile the Bank's staff magazine featured articles vibrant with computer praise. Here is a quote "...these extraordinaty god-like machines that have so uplifted our lives and widened our horizone..."This appeared at the very time when the experts could not make the central computer work at all!

The author cites quotations to show that computer enthusiasts often regard computers with religious awe. Plato hoped to find ultimate truth in pure number and logic: the computer worshipper of today, too, respects his idol because it combines dedication to mathematics with an absence of disagreeable sensuality. It asks no awkward questions like, Who am I? or What is the meaning of it all? It is free from vice, unemcumbered by doubts, worries and frustrating hungers. It obeys all the commandments save that it does not honour its father and mother or keep the sabbath.

We are treated to a most interesting account of the inside story of computer technology. Vast fortunes are made and lost. Younger men are ever in demand: older men clique together in groups for self-preservation and invent terms so freely that new outlandinsh languages, unintelligible to other experts, develop with great rapidity — in computer literature comparisons with the story of Babel are often made! New ideas coming in from the outside are therefore unacceptable, for the newly formed power groups can always tell the innovator that, like management, he is too ignorant to understand the subject because he cannot follow its jargon. Computer technocrats worm their way into the vital sanctuaries of their firms — customer billing, accounting and stock control departments — where a mistake can smash a company. And so on. A sorry tale indeed, even if what we are told is exaggerated.

Lack of innovation in the hardware ('physiology')

of computers leads to endless pretences."A whole new range of computers" in an advertisement means only that the knobs have been rearranged , a game learned from car manufacturers. In fact serious re-design is extremely rare.

In illustration Catt cites the standard typewriter keyboard ,deliberately invented in 1873 by Christopher Sholes to ***slow*** down typing, for he feared that type bars would jam if operated too fast! No one questioned the keyboard for 60 years when Dvorak in Seattle , after trying 250 variations, designed the DKS (Dvorak Simplified) keyboard.

A whole century has now passed and we are still condemned to use the 'qwerty' arrangement of letters. In the same way, says Catt, even the most modern computers are mausoleums of many a 'qwerty' device!

The story is highly relevant to the human condition. For age after age men go on practicing and justifying irrational, silly and too often wicked practices and teaching succeeding generations to follow in their steps. How can the chain be broken? By revolution? But then the process starts anew. In the Bible, by judgment— complete destruction as in the Flood. Or psychologically by administering a deep trauma — the way of Christianity. It was man's sin, his willingness to follow patterns of behaviour set by others which led to deicide.When we realise this and apply it to ourselves we are in a position to start again.

GOD & NATURE'S LAWS

Many highly respected Christian scholars,including a number of writers in FAITH AND THOUGHT tell of their conviction that God does not suspend the laws of nature but is ever at work in and through these laws. In a recent book (***Beyond Chance and Necessity*** , ed.by John Lewis, Garstone, 1974) Dr A.R.Peacocke repeats this claim which he made also in ***Science and the Christian Experiment*** (1971). The idea that nature's laws are an expression of the divine activity is now rarely challenged, perhaps because fellow Christians do not like to appear critical or destructive. However, John Maynard Smith has now voiced thoughts which some of

us have for a long time been harboring. In reviewing Peacocke's chapter he says: "My difficulty is not so much that I disagree with him as that I cannot see what he can possibly mean. If God is simply another name for the laws of nature, then not only is there no need for that hypothesis, there is no need for the term itself." (*Nature*, 252, 762)

Some would reply that God's activity is a complementary description of, or an alternative language to, the language of science. But if so, how can we usefully describe the constant pull of the earth on our bodies, or the predictable release of chemical energy in an explosion as the activity of an intelligent loving person — or super-Person? It is often said that the constancy of God is revealed in the constancy of scientific law. Certainly God is constant ("...showing stedfast love to thousands of those who love me...", Ex. 20:5) and His character unchanging ("I the Lord do not change" Mal.3:6) but expression of character shows itself by variability in detail, though not in ultimate objective. As each way of achieving an end is blocked, the stedfast person finds another...and yet another... This is in striking contrast to the operation of the laws of nature which are so easily blocked (eg. a dam stops water finding its level). In physical science causal response is reliable and repeatable. Even on the sub-microscopic scale this is so statistically though not always at the level of individual events.

Were we to observe constancy of the scientific kind in a person it would be disconcerting to say the least! We judge the man who always gives the same response to the same stimulus or who repeats the same actions unendingly as depersonalized: he has become an automaton, seemingly controlled by the laws of nature only.

Then what do they mean who claim that God does not intervene in nature, because He is at work within nature, the laws of nature being an expression of His activity?

MEANING OF IMMANENTISM

A possible answer is that nature is divine, but pantheism has always been rejected by Christians. Furthermore as Maynard Smith asks, If nature is divine, why talk of God at all?

Mohammed taught that all that happens is done by God. Many of his later followers claimed, therefore, that because every event is caused by God, there can be no laws of nature at all, nor even causes and effects, since such terms imply the existence of powers in the universe apart from God, which is idolatry. Through the influence of al-Ghazalli (1058—1111 AD) this view became part of Muslim orthodoxy.

Al-Ghazalli considered sets of events in which one followed the other, such as fire followed by burning and ash formation, sunrise followed by daylight, treatment with medicine followed by healing, fertilization followed by birth, etc. Taking the second of each pair, he says, "all these things are observed to exist with some other conditions. But we cannot say that they exist by them... On the contrary they derive their existence from God...So it is clear that existence with a thing does not prove being by it." (***Incoherence of the Philosophers*** , Problem 17; see also M.Fakhry, ***Islamic Occasionalism***, 1958) This outright denial of causality made it impossible for the devout Muslim to discover, or even to conceive of, a law of nature and as a result science in the Moslem Abassid Empire, was unable to advance beyond the early stage.

According to the Moslem view, then, there are no laws of nature. But God is ever on the watch. When He sees what we call a cause He intervenes directly to bring about what we call an effect but which in fact is nothing of the kind. So - called effects are interventions by God (according to fixed rules?) which occur on such occasions (hence the name 'occasionalism') as God reckons necessary.

All this seems too quixotic for Western belief:

little better, in fact, than Malebranche's quaint theory of pre-established harmony. (Every object in the universe contains a kind of clockwork which, wound up at the Creation, unwinds to set off alarms which cause it to react precisely at those moments in time when they will give the illusion of cause producing effect.)

Another view, again with a long Muslim tradition, is that because the universe cannot exist without God it immediately ceases to exist after it is created and so has to be re-created again — which happens many times a second. On a cinema or tv screen the pictures come and go so fast that we experience the illusion of continuity. According to this view the universe is like the cinema screen and God's creative activity stops and starts at an enormous frequency -- immeasurably faster than anything which electronic gadgetry can detect. Again... hard to believe!

Dorothy Sayers, in her well-known book ***The Mind of the Maker***, suggested another way of understanding the immanence of God. She pointed out that the events described and the characters of people in a novel possess an internal coherence (and therefore obey laws) but that the creator of the story is immanent in them. If a character says, "Good morning" the remark is made by the character depicted, but also by the author of the book who wrote the words. Yet the author does not intervene supernaturally to over-ride the natural laws of psychology, etc. implied in his story. Rather he is immanent in his novel and it is suggested that God, too, is immanent in nature in a somewhat similar way. The analogy is cleverly extended by MacKay. The book now becomes a tv screen; the author an artist who at great speed creates a moving picture from his own imagination. The immanence of the creator is now continuous: in the novel or play creative activity is finished as soon as the book or play has been written.

Granted that no analogy is perfect, there are obvious short comings in analogies of this kind. It may be questioned if an author creates the laws which the characters or objects in his book or play obey. Surely a good

novel portrays events representative of the real objective world. (Even in a novel objects fall in a gravitational field,they do not slither sideways:observable laws of psychology are illustrated by characters depicted in the story ,etc.)

Secondly there is the implication that objects and people are thoughts in the mind of God (Berkley's view) and nothing more. It seems hard to make this theory tally with a Christian view of responsibility. If I do evil, is God indulging evil thoughts? If I am a character in His novel, a puppet in His show, a projection on His tv screen, why does He complain if I do wrong? Who resists His will? (Rom.9:19 is interesting in this connection but Pharoah whom Paul cites,hardened himself before God hardened him. Paul seems to teach that by sinning man turns himself into the clay out of which the divine Potter makes vessels to dishonour — or does he?)

Thirdly, does not the analogy we are considering encourage a pagan view of Fate? From the start characters in a novel have no say in what they do or say: from their point of view Fate is in control.

None of the theories we have outlined seems very plausible. There are passages in the Bible which, though often poetic, admittedly seem to support the immanentist view. Perhaps we should not interpret them too literally, however. They are balanced by other passages,sometimes overlooked,which speak of the laws of nature ("ordinances of heaven and earth", Jer.33:25;cf.Jer 31:35) impressed on nature at the beginning. ("When he gave to the sea its bound, that the waters should not transgress his commandment.") These ordinances or laws are spoken of as independent, or semi-independent, of God. God, in claiming to be as faithful and reliable as natural law, refers to the latter as an external standard of reference.

Let us hope that amongst our readers someone will rise to meet Maynard Smith's challenge.

INDIAN SCIENCE

We have previously had occasion to refer to the sorry state of Indian science and to the suicide of three good Indian scientists as a result. In his pathetic valedictory letter, addressed to Swaminathan, Dr V.H. Shah spoke of " a lot of unscientific data passed on to you to fit your line of reasoning".

Dr Swaminathan, we are told, has done outstanding work in the past and holds important positions both in India and in the UN. Some years ago he submitted a dwarf wheat variety to radiation and in 1967 announced that one mutant was so remarkable that it would do much to solve India's and the world's food problems. For this work , he received, in 1971, a top science award of 10,000 dollars.

Dr Shah's allegation caused an investigation to be made. It was found that figures had been falsified and that evidence which clearly showed that the new strain was no better than the old had been suppressed. The claim has "all been demonstrated to be false". But, says the investigating committee, "many junior scientists in IARI (Indian Agricultural Research Institute)...feel that they are not free to publish a scientific finding because it does not suit somebody higher up or that in fact unscientific data are being passed on to the higher authorities in return for favours and promotions." With minor exceptions, "the phenomenon ...pervades the entire scientific and academic community in this country. At the root of it is the greed for bureaucratic power and love of a comfortable life which afflicts this class" (***New Scientist***, 7 Nov. 1974; see Letters, in later issues for defences of Swaminathan but not of Indian science. See this JOURNAL **99**, 64; **100**, 119.)

It is hard to resist the conclusion that in the absence of a sense of responsibility to God , integrity cannot be maintained, either among scientists or among any other groups of men.

ISOMERS

The year 1974 saw the centenary of three great discoveries in chemistry: a recent article in ***Endeavour*** (1975,**34**,28) by Dr D.H.Rouvray tells the story.

In 1874 Sir Arthur Cayley,the mathematician, showed the way to calculate the number of isomers (chemical compounds containing the same elements in the same proportions but differing in properties because of the arrangement of the atoms) of simple compounds such as C_nH_{2n+2} and $C_nH_{2n+1}OH$.

In the same year W.Körner proved unequivocally that in benzene all six hydrogen atoms are equivalent : a wonderful achievement for the time which involved many years of patient toil. In the same year, yet again, Jacobus van't Hoff laid the foundations of space chemistry showing how on paper we can predict which molecules will exist in isomeric mirror-image forms and which will have isomers depending upon the fact that there is no relative rotation between two atoms of carbon which are joined by a double bond. (cis-trans isomerism).

The existence of isomers was proved in the earlier part of the century,but not the laws which govern their existence. Rouvray aptly quotes Faraday's prophecy (***Phil.Trans.RS.*** 1825 ,**115**,460) "Now we are taught to look for them,they (isomers) may probably multiply upon us" — a principle by the way, most applicable to the goodness of God in the life of the Chrisian!

In the early days those chemists who believed in atoms thought that molecules were probably built up of atoms forming structures of a quasi-permanent kind. Such structures were thought unknowable because in chemical reactions (the only conceivable source of information at that time) it was thought that structures would be changed. But now, after 1874,sitting down with pencil and paper, a chemist could predict that there ought to be ,say, just eight and only eight structurally different amyl alcohols ($C_5H_{11}OH$) of which three and only three can be separated into left and right

handed forms. And, wonderful to say, chemists have found that these rules work out correctly, not once or twice but in literally hundreds of thousands of cases. A brilliant confirmation that atoms are really there: they are not figments of man's imagination!

Today the opinion is widespread that science is unreliable because it is for ever changing. At the boundaries of science this is of course the case, but when once basic discoveries have been made they do not change; they are permanent. The three great discoveries of 1874 are as true today as then: they are still basic to chemical science and their influence extends far beyond chemistry. Certainly science has limitations, but the Christian can rejoice that God has given to man the power to discover Truth, in a limited way at least.

CHANGE versus GAIA

It has commonly been assumed until recently that the onset of climatic changes in past ages was a slow affair, an ice age setting in, for example, over a period of thousands of years. This view has now been shattered. In a BBC documentary on the Weather Machine (21 Nov. 1974) Nigel Calder and his helpers outlined the new evidence. (See his book, '***The Weather Machine and the Threat of Ice***, BBC, £3.25) Studies of cores in Arctic ice show that in previous ages changes to icy conditions sometimes occurred with extreme rapidity. The snow fell one winter but for some reason did not melt in the summer that followed. The snow then thickened in the second winter and thereafter thickened steadily.

Over the past few years there has been a great and sudden change in the world's weather: desert conditions have been created in some parts, others have suffered from excessive rain and flooding. Dislocation of agricultural patterns and famines have resulted. There are suggestions that a new ice age may set in, for which we are ill prepared.

Though such changes seem dramatic to us, they

are, in fact, very small. A change in average temperature of only a degree or so could cause widespread disasters. The fact that changes in temperature are so small has led to a new appreciation of how wonderfully planet Earth is thermostatted. The sea absorbs most of the heat of the sun and this warms its surface layers. These rapidly transfer their heat to the air immediately above them which, becoming moisture-laden and warmer, rises and is replaced by colder descending air. But the surface of the sea is not easily cooled, for the colder water becomes denser and sinks, being replaced by waters from below. The oceans serve as a vast thermal reservoir.

The Earth's temperature over 3.5 aeons has kept within the range 15—30° C. But the tendency to stability is not confined to temperature. What stopped a runaway production of NH_3 or CO_2? At one point the O_2 concentration rose rapidly yet life was preserved; yet O_2 might have proved as dangerous as Cl_2 or NO_2. Taken as a whole, thinks James Lovelock FRS (***New Scientist***, 6 Feb. 1975; see also this JOURNAL ***100***, 231) nature behaves like an organism ("...living matter, the air, the oceans, the land surface, were parts of a giant system...The system seemed to exhibit the behaviour of a single organism, even a living creature...") The ancient Greeks had an earth goddess called GAIA and Lovelock, who now talks of the Gaia hypothesis, has revived her memory. Gaia, his quaint goddess, always acts to preserve life. Even if man contaminates the atmosphere, Gaia will be there to counteract his folly (though perhaps after great suffering has been caused).

Lovelock is a little worried that Gaia's existence is not potentially disprovable in true Popperian style. But never mind about that, he says, for Gaia continues to provide guidance in scientific thinking — she proves "an extremely fruitful source of experimental suggestions".

All this is a bit too much like the world-animal theory of pre-scientific days for our liking ! What Lovelock is saying is that nature is intelligently constructed and that in science it is helpful to remember this fact. But any believer in God, the Creator, could have

told him this and scientists (eg. Kelvin and Maxwell) in the past have often found this belief helpful in their work. So why the whimsical Gaia?

ERRATA

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Yeats, W. B., 257f
Yokoi, Corp., 187
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Young, J. Z., 29

CHARTS

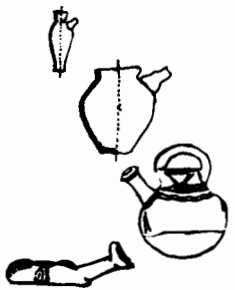
The charts on pages 19 and 20 were supplied by Preb. Victor Pearce to illustrate his paper (vol. 101 p 228) and the reply to comments in the discussion (this issue, p. 21)

NORTH MESOPOTAMIAN SITES

Genesis 10:11,12

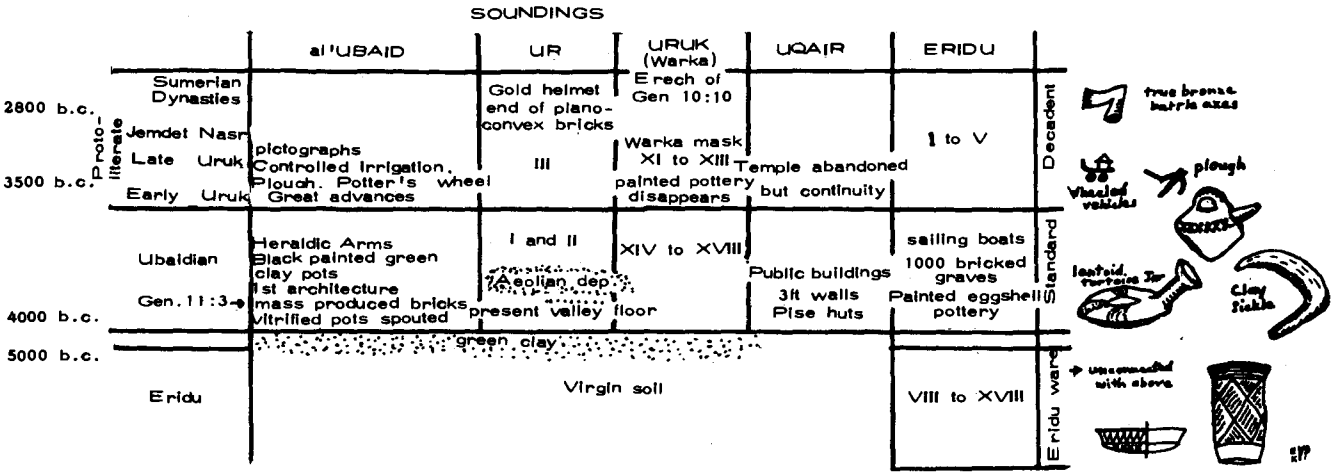
Archaeological Period	Nineveh Site	Arpachiya site	Gawra site	Samarra site	Hassuna site
Early Dynastic	V		VII		
3400 b.c. Proto-literate	IV		VIII to XI		
Early bronze: Ubaid	III	I to IV	XII to XIX		XI to XIII
Appearance of spouted pottery, diagnostic tortoise vases, dull colours unconnected with Halaf and Hassuna. Milking.	Nineveh refounded by Nimrod. Gen 10:11	Advanced agriculture. Graves. V. Pottery different	(XIII Acropolis) Buttressed temples. Formal Architecture. Eggshell and Tortoise ware		
Copper-stone: 4000 b.c. Disappearance of Halaf & Hassuna type of Chalcolithic red on cream pottery	Flood Clay. v.hot kilns over 1000°	Polychrome	GAP. Copper, rosettas, Tholoi gold studs, large beaker		Break in pottery and culture
Halaf	II. Red and black monochrome pots	VI to X	XX. Impressed lamp seals. Pin-prick sherds.		VI to X. Burnished pots. Flint sickles
Hassuna	Plain pottery, unburnished. Husking trays			Samarran unburnished pots	Husking trays. Chart hoes. II to V
6000 b.c. Neolithic PPNB*	Flinting poor developing to w. chalcolithic				Obsidian arrows. Neolithic PPNB* Camp sites

*Pre-pottery neolithic "B"



SOUTH MESOPOTAMIA

Shinar—Gen. 10:10 & 11:2



The Flood and Archæology
by E. K. Victor Pearce

(*This Journal*, 1974, **101**, 228) See charts pp. 19, 20.

DISCUSSION

G. E. Barnes. Would it be true to say that your paper demonstrates that over a large part of the Old World there was a simultaneous cultural hiatus at a period that partially coincides with a possible biblical dating of Noah's flood, but does not in itself demonstrate that the cause of that hiatus, except in Mesopotamia, was flooding ?

Author's Reply. There are indications outside Mesopotamia that the cause of the hiatus was a flood and also that populations vanished.

To mention some, in England at Shippea Hill, Cambridgeshire, a clay stratum indicates a flood occurring between the neolithic and bronze ages. At that time also the British Isles separated from the Continent marking the Atlantic phase. In North Africa, according to the geologist J. Prestwick, the rubble drift was caused by flood erosion and not by ice-age glaciation. Also the isostatic re-adjustment resulting from the Flood would explain the lowered water-table which caused the Sahara to become a desert at that time.

In S.E. Asia, the Woakwine submergence indicates that a flood was the cause. There are indications in China, but details of site and cave stratigraphy are sparse. There are also genetic and ethnic data which indicate a disappearance of population, a fresh dispersion and re-population of the Old World.

(See chapters 7 and 9, "The Flood and Human Dispersions" in IN SEARCH OF CAIN, to be published.)

R. S. Luhman. In the light of your identification of Adam with neolithic man and your account of the Flood, how would you account for the existence of neolithic man in the New World ?

Author's Reply. The evidence points to the Flood affecting only the Old World fauna, although the Flood reached the New World. Thus it was only the Old World which needed re-populating by the post-Flood bronze-age and iron-age peoples. This is the reason which these archæological successions cover the Old World only.

The New World and the S.E. Pacific has no succession of bronze and iron cultures since the pre-flood neolithic and chalcolithic. The natives continued with the chalcolithic tools until recent Old World contacts, and what is significant is that they had the dog and the digging-stick which are diagnostic features of the meso/neolithic farmer, even though many tribes had reverted to hunter-gathering.

This means that the Adamic farming culture reached the Americas and the S.E. Pacific before the Flood. This accords well with the dates, and it is generally accepted that the American aborigines came from the Old World via the Bering Straits. There was flood erosion in the New World, but the catastrophe did not eradicate all life there, it would seem. These factors explain the survival of the marsupials which have disappeared elsewhere, and the almost 100% "O" blood group of the N.W. aborigines. (Canon Pearce is writing a book with full details — *Editor.*)

FAITH AND THOUGHT 1975, *Vol. 102 (1)*

GORDON E. BARNES

Human and Animal Aggression

Human and animal aggression are often considered in the same context and even identified. Is this defensible? Mr. Barnes, Senior Lecturer in Zoology at Chelsea College, University of London, points out that the word "aggression" is used in at least four different senses and that, despite exceptions, we do not usually use the word in the same sense when speaking of animals and men. He argues that man is unique in the kind of aggression he exhibits.

In recent years both ethologists and also popular science writers have written extensively on the relation between human and animal aggression. We are indebted to the authors of two of the papers read at the Institute's Symposium in May 1973 for two outstandingly able introductions to some of this literature. [1, 2]

In such writings we frequently encounter the word *aggression* used in such a wide and imprecise way that it can easily lead to erroneous conclusions in the comparative study of man and animals. This paper, which may be regarded as a postscript to last year's Symposium, is an attempt to clarify the uses of the word, not by producing an all-embracing definition (probably an impossible task in our present state of knowledge) but by examining the logical categories in which the word has been employed, and then enquiring about the nature of resemblance between animal and human behaviour as described within any appropriate category. I am concerned here, not with describing

different types of behaviour — Dr. Poole's paper has surveyed these — but with discussing inferences that can be drawn from and about them.

It is perhaps significant that the Conveners of the Institute of Biology's Symposium in 1963 on *The Natural History of Aggression*[3] wrote in their introduction to the published proceedings, "We did not attempt to define 'aggression', nor, with the exception of Veness, did our contributors. Nevertheless, at least in relation to aggression by individuals, it became clear that they were all talking about the same thing." That fourteen out of fifteen major contributions made no attempt to define the term highlights the difficulty in using the concept of aggression. That they were 'all talking about the same thing' is, I regret, less clear to me than it was to the Symposium Convenors.

As a starting point for this discussion I shall use Poole's definition that "aggression is any activity which is directed towards the discomfiture of another individual".[2] No one would claim, least of all Poole, that this is an entirely satisfactory definition: it does not cover all that is regarded as aggressive (many psychologists regard suicide as a form of aggression), and some of the words (e.g., 'directed towards' and 'discomfiture') are somewhat vague. Yet their very vagueness permits useful discussion within the framework of the definition.

Dr. Young[1] in his paper at last year's symposium likened comparative ethology to comparative anatomy; and I think the analogy is helpful. Anatomists have always recognized that the same name (particularly if it is a word of common parlance) may be given to different structures for different reasons. Thus the wings of a bird and of a bee are both so called only because they have rather similar functions; they are totally different in structure and origin (such organs are described as *analogous*). The wing of a bird and a human arm, however, are both called forelimbs because, although they have totally different functions, they have a common structural plan and origin (such organs are described as *homologous*). Further, it is possible for the same popular name to be given to two things which have neither

structure nor function in common; the leg of a table and the leg of a sloth (which hangs 'upside-down') are neither analogous nor homologous. An early task, therefore, in any comparative anatomical study is to distinguish between analogies and homologies. Until this is done, general conclusions regarding phylogenetic relationships or adaptive significance are worthless.

Similar considerations apply to comparative ethology, a discipline which has borrowed several words from human behaviour and applied them to animal behaviour without always making clear whether the relation is one of analogy or homology. 'Courtship' is such a word. If, ignoring for our present purpose the moral and spiritual aspects, one compares human courtship with that of other primates, it is obvious that they are homologous: although there are many differences in the behaviour of the two, the same reproductive organs are involved and the same hormones and similar nervous responses control the behaviour. If, however, one compares human courtship with that of an insect or a spider, it is equally obvious that the relation here is purely one of analogy; different organ systems are involved and different hormones are in control. Further, one cannot press the analogy very far — the courtship of certain insects and spiders induces the female to cannibalize her mate during or after copulation!

The word *aggression* requires similar enquiry: is animal aggression homologous or analogous with human aggression? Or is it neither; and are we being misled by our thoughtless use of the word? (It may be, of course, that there is no simple answer; but that some aggressive behaviour patterns are homologous, some analogous, and some neither.)

To answer these questions we must ascertain what is usually meant by 'aggression' in man and animals, i.e., what are the criteria by which it is recognized.

A specific instance of human behaviour can, in principle, be described in four different ways: (a) by giving a purely objective account of what a man actually did (e.g., *A* picked up a loaded rifle, pointed it as *B*, and pulled the trigger); (b) by

describing objectively the effect of the action (e.g., *A* mortally wounded *B*); (c) by stating the intention of the activity (e.g., *A* intended to kill *B*); and (d) by evaluating the intention (e.g., *A* feloniously, or with malice aforethought, killed *B*).

Now descriptions (a) and (b) are clearly in the same logical category, because, given sufficient objective information about the rifle, the relative positions of *A* and *B*, a knowledge of ballistics, etc., one could predict the effect of *A*'s action on *B*. Description (c), however, is not in the same logical category, because no amount of objective information about *A* would enable one logically to infer anything about *A*'s intention. To do this one would have to know something about *A*'s subjective experience: e.g., whether he knew anything about rifles, whether he knew it was loaded, etc. Lastly, description (d) is not in the same category as (c); for *A*'s intention to kill *B* would have different evaluations according to the moral or legal code by which it is judged (many would regard *A*'s action in self or national defence as justified, but a conscientious objector may regard all killing of humans as evil). Thus we have four types of description of behaviour which may be regarded as occupying three different logical levels.

Now different words used descriptively of the same activity may embrace, by implication, all of these types of description, or fewer than all. Thus the statement '*A* killed *B*' is purely a type (b) description: it indicates the consequence of *A*'s behaviour but tells us nothing about what *A* actually did (he might have shot, stabbed, poisoned, strangled, or starved, *B* to death). The statement '*A* shot *B*' is a mixture of types (a) and (b); while the statement '*A* murdered *B*' is a mixture of types (b), (c), and (d), for it implies the consequence, the intention, and a moral or legal judgment, of *A*'s behaviour.

In contrast to human behaviour, animal behaviour can be described only in type (a) or type (b) terms (as the ethologist cannot impute intention or moral value to it), and of the two the latter is the important one for diagnosing aggression. It is not the objectively-observed character of the behaviour which

identifies it as aggression but its consequence (the 'discomfiture', to quote Poole) for another individual. If the same behaviour pattern were normally followed by mating it would be described as courtship behaviour; but if it usually leads to the withdrawal or a submissive posture of another individual it is called aggressive. Of course, once a behaviour pattern has been recognized as aggressive from its type (b) description it could thereafter be defined by a type (a) description. Thus one can quite correctly say that aggressive behaviour in the domestic cat involves the arched back, the raised hackles, the bared teeth, the deflected tail, the outwardly-rotated ears, and the high-pitched howling; but one can say this only because of its observed effect on other individuals.

In order to identify aggression (as this word is commonly used) in man, however, we need more than types (a) and (b) descriptions, which, in fact, may be irrelevant. To recognize what is usually meant by 'aggression' we need type (c) and probably type (d) descriptions. Thus, if a dirty, smelly, and possibly verminous, tramp were to come regularly on summer evenings and sit on a particular park bench and start a conversation with whoever was there, the latter might well experience discomfiture, which could be shown by such behaviour as his movement along the bench or even getting up and walking away. We should not, however, describe the tramp's behaviour as aggressive — unless, of course, we had some reason to believe that he came to the bench with the intention of causing discomfiture; and even then we might feel that 'aggression' is too strong a word if he was merely hoping to have the bench to himself for his night's sleep. It seems we may have to know the purpose of the intended discomfiture, and thus pass a moral or legal judgment upon the intention, before we can agree to call the behaviour aggressive. In other words, we need types (c) and possibly (d) descriptions.

If, then, aggressive behaviour in man and animals is recognized by criteria representing different logical categories, it follows that the two types of behaviour may be quite different, in the sense that they are neither homologous nor analogous.

This, however, is only a possibility and not a certainty, for two things may be normally recognized by, or defined in terms of, features of different logical categories and yet have concomitant features in the same logical category such that the two things are undoubtedly recognized as homologous or analogous. Hunger is an example. When this word is used of man it usually denotes "the uneasy or painful sensation caused by want of food" (to quote the Oxford English Dictionary), which is, of course, a subjective experience; but when the ethologist uses the term with respect to other species it connotes those objectively-discerned patterns which together constitute feeding behaviour (feeding itself, and the exploratory behaviour which leads to feeding). Yet the human sensation and the feeding behaviour of rats are both correlated with physiological changes (violent stomach contractions, reduced blood sugar concentration, etc.) sufficiently similar as to suggest that hunger in man and rats is homologous. On the other hand, the physiological accompaniments of hunger in those insects where it has been investigated (e.g., *Phormia*, a blowfly, and *Rhodnius*, a blood-sucking bug) are so different from the mechanisms in man that hunger in insects and man can be regarded as no more than analogous.

I therefore come to two conclusions: (a) that aggression in man and animals is commonly recognized by, or defined in terms of, aspects relating to different logical categories, so that the common use of the word 'aggression' tells us nothing about the relation between this behaviour in man and animals, and (b) that, in order to ascertain this relation (whether it be homologous, analogous, or neither), we must carefully examine each aggressive behaviour pattern of man or animal for *objective features* which it shares with the other. Then only shall we have a satisfactory basis for comparative studies and phylogenetic inferences.

Animal vis-à-vis Human Aggression

It is generally accepted by ethologists that, if we exclude predation from our definition of aggression, then the latter is largely restricted to defence of territory and attainment of or

maintenance of status within the group. Both of these have human counterparts which frequently serve similar biological ends. This is not surprising, since man is biologically a mammal and has physiological needs similar to those of other animals — mammalian and indeed non-mammalian also.

An animal's territory is a defended area in which it can 'mind its own business' without molestation or interference from others of its species. The business itself varies from species to species; so territory may be a private feeding area (thus ensuring the individual's food supply), an area for courtship and mating (which in mammals, and probably in other vertebrates, are physiologically incompatible with emergency measures required in self-defence, as being under the control of antagonistic parts of the autonomic nervous system), a nursery in which the young are reared (thus providing protection for them) or, in the case of that mobile territory called 'social space' or 'individual distance', an area in which the animal can do anything else or just rest in peace. Where territory is related to courtship and mating it serves as a means of population control, because it limits the number of animals that can mate in any area. This no doubt helps to maintain a healthy stock.

Human territory serves parallel functions, although the uses to which territory is put by man are much more varied than in the case of animals. The nature of territory also varies enormously. It may be a family farm which directly provides the family's food as, for example, in Central Africa, or it may be a vast Canadian wheat belt farm which indirectly, through the economic processes of marketing, again supplies the food of the owner, his employees, and their families. Such territories are functionally similar to an animal's feeding territory. Another type of human territory is the homestead, which may be a collection of mud huts in an African compound or a three-bedroomed semi-detached house in a London suburb. Such territory provides, amongst other things, an environment for reproduction and rearing of young: and it may be, at least in some cultures, that this provides a check on population growth for many young married couples having to live with parents choose not to produce children

until they have acquired territory of their own. Thirdly, as Poole points out, social space is a phenomenon readily observed when one watches human behaviour, although it may have no special function. Perhaps it has just the general function of permitting freedom of posture or movement, and thus contributing to comfort. Man, of course, has many other types of territory, ranging from the goal area on a football pitch to national and colonial territories; but these appear to be without parallel in animal behaviour, and are therefore irrelevant to comparative ethology. [5]

The concept of social status or rank in animal groups reflects the fact that certain individuals are dominant over others. The dominance is shown in various ways. A dominant male in a monkey group, for example, takes precedence in selecting its resting site, subordinate ones giving place: if a dominant animal approaches a subordinate the latter moves away and keeps its distance: a dominant male may have priority in mating with a female on heat: a dominant animal may 'discipline' a subordinate that 'breaks the rules', and may even drive an unruly member out of the pack. The social hierarchy is not always imposed by the aggressive behaviour of the boss; it may be established, as T. E. Rowell [6] discovered in captive baboons, by the submissive behaviour of the lower ranks. The biological value of such a hierarchy is that it tends to minimise internal group conflicts, achieve group cohesion, co-ordinate the activities of the members of the group, and lead to a certain degree of division of labour.

Again, human parallels are obvious, indeed so obvious as not to warrant listing; but it is of interest that the parallels are closer in primitive societies than in complex ones. For in the primitive society the head of the family, or the village chief, is likely to be dominant in all the activities of his respective group as is a dominant male in a monkey pack; whereas in the complex society a different hierarchy will probably be set up for different activities — the captain of the factory football team may be a labourer on the shop floor, while the managing director, if he is in the football club, may be a reserve player.

The question now arises whether the similar behaviour patterns in animals and man are homologous or merely analogous. That they are analogous seems incontrovertible since, as we nave seen, they serve the same functions; but before they can be regarded as homologous it must be shown that the same fundamental behavioural processes are involved.

An animal usually acquires its territory by searching for a suitable area and, on finding one, occupying it and thereby staking its claim. It is very unusual for an animal to win it from another by aggression, because a territory-holder is much more strongly motivated to defend its territory than an intruder is to attack. It is in defence of territory that aggression becomes important. High social status, on the other hand, is normally both achieved and maintained by aggressive behaviour. Factors other than aggression may be, and in fact usually are, involved in the establishment of dominance: very frequently a low-ranking animal wins promotion because a higher-ranking individual falls sick or becomes senile and therefore can no longer counter the aggression of the subordinate. There are thus three areas in which animals show aggression and which have human counterparts: defence of personal and small-group territory, achievement of social status, and maintenance of social status; and we have to enquire whether, and in what sense, man shows aggression in these areas.

Although a man may make his territory, or more usually a small part of it (his house and his farm buildings, etc.), not easily intrusible, by locking the door and bolting the windows, most personal territory is, in fact, defended by social convention. A fence, a five-barred gate, a hedge, or a mud wall, is no impregnable barrier against an intruder, for the fence can be scaled and the gate opened. These things, like the verbal announcements that sometimes accompany them — 'Private: keep out' or 'Trespassers will be prosecuted' — are symbolic of territory ownership and, as such, are analogous to the threatening displays of territory-occupying animals. They cannot be regarded as anything more than analogous because they obviously make use of entirely different organs and physiological mechanisms.

Furthermore, the response to the symbol is much more complex in man than in animals. The would-be animal intruder into the territory of a conspecific is normally deterred by a relatively simple and stereotyped behaviour pattern sometimes called a 'sign stimulus' (e.g., display of the red breast in the robin, or head-up posture of the great tit). But the potential human intruder into human territory is put off not by the pattern of the symbol but by its significance, so that a fence, a hedge, a railing, a wall, a written notice, would all be equally effective.

Now an animal exhibiting its threat display to an intruder would be described by an ethologist as showing aggression; but I doubt if anyone would describe as aggressive a farmer who grew a hedge round his farm or a suburban householder who erected a garden fence. Even if the message of the farm hedge failed to get across, as that of the animal's threat posture occasionally does, and the farmer chased the scrumpers out of his orchard I suspect he would still not be charged with aggression, provided the persuasive measures he used were no greater than were required to protect his property. If he used unnecessarily violent measures one would suspect that his primary motive was not just to defend his territory but to cause harm to the trespasser. Such behaviour would be morally and legally wrong, and would, I suggest, undoubtedly constitute aggression. So, as far as territory-defence is concerned, animal behaviour which the ethologist, on the basis of type (a) or type (b) description, would call aggression has a human counterpart which is merely analogous and which, on the basis of type (c) and type (d) description, would not be so called.

To examine fully the place of aggression in the achievement and maintenance of social status in human societies would clearly extend this paper beyond reasonable length, because, as pointed out earlier, status can take so many different forms in various human activities. But a rapid survey will, I think, show that aggression, analogous or homologous with that shown by animals, does not play a comparable role in the majority of human hierarchies.

In some circumstances high rank is determined on a hereditary basis. The rules governing the line of inheritance may vary from one example to another, but the status is determined by rules and not by the behaviour of the individual (although unconventional behaviour may prevent high status, as in the case of the abdication of King Edward VIII). This operates in many royal dynasties, and tribal, area, and village chieftaincies. These rulers may in turn bestow slightly subordinate but nevertheless still relatively high status as favours upon their friends or as rewards upon their faithful servants (peerages, etc.). In many societies and cultures age determines status (village elders, heads of extended family compounds, etc.). In most hierarchies (e.g., in industry, commerce, government, armed forces, the church, education) in Western culture status is determined roughly by merit, which is compounded of such factors as knowledge, skill, variety of experience, ability to work amicably with others of various ranks in the hierarchy. In all these situations aggressive behaviour is likely to be either irrelevant to status or more frequently inhibitory to promotion, because aggression produces antagonistic responses in others ; either superiors who are therefore less likely to promote or subordinates who are less likely to work well.

It may be thought that political revolution is an instance of status acquisition by means of aggression. It is certainly true that revolutionary leaders adopt aggressive attitudes towards the established rulers, and equally true that if their revolutions are successful the leaders achieve a higher social status. But even here the analogy with animal aggression is far from close. The aggression of animals that leads to higher rank is essentially an individual encounter between the aggressor and its superior, an encounter which is settled by the greater strength, courage, or persistence of the aggressor. It is doubtful if a revolution could occur in this way. If a revolutionary were successfully to challenge an established leader personally, the latter's loyal subjects would almost certainly defeat the aggressor. The success of a revolution depends on its leader's ability to gather a large following by persuading people that his cause is just or expedient ; and he will not be able to do this by adopting aggressive behaviour. He may preach aggression against the establishment, but he must

woo his followers by showing reason for his policy and concern for them. When the challenge to the establishment actually comes, the revolutionary leader may well keep in the background.

Once status in human society has been established, it is maintained by a large variety of methods of communication. An announcement that Mr. X has been appointed Deputy Manager, the bestowal and use of a title (e.g., mayor, colonel, professor), conventional forms of address (Bloggs, Mr. Bloggs, or Dr. Bloggs, according to rank), are all forms of verbal communication. But many other factors (e.g., size of office, cost of car, type of dress, badges of office or rank) can communicate status. In fact, 'status symbol' has become a part of everyday speech. Now none of these is normally regarded as aggressive.[7] From time to time, however, an individual may behave in a manner deemed inappropriate to his status, and disciplinary action ensues. This may well be directed to his discomfiture, either mental or physical, but even in these circumstances I doubt if the administrator of the discipline would be regarded as aggressive, unless the measures taken were incommensurate with the fault committed.

There is, however, one type of social status that I can think of where there is a very marked similarity between animal and human aggression, and that is in schoolboy communities. The class bully achieves his dominant status and defends it by threatening postures (the pugilistic stance and the facial glare), or actual fighting, in personal encounters. He uses similar muscular mechanisms to those used by animals, and his aggressive behaviour, like that of other mammals, is associated with increased adrenal secretion. Here seems to be a clear case of homology. But the advantages conferred upon an animal group by its having a dominant male are sadly lacking in the classroom society.

Human vis-à-vis Animal Aggression

Our definition of 'aggression' included the words 'directed towards the discomfiture of another'. We have already seen that

the 'directedness' of behaviour is recognized in animals on the basis of types (a) and (b) descriptions but in man commonly on the basis of type (c) and sometimes type (d) descriptions. Now the only way, therefore, of discovering whether any behaviour of an animal is directed towards the discomfiture of another is by observing a correlation between that behaviour and the behaviour of the other. Such a correlation must be demonstrated by repeated observations. In other words, an ethologist can recognize aggressive behaviour only when an animal shows an oft-repeated pattern which elicits an oft-repeated response in others. A unique piece of behaviour could not logically be identified as aggressive.

In man this is not so, for intention can often be communicated in a single event. This is because human communication mechanisms are vastly more complex than those of animals. Man uses not only his innate simple sign stimuli but also his range of acquired signals in the forms of facial expressions, gesticulations, postures, and, above all, verbal language. In addition, each single display of aggression may take an objectively different form: the same man could beat his child, throw his dinner at his wife, kick his cat, swear at his secretary, and quite calmly speak damaging insinuations to his colleagues. By the same token, the victim of aggression can communicate his discomfiture in a great variety of ways: and that discomfiture may not be physical or even have obvious physical concomitants — it may be largely mental. Man's powers of verbal communication, particularly when aided by modern technology, also enable large numbers of individuals to combine in a concerted act of aggression against equally large numbers of victims simultaneously over large areas of the earth.

It follows then that man has an unequalled repertoire of what can be recognized as aggressive behaviour, ranging from heated arguments, through dirty play in games, over-harsh disciplinary measures, 'bitchiness' in the typing pool, various forms of racial discrimination, rape, malicious wounding, murder, religious persecution, civil war, to global nuclear warfare; and any one of these could take many objective forms.

To what extent do these have animal counterparts; and where counterparts exist are they analogous or homologous? Of course it is impossible to answer these questions in general terms: one would need to look carefully at each event to ascertain its biological significance and its anatomical and physiological features before the questions could be answered.

As far as warfare is concerned, it seems to be generally agreed by ethologists that animals do not engage in any comparable activity. It is also very unlikely that animals have an equivalent of rape, since before copulation is attempted a male needs the responses of female courtship behaviour, and these a female does not exhibit unless she is in a receptive physiological state. Malicious wounding and murder present greater problems. In discussing human aggression one has to use such words to distinguish intentional from accidental injuring and killing, which would not be regarded as aggression. That injury and death do occasionally result from animal aggression is undeniable; but how can one tell whether they are accidental or intentional? Perhaps, as a suggestion, it is reasonable to assume that they are accidental if (a) they occur as a result of aggressive behaviour which usually causes merely submission or withdrawal, or (b) if they occur as a result of the more violent behaviour (e.g., fighting) which follows the failure of the usual threats to produce submission or withdrawal, and (c), in the case of injury, if that injury is followed by submission or withdrawal. Such circumstances would suggest that the biological significance of the aggression relates to status or territory and not injury of the victim, but that injury is an accident due to failure of the normal agonistic communication. If, on the other hand, the wounding or killing occurs in circumstances which appear to be irrelevant to status or territory, then perhaps one is justified in tentatively accepting the injury or death as the goal of the behaviour. In this case it could be taken as an animal equivalent of malicious wounding or murder. In actual fact such an animal equivalent appears to be virtually unknown in the wild state. In captivity intra-specific fighting leading to injury and death has been reported, but when similar behaviour has been studied in the wild it has been found that it is normally concerned with status or territory

and that the victim of the aggression submits or escapes before injury occurs. Harrison Matthews [3b] makes the same point in a different way: "Intra-specific fighting has been divided into two kinds, ritual and overt, the first a formalized sparring match with strict rules, the second a fight to the death with the gloves off and nothing barred. In preparing this paper the more I have sought examples of such intra-specific overt fighting in mammals the less I have succeeded, and I doubt that it normally occurs in nature." He is referring here only to mammals, but they are the animals of greatest relevance to this discussion. In so far then as one can speak of accident or intention in animals, it seems as if animal injuring and killing must be regarded as accidental in the sense that it is not an end in itself but results from a breakdown of normal communication in agonistic behaviour.

It is impossible to examine all possible forms of human aggression even in this superficial manner. But my impression is that in most cases it would be difficult to find animal counterparts; but even if true homologies could be found, I think it very unlikely that the biological function of the aggression in man would be related to social stability, as is that of most animal aggression. If it has any positive biological function at all it is much more likely to be concerned with the relieving of 'psychological tension' in the aggressor.

Conclusions

The foregoing survey of aggression in man and animals is not intended to be exhaustive and it might even fairly be deemed superficial. It serves merely as a basis for discussion of the logical problems involved in comparing the two; and from it I draw the following conclusions:

(A) Animal and human aggression are usually recognized by different criteria. Ethologists identify animal aggression by means of objective criteria — type (a), what an animal does, and type (b), the concomitant response of another individual — while,

in everyday usage, aggression in man is identified by a subjective criterion — type (c), what a man intends — and possibly by a moral or legal criterion — type (d), whether the behaviour is justified. Hence we find in the literature on aggression either a lack of definition or the use of definitions which are ambiguous or imprecise. There is obviously a need for rigorous definition to avoid confusion.

(B) Animal aggression usually takes the form of the display of relatively simple, often stereotyped, signals involving postural, vocal, colour, or other configurations. It is only when these fail to produce the appropriate response in the victim that more violent aggression, such as biting, fighting, chasing, ensues.

In man with his much more versatile communication system stereotyped patterns become relatively unimportant, and aggression is recognized by the meaning, and not the objective features, of his behaviour.

(C) Animal and human aggression are not, therefore, necessarily the same thing, and the question needs to be raised of the relation between the two: are they analogous (i.e., serving the same biological ends, but of different origin, structure, and mechanism) or homologous (i.e., of similar origin, structure, and mechanism, but possibly serving different ends) or neither?

(D) Animal aggression in the contexts of territory and status does have human counterparts; but they appear to be purely analogous — and are not normally regarded as aggression.

(E) Most human aggression appears to have no animal counterpart, either homologous or analogous; although the aggressive behaviour of the class bully seems to be an exception. But although this behaviour has mammalian homologies it appears to serve biological ends quite different from theirs.

(F) Amongst animals aggression is, in the ultimate analysis, a form of communication which serves to stabilize communities by determining territorial limits and social status. Man, on the

other hand, because of his powers of reason and the versatility of verbal language, does not need to the same extent the simple displays or the overt fighting of aggression. He could, in principle, relatively easily solve the problems of equitably sharing the world's territory and other resources, agree rank order for responsibility in society, settle differences of opinion by investigation and logical discussion, control population by limiting conception (and thus removing any biological reason for war), and in love discipline children and guide subordinates. But the undeniable fact is that he does not. Instead he employs his own unique types of aggression, in which intention plays a large part, and in which he himself sees moral evil.

NOTES AND REFERENCES

1. D. Young, this JOURNAL, **101**, 17.
2. T. B. Poole, this JOURNAL, **101**, 209.
3. J. D. Carthy and F. J. Ebling (eds.) *The Natural History of Aggression* (Institute of Biology Symposium, No. 13, Academic Press), 1964. (a) T. Veness, pp. 77 – 82; (b) L. H. Matthews, pp. 22 – 32; (c) J. Laver, pp. 101 – 108.
4. It is worth pointing out that 'aggression' is sometimes used of man in a different sense from that covered by this definition. As Veness [3a] says in her paper to the above-mentioned Symposium, "it is used to refer to assertiveness where there is no direct implication of social interaction. For example, a man may be said to have an aggressive personality if he is generally energetic and determined in adopting and pursuing goals and if he is not easily daunted by obstacles of any kind. 'Aggressive' so used is virtually equivalent to 'active'." In the present paper I am excluding this secondary use of the word 'aggression' although it has been a further source of confusion.
5. R. Ardrey (*The Territorial Imperative*, 1967, Chap. 6) has, in fact, maintained that national territory is equivalent to small group territory in animals. He writes, "The biological nation, as I define it in this work, is a social group containing at least two mature males which holds as an exclusive possession a continuous area of space, which isolates itself from others of its kind through outward antagonism, and which through joint defense of its social territory achieves leadership, co-operation, and a capacity for concerted action. It does not matter too much whether such a nation be composed of twenty-five individuals or two hundred and fifty million." But this concept seems confused. An animal group may hold an 'exclusive possession' in the sense that the group *occupies* or *uses* the area while conspecifics not belonging to the group are excluded. This does not apply to human nations, which do not prevent non-nationals (except for a few *personae non gratae*) from entering their territory. On the other hand, some human nations do prohibit foreigners from having *legal ownership* of land in their territory: in this sense only they have 'exclusive possession'. This is clearly not applicable to animal societies. Furthermore, human nations do not necessarily isolate

themselves through outward antagonism. I do not know if there ever has been a nation which has completely excluded all foreigners from its territory and kept itself completely isolated; but if such has existed it is exceptional.

6. T. E. Rowell, "Hierarchy in the Organization of a captive Baboon Group", *Animal Behaviour*, 1966, 14, 430.
7. Laver[3c] entitled a paper "Costume as a means of social aggression", but he did not define 'aggression', and I find it difficult to know what he means by the term. I suspect his thought took the line: (a) animal status is maintained by aggression, (b) dress serves to maintain status, therefore (c) dress is aggressive. But one has only to set the argument out in this syllogistic form to demonstrate its falsity. But I may be maligning the author in guessing his line of thought.

* * *

Author's Addition

I am not an ethologist, and cannot pretend to be familiar with the rapidly increasing body of research literature in this field. For this reason I am very grateful to Prof. R. A. Hinde and Dr. T. B. Poole who kindly read and criticized, from the ethologist's point of view, the manuscript of this paper. Their comments saved me from some serious ethological blunders.

A few of their philosophical comments, however, I had difficulty in accepting on epistemological grounds, so they would not agree with some of my statements: if these prove to be erroneous I take full responsibility. I realize that one or two of my philosophical assertions are debatable; but the purpose of this paper is to stimulate discussion in an area which was, for lack of time, largely by-passed in the discussion at the Institute's Symposium. I hope therefore that others will take up the debate in the pages of this Journal.

FAITH AND THOUGHT 1975, *Vol. 102 (1)*

TREVOR R. GRIFFITHS

"Let the Earth Bring Forth"

(Gunning Prize Essay, 1974)

Dr. Griffiths, Lecturer in Chemistry at the University of Leeds, discusses some of the chemical suggestions which have been proposed for the origin and very early development of life. He shows how question-begging and unsatisfactory some of the proposals are, and draws parallels between the beliefs of scientists and those of Christians.

The biblical phrase "Let the earth bring forth" (Genesis 1: 11, 24) has, in the past, received all too little attention from a scientific angle. Perhaps scientists have felt embarrassed by the picture painted by Milton in *Paradise Lost* in which he describes animals pawing their way fully grown out of the earth. Early adherents of the theory of evolution, when pressed to account for the origin of life, suggested that life arose from a single cell which had arisen by chance, or had been brought into existence by God. The chemical aspects of the subject were simply ignored because for many years biology and chemistry were considered as separate subjects: not till the 1920s did biochemistry begin to come into its own. Even so, medical training was usually the path taken to enter this field, and only within the past three decades has it been possible for the trained chemist to introduce his own approach and thinking.

The nature of the cell has been the subject of much scrutiny and the 'simple' cell is now known to be a very complex

entity. Newer related research subjects include cell nuclei and cell membrane studies. The biochemist has established the nature of the building blocks of the cell, but their origin has become the concern of the organic and inorganic chemist, and of the earth scientist.

In this essay we shall think of a recent aspect of chemistry, which stands at the portals of biological sciences: this is 'chemical evolution', or 'prebiotic chemistry' as it is sometimes called. We shall attempt, from the chemist's viewpoint, to look at some of the experimental evidence reported and to relate the conclusions reached to the Christian faith.

"Let the earth bring forth." When the injunction was first given in Genesis 1 it referred to living matter, vegetation, plants and trees: on the second occasion it was to living creatures. Concerning man (v. 26) it is recorded that 'God said, "Let us make man in our image, after our likeness,"' and in the New Testament, Christ said (John 10 v. 10), 'I am come that they (mankind) might have life, and have it more abundantly.' It will be here contended that the quality and attributes of life have at times been misplaced by scientists in their investigations into the origin and nature of life, thereby producing fallacious arguments and specious explanations of the (as yet unknown) intermediate stages in the appearance of life. It is further contended that an understanding of a satisfying and abundant self-life demands, at least, a theistic approach.

Life: Some Definitions

But what is life? In one sense it is that point at which the biologist takes over from the chemist. As a personal aside, this author, when at school, was perturbed by the lack of a precise definition for life. Recognising at that time the power of prayer, and that there were many cases where the medical doctors would predict a rapid termination of life, he knew also that "the prayer of faith will save the sick man, and the Lord will raise him up" (James 5: 15, RSV). With school-boy logic he concluded that

if he could learn all there was to know about the non-living, and if this knowledge was 'subtracted' from the knowledge of a living system, then the answer would be the definition of life: he is still a chemist !

Life has been defined by Perret[1] as: A potentially self-perpetuating open system of limited organic reactions catalysed stepwise, and almost isothermally, by complex and specific catalysts (enzymes), which are themselves produced by the system. This definition, however satisfying to a biochemist, will hardly please a chemist since it has nothing to say about energetics. The crystallographer Bernal[2] has suggested, as a provisional definition: A partial, continuous, progressive, multiform and conditionally active, self-realization of the potentialities of atomic electron states. This suggests that life is bound to arise because atomic and molecular interactions take place the way they do, as a result of the quantised energy levels associated with each constituent atom. These levels are invariate among identical atoms. The definition would therefore, if correct, seem to eliminate God in His creative capacity, but there is still the question "How did these levels originate ?", or "Who ordained these levels ?". We shall return to this latter point.

Belief

The beliefs of investigators colour their definitions and conclusions, sometimes consciously, but more often sub-consciously. This is not generally apparent in their contributions to scientific journals, but books and biographies are illuminating. Following on from Bernal's definition of life it is not surprising to find later in his book[3] the statement that "sooner or later both metaphysical and theistic explanations of life will be seen to be useless and essentially absurd". He therefore obviously believed that God is not involved in the emergence of life.

On the other hand, Calvin, in describing his personal experience in his book Chemical Evolution,[4] says that "The fundamental conviction that the universe is ordered is the first

and strongest tenet . . . the universe is governed by a single God . . . This monotheistic view seems to be the historical foundation for modern science." Yet Calvin, too, advocates that life arose *per se*.

The Christian might well ask 'Does it matter at what stage God took the initiative in the history of the solar system so that life was brought about?' There are two points to note here. The Christian may be, as it were, keeping pace with the scientist. When the latter says 'I cannot explain how this arose or this vital step in the sequence to life was brought about,' the Christian would reply, 'That is where God became involved'. This is, to say the least, spiritually unhealthy. As further research removes the scientist's difficulties, the Christian is continually back-tracking, and his faith is being eroded. This is essentially a 'God-of-the-gaps' approach, and in these circumstances would seem to be expressing fear rather than faith.

The second point is that God is ever present, and not remote in space. Genesis 1: 2 declares that when the form of the continents was not yet settled and the earth was dark and void of life, the Spirit of God "hovered and brooded continually, just as a bird does over its nest" (lit. Hebrew). There is no reason to suppose that God does not do the same today.

The role of God is hard to define, for the individual is involved. To some, and perhaps Calvin[4] would wish to be included here, God is recognised through the laws of nature as being immutable, regular, unaffected by time; energy levels within atoms and molecules are constant; and events, certainly at the molecular level, occur in conformity with statistical laws. To others, God is intensely involved. This means that in addition to God's involvement in macro-events of daily life, He knows the paths and trajectories of each atom and electron. Thus the involvement of God in the appearance or creation of life is a matter of individual belief, and consequently men may have the same Christian faith, but differing beliefs concerning chemical evolution.

Inevitability

The concept of inevitability arises from an inherent faith in science. Chemicals A and B, under the same conditions, always give the products C and D. When complicated organic reactants are brought together it often happens that several products could theoretically arise, but only one product may predominate because shapes and charges make molecules come together in a particular way. Chargaff's Rule,[5] that adenine (A) always pairs with thymine (T), and guanine (G) with cytosine (C), enabled Watson and Crick[6] to postulate a double-stranded helical structure for DNA, which provided an explanation of the chemistry of the molecule and its biological role as the carrier of genetic information.[7] The existence of highly plausible explanations of this kind makes it easy to see (imagine, postulate, believe) that the as yet unknown intermediate steps which gave rise to the first appearance of DNA arrived *per se*.

It cannot be too strongly stressed that molecular building-blocks do not assemble themselves into cell molecules because they are programmed to do so, or because the process is self-determined. Chemical reactions take place when the energy of the products is less than the energy of the reactants. However, change in molecular geometry, say when molecules fit together with complementary parts, as in a three dimensional jig-saw, is also a major consideration in determining whether or not combination is possible (the free energy for a reaction must be negative).

Various writers, who are both Christians and scientists, have discoursed lucidly on the role of faith in science.[8] They have demonstrated that scientists, in their approach to their subject, exercise a faith akin to that of the religious believer. Indeed, the scientist at times seems to be asking others to exercise even more faith than does the Christian — this is particularly so in the life sciences.

At this point we must begin to ask questions. We need to distinguish, where we can, between pleas for belief which refer

to merely plausible suggestions and those which demand belief that events will take place inevitably given the starting conditions. Obviously this is not easy, but Christians are exhorted to "have a reason for the hope (faith) that is in them" (1 Peter 3: 15) and therefore, if they are prepared to examine their own faith, they ought also to be prepared to examine the rationalisations of prebiotic chemists. Though such an examination may not always at the time seem satisfying, in the long run it will help to clarify belief, particularly if dialogue ensues.

We shall, however, take with us the warning of Solomon, "I applied my heart to know, and to search, and to know the reason of things . . . Lo, this only have I found, that God hath made man upright; but they have sought out many inventions" (Ecclesiastes 7: 25, 29). In discussing man's 'inventions' in the sphere of chemical evolution we have first to consider the question of relevance.

Relevance

The biologist is well aware that experiments performed *in vitro* do not necessarily give the same results as *in vivo*, and that chemical compounds given to animals do not necessarily produce the same effects in humans. However, the biologist is usually in a position to do both types of experiments and assess any differences. The prebiotic experimenter is not so fortunate, for he cannot be certain that his experiments replicate original conditions and materials. Thus to decide whether a particular set of laboratory conditions adds up to a relevant 'chemical evolutionary' experiment is by no means easy. Many experimenters have investigated the effects of electric discharges on mixtures of water and carbon dioxide. Attention was often given to the possible production of formaldehyde since this was for many years assumed to be the first product of CO_2 fixation by green plants. More recently radiation chemistry studies have yielded much information concerning the effects of ionizing radiation on the (assumed) key molecules of CH_4 NH_3 and H_2O. However, many of these experiments were not performed

with the object of advancing prebiotic chemistry and hence care must be exercised in drawing conclusions, for many findings have little relevance to the Earth's early history.

Prebiotic-Earth Conditions

We shall now consider experiments which have been specifically designed to relate to supposed prebiotic conditions, and we hope to pin-point crucial areas of uncertainty and conjecture. Many of the experiments, taken in isolation, would seem to have promise and to provide partial support for a belief in life arising on its own on our planet, but our attempts at a more critical view would suggest that there are several unanswered, because unasked, questions. We do not necessarily know the answers to these questions, but we hope that, by asking them, we shall channel thoughts and investigations towards profitable lines of enquiry. It is reasonable to take the premise that reactions in the prebiotic atmosphere gave compounds that then were washed into the prebiological oceans, and subsequently these, or further reaction products, reacted with solid surfaces, possibly so that 'the earth brought forth'! We shall therefore examine each of these environments in turn.

Prebiotic-Earth Atmospheres

Several atmospheric compositions have been postulated at various stages in the Earth's early history. We may be certain that though our atmosphere is now stable, it was different in the past and changed slowly from one composition to another.

To obtain the complex carbon-containing compounds present in living matter simple precursors were sought, those first considered being gases containing only one carbon atom in the molecule. The original workers in this field were Urey, Miller, Groth and Terenin. Oxidising and reducing atmospheres were subjected to high intensity uv radiation and also to electrical discharge, since these energy sources could be assumed readily

available to bring about bond formation. It emerged that, using a recycling system, a reducing atmosphere, consisting of methane, ammonia, water and hydrogen, was required for the production of various carbohydrates and a wide variety of amino acids. Oxidising atmospheres yielded no interesting products.

Let us look more carefully at these experiments. Using optimum gas ratios for amino acid production Miller [10, 11] found that only 10% of the carbon present was used up after about 100 hours of sparking and recycling of methane, ammonia, water and hydrogen. Approximately half had been converted into formic acid, and of the other carbon-containing compounds the largest component was glycine, around 1·5%. Ammonia is extremely soluble in water, being liberated on heating — Miller boiled his condensate to regenerate ammonia and water for recycling. Calvin, [12] using essentially the same apparatus but with increased proportions of ammonia and methane, and using electron bombardment as the energy input, obtained similar products, but including 0·5% HCN. Fox, [13] among others, employed thermal energy, the gases being passed through tubes at around 1,000°C and containing various packings; one was silica, another alumina, thereby attempting to reproduce hot earth conditions. Essentially similar yields were again obtained.

The writer has not seen adequate discussion in books and reviews on chemical evolution of the implications impinging on astronomy and geology. There is almost a suggestion that these sciences will and must (or must and will) conclude that this Earth once had a reducing primitive atmosphere. Calvin, [9] for example, after mentioning some, but not all of the difficulties, states "But, nevertheless, it would be a reducing atmosphere in spite of that."

The constraints placed upon these other sciences are that this Earth was once a cold body. Later it heated up so that much of the land mass was molten, and then it cooled down to its present, approximately equilibrium, condition. Such a primitive history is not obvious or readily explainable by astronomers and earth scientists. A possible mechanism would involve the heating

up of the Earth as a result of radio-active decay, particularly of uranium and potassium. Radiation breaks up molecules much more readily than it assists in assembling them. Thus the radiation cannot be considered conducive to chemical evolution from molecules formed in (possible) primitive atmospheres.

Another problem, not considered by prebiotic chemists, is the implications of hydrogen cyanide polymerisation. Various mechanisms have been proposed [14–17] whereby HCN may polymerise into various polypeptides and amino acids, but complete experimental proof is awaited; the last step in the proposed condensation to give adenine is, for example, yet to be experimentally established. [15] Two points seem to have escaped attention. First, the polymerisation of HCN is not quantitative and considerable quantities of cyanide would remain. Second, the stage at which cyanide formation would cease, to avoid the adverse effects of this material upon living matter, does not seem to have been evaluated. And a route for eliminating the extremely stable cyanide ion has been ignored ! (*Editorial addition.* Ferrous and ferric oxides and hydroxides must have been abundant on the primitive Earth, as they still are today. Hydrogen cyanide, if present, would soon have formed Prussian Blue, but this does not appear to be known as a mineral. If HCN was originally present in the atmosphere, such a mineral should be common in the early rocks.)

The Earth's atmosphere is now an oxidizing system and contains some 80% of nitrogen. Let us consider its impact on molecules probably (or possibly) formed in a reducing atmosphere. The nitrogen cycle, involving as it does the production of nitric acid by electric sparking, would have a deleterious effect if chemical evolution was not sufficiently advanced by the time the atmosphere had become oxidizing. It could be argued that the energy input required to form molecular building-blocks diminished as the atmosphere became oxidizing, i.e., the intensity of electrical storms and the radio-activity associated with heating the Earth were now subsiding. However, this implies that nitrogen was a late arrival in the Earth's atmosphere. When it did arrive is difficult to determine. Nitrogen is difficult to detect with the

astronomer's spectroscope and hence its abundance in the universe, and possible role in the formation of stars and planets, is not easy to assess. The American Mariner series of space shots to investigate Mars were needed to confirm that the light atmosphere on that planet was almost entirely nitrogen. This author has failed to find mention of primitive atmosphere experiments containing nitrogen gas. And if it were present, one could readily conclude that, because oxygen was present in water vapour, oxides of nitrogen, and hence nitric acid, would be formed. The effect of the nitrate ion upon the condensation reactions variously proposed [18] for obtaining macro-molecules has not been investigated; it is doubtful if it would be helpful.

In summary, then, on taking various processes in isolation, possible detailed steps appear to proceed readily, but an overall view reveals many problems. These have probably been considered by prebiotic chemists, but have not been published, either because they feel they are more in the province of the astronomer and earth scientist, or because it is realised that to discuss them weakens their case for chemical evolution. To argue or imply that others must find an explanation for the existence of reducing primitive atmospheres, because they consider that life could not arise of itself without this precursor, is improper and begs the question. Indeed, as we shall develop later, it would seem that, instead of life arising *per se*, pleas are being made for Special Chemistry.

Prebiotic Oceans

Many experiments have been carried out on solutions of products formed in (supposedly) prebiological-Earth atmosphere experiments. The idea is to look for further products that may have been formed from them in the prebiological oceans. Certain successes are not lacking. Seven of the amino acids present in proteins have been formed [19] by the action of uv radiation on solutions of formaldehyde, NH_4 Cl and NH_4NO_3 Ammonium cyanide solutions heated to 90°C have produced similar products. [20] Haldane [21] in his original article in 1929 described the chemicals

formed by primitive atmosphere experiments as accumulating until " the primitive oceans reached the consistency of hot thin soup ". This concept has unfortunately been retained by many: we have indicated above that the concentration of organic molecules, from primitive atmosphere experiments even at the surface, would be only a few per cent under optimum conditions, and then in the absence of any adverse conditions or chemicals.

A complicating factor that seems to have been overlooked is the salinity of these oceans: solution experiments are generally performed in water. The role of dissolved salts, and their buffer effects due to their being considerably in excess of, say, amino acids, has not been investigated in the formation of biopolymers. However, fresh water systems may have been involved.

All the four bases that occur in RNA (adenine, guanine, cystosine and uracil) have been formed in simple solution experiments. The remaining base of the nucleic acids, thymine, which occurs only in DNA, has not been synthesised under any plausible prebiological-Earth conditions: in making this statement Lemmon [22] includes the word ' yet '. He later remarks that the largest specifically identified unit from dilute aqueous solution studies has been a tetrapeptide (tetraglycine). He then develops a commonly proposed high temperature route to biopolymers; ocean waves depositing their solution of dissolved amino acids in pools at high tide where there is geothermal activity. Although by heating mixtures of dry amino acids protein-like polymers, called proteinoids, have been formed, [23, 24] most naturally hot regions are acidic, low pH, and not necessarily helpful to such reactions. If fresh-water conditions are subsequently shown to be required, then regular tidal action would be considerably reduced, and the conditions required for forming biopolymers would therefore become more Special.

Experimental findings are thus tending towards the need to involve the earth. Nucleic acids, for example, contain many phosphoric acid groups, and the present level of phosphorus in sea-water is low, ranging [23] with locality and depth from below 60 up to 85 mg/m^3, and averaging [24] 70 mg/m^3. In surface waters

almost half is in the form of organic phosphorus within plankton, [25] and in primitive oceans the inorganic phosphorus level would remain low as calcium phosphate is very insoluble, and the present (and presumably past) calcium concentration [24] is considerably in excess of that of phosphate, currently 0 · 4 g/1.

Horne [26] has recently concluded his book on Marine Chemistry with a somewhat emotional, yet in parts most perceptive, account of the origin and evolution of life in the seas. For example, he notes that 'the stones are not a temple; once in hand the building-blocks (amino acids, etc.) must be put together. How are the pieces brought together? The putting together of the pieces was a long, tedious, and delicate sequence and each step in the sequence was highly improbable. Fortunately, the time span allotted to the beginnings of life was exceedingly long, perhaps several billion years, so that the improbable was not necessarily the impossible. Biogenesis is pushed further into the realm of possibility if there were mechanisms operative for the concentration of the pieces and, in order to outrace the forces of dissolution, for the stabilization of the pieces and their combinations . . . the ancient seas were a very dilute broth . . . let us imagine, then, the proto-biological substances being absorbed on bubble surfaces, transported upwards to the sea's surface, and joined with other material absorbed there, then tossed by the waves and carried by the sea spray up on to the beaches and estuarine mud where, in the richer, warmer waters the pieces begin to react and then aggregates to grow.' He also states that 'while the details remain scarce and while many questions will remain unanswered for many years to come, perhaps forever, the answers to the principle questions now seem to be all at least foreshadowed; the principal conceptual barriers have already been breached.'

Here we see a typical example of an attempt to eradicate the presence and power of a Creatorial God. Statements like these can be so readily taken as 'proof' that the scientist has now achieved the break-through that sweeps away any need for a belief in God or His involvement in the universe: time allowed life to develop, and future time will provide the answer to the

question 'How ?' And should it not provide all the answers that will not be reason enough to abandon such belief. It is sad that such speculations, while showing original thinking in places, are so often based on earlier concepts that have not been borne out by experiment, for example, synonyms of the original description [21] of the primitive oceans by the evocative word 'soup' being still commonly employed.

Christians also are not blameless in this respect. The pictorial descriptions and some of the names of the Evil One, which are still with us, for example Lucifer, Son of the Morning, are based on mediæval imagery and dubious Scriptural interpretation. Christians working in the area of chemical evolution should consider the similarities in the faith exercised in the belief that life created itself with its ensuing "shibboleths", and the faith involved in Christianity, and attempt to bring them to their colleagues' attention. The special conditions, which are proving so elusive to find, must be placed alongside a God-ordered and God-ordained system.

Primitive Earth

The involvement of a liquid-solid interface is now considered crucial to the formation of biopolymers. The clay-water interface has received much attention. There are two features to be explained. First, the aggregation of simple organic molecules to more complex species, generally considered to be intermediates in the formation of nucleic acids and proteins, must be established. An explanation of the mechanisms involved would be helpful. Second, the advent of chirality. Chemical reactions obey the law of averages. Should a compound be formed, in the laboratory, which contains an asymmetric carbon atom, this compound will be obtained as a racemic mixture, with equal quantities of *d* and *l* forms. Living matter commonly employs one form, the *l* form in the case of amino acids.

"It must be admitted that the explanation of chirality still remains one of the most difficult parts of the structural aspects

of life to explain . . . This question of chirality, though admittedly unanswered, is certainly one of those that can be left over for further observation and experiment: the fact that we cannot solve it now is not sufficient reason for abandoning the search for physical-chemical theories for the origin of life", so said Bernal [27] in 1967. At that time it was generally assumed that chance decided on which stereochemical form life should be based, but the inherently difficult implication, that life arose from essentially one molecule, since no evidence for life forms using d-configurations had been found, was recognised. Some evidence to support Bernal's 'faith' has now been published. Degens, Matheja and Jackson [28] have reported the direct polymerisation of aspartic acid on the clay kaolinite and found that, over a given period of time, the l-form polymerised much more readily (25%) than the d-form, (3%). There are now a few similar papers. However, the roles of defect lattices and active sites in clays require further investigation before it can be concluded that the l-form is systematically favoured, and that the Earth brought forth life. The case for special reactions is still with us.

This is clearly brought out in a recent paper by Good [29] in which he examined the structural role of water, as influenced by clay surfaces, in the origin of life. He suggests that the hydrogel, the primitive biopolymer that subsequently becomes a dividing coacervate droplet, "is 'probed' and 'inspected' by the flickering, dynamic framework of the ever-changing water structure, and that confirmation was the price of survival." His conclusion "that life was not the result of a unique event of transcendental improbability, but was rather the inevitable consequence of the physics and chemistry of the formation of the earth" is no more than a re-statement of Bernal's provisional definition of life. [2]

Personalizing

In writing scientific articles one of the many traps which the author tries to avoid is personalizing the inanimate. For example, 'the reaction *preferred* the addition of X . . .' House custom

varies between journals and individual editors; some attempt to alter all such phrases while others remove the more humorous. This author has observed that writings on evolution and chemical evolution contain more examples than in, say, chemistry journals. The impression obtained is that molecules and cells are attributed properties of life-characteristics and self-determination, when intermediate stages are unknown, because the authors wished to avoid any suggestion of possible supernatural involvement. Further, unless they employed this technique their ability to postulate or describe related processes would be impaired, if not removed. Essentially they are employing a 'begging the question' approach. Admittedly there are occasions when such techniques improve the literary style, but an examination of the quotations already given in this essay exemplifies this point. This author has attempted to refrain from such devices, but no doubt some have crept in.

Erroneous Analogies

By imposing life-characteristics on the simpler chemical molecules the analogy is implied that the route to such molecules as DNA will be found by considering those mechanisms which would seem to follow this pattern. While it is reasonable to simplify a massive problem by selecting an approach which would seem valid and representative, and also would reduce the number of possible explanations to be considered, it is possible that certain lines of enquiry have been hampered in prebiotic chemistry by, perhaps subconsciously, restricting explanations to this programmed approach.

Further, the utilization of visual and mechanical analogies is not consistently helpful. Certainly very crude analogies, which on examination appear absurd, have helped many successful innovators; for example, Goodyear [30] maintained that since iron is improved by adding carbon, and leather by tanning, rubber also must be capable of being 'tanned'. Nevertheless the development of the cell through coacervate drops is considered by the present writer to be potentially fallacious and unhelpful.

The approach commonly adopted, for example by Calvin,[31] is to examine the membrane of a simple cell, its constituents and its properties, and then to look for simpler analogies. Small droplets can be made to come out of solution and have been observed to increase in size (personalized as 'grow') and divide into two ('reproduce'). Droplets containing polypeptides and polynucleotides having these properties have been studied in detail by the Russian biochemist, Oparin.[32, 33] They are termed coacervates and result when a solvent, usually water, contains two different macromolecular polymers that interact with the solvent, but do not interact well with each other. Phase separation occurs, one phase being dispersed within the other (continuous) one. The coacervate boundary is likened to a membrane structure, and certain properties typical of cell membranes have been obtained.[31–33] However, a simpler system, accessible to the chemist, is micelle formation. Many biologists have for a long time neglected to consider the role of the structure of water, particularly with regard to its involvement in the transport of ions across membranes. Recently the effects of solvent structure and added solutes on critical micelle concentration (c.m.c.) have been investigated. Below the c.m.c., molecules containing a hydrocarbon portion, usually a long straight chain having hydrophobic properties, and a charged portion, are unassociated in solution. Above the c.m.c. they coalesce into structures having the polar portion of the molecules at the surface. Other molecules will enter these structures — detergents are typical examples of micelle forming compounds. However, micelles may be destabilized by certain molecules, including urea, possibly by entering the micelle.[34]

It is therefore here suggested that the behaviour of the surfaces of micelles, and their interaction with structured water, be further investigated, in order to help understand the behaviour of coacervate drops and establish whether or not they are a required intermediate in the development towards cell membranes.

The Christian Faith is often communicated and explained by analogies, as in parables. The parables in the Scriptures are most illuminating and continual study reveals fresh truths.

Occasionally a dubious conclusion is reached, usually because one presses a story too far. Teachers are well aware that, should they select a poor analogy to convey a certain concept, the inapplicability of the model, in that it suggests obviously incorrect inferences when pressed too far, is one of the first points raised in discussion. The pupil has 'scored' off the teacher, and the original concept is obscured. The impact of the models and analogies used by prebiotic chemists upon the Christian Faith is first to imply that the coming together of atoms to give molecules, molecules to give polymers, polymers to give coacervates, and coacervates to give cells, was pre-ordained and self-determined by properties, arising from the various set energy levels, inherent in the atoms. That this is not (necessarily) so has been shown above. The Christian must also recognise that literary and artistic devices are used to convey this impression. The immanence of God is not diminished by these approaches.

Second, an unconscious case is being put forward for Special Chemistry. The more the subject of prebiotic chemistry is investigated with the object of finding the chemical pathway followed from primitive earth conditions to living things, the further away seems the solution. One advance here means several more questions yet to be answered satisfactorily. It is unlikely that these investigators will at some future date even begin to suggest that the 'finger of God' might be seen in the processes of chemical evolution. However, the onus is perhaps on the Christian to present the case that prebiotic chemists are essentially searching for the Special conditions that would allow life to emerge, and hence looking for the Special Chemistry involved. The parallels should be drawn with the concept of an immanent God guiding the process — to use an evolutionist's postulate, making the laws of wind and sea movement to coincide such that reacting amino acids in a tidal pool are not washed out before a vital step, say the advent of chirality, was completed. And the obvious parallel with the various concepts of Special Creation, defined as God being involved in the appearance of life on Earth, should be described. It is the writer's view that complementary views are emerging for the origin of life: Special Chemistry and Special Creation.

Some Final Remarks

In an essay of this nature it is necessary to be selective. Some possibilities for the origin of life are at present too speculative to merit prolonged attention. Was life on this planet deposited by visitors from another planet and how did their life form in turn arise? The role and necessity of trace elements for the functioning of living systems is a topic which in the future will demand attention, but probably not until the ability of a cell membrane to distinguish between ions of like charge, differing only slightly in their size and influence upon contiguous water molecules, e.g., sodium and potassium cations, has been adequately understood.

The day is probably coming when computer calculations and 'predictions' of reactions between large molecules will become feasible. Then there will be another surge of proclamations that calculations have shown the emergence of life to be inevitable. At the present time reasonably accurate *ab initio* calculations of energy levels are limited to systems containing about 50 electrons. Clementi *et al.* [35] have made an excursion into the biochemical field, but achieved disappointing results in a calculation on hydrogen bonding in a guanine-cytosine base-pair. Repeated computation and the processing of more than 2×10^9 electron repulsion integrals were required, and needed about 8 days on a 360/195 IBM computer. Expansive *ab initio* calculations do not automatically give sensible results: basis sets and parameter values must be chosen intelligently and even then the largest usable basis may be inadequate. [36]

In another early book, Job, we find 'The Lord said . . . Where wast thou when I laid the foundations of the earth? Declare if thou hast understanding' (Job 38 v. 4). This chapter, and the next three, describe an impressive research programme, including the subjects of earth science, astronomy, deep-sea research, space travel, meteorology, natural history and biology, and animal psychology, to name but the main ones. It is also suggested that while part of the research proposals God puts to Job can be resolved, some questions will remain unanswered,

the answers known only to God, but the search will be rewarding.

Finally, the writer has been impressed by the similarities between the approach to knowledge taken by many scientists, and John 10: 1–39. Those who seek God's wisdom, but not in the right way, are called thieves and robbers; some come even to destroy the author of Wisdom: this they seem to do, but cannot. When confronted with the evidence, like the Jews, they will not believe, and dismiss the claims with "He is mad; why listen to Him?" Some try to "cast stones", but when "they tried to arrest Him, He escaped from their hands" (RSV).

Abundant life (v. 10) is thus for the seeker after truth who acknowledges, in his seeking, the presence and power of God. The (indirect) attacks by prebiotic chemists upon the role of God in the appearance of life on this Earth cannot disprove His existence and involvement, but neither can any specific actions by God be identified. What can be said is: God is immanent; let the Earth bring forth.

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[*Editorial addition:* Attention is drawn to *The Origin and Development of Living Systems* by J. Brooks and G. Shaw, reviewed in this JOURNAL, **101**, 117.]

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DAVID LYON

Sociology and Secularization

Mr. David Lyon, who works in the Postgraduate School of Studies in Social Sciences, University of Bradford, traces the history of present attitudes in sociology. He looks into the antagonisms which have developed between world-views of Christians and sociologists respectively and makes suggestions about how Christians should act.

Is sociology a help or a hindrance to the Christian Faith? Some Christians shun it as a spawning ground for 'radical' cynics, while others envelop themselves in penitent sackcloth and ashes as they acknowledge social sin after social sin which sociology has exposed. These are curiously negative and yet contradictory attitudes to a widely accepted and crucially important academic discipline. There are probably several reasons for this state of affairs, with personal temperament and upbringing playing an important part. We shall concentrate here, however, on 'historical' factors which, in our current a-historical climate, are often misunderstood.

In an attempt to unravel some of the twisted threads, these reflections are based on a series of propositions, as follows: Church history apart, sociology is the area where one is most likely to encounter the concept of secularization. Sometimes (or at least implicitly), sociology appears as a 'good thing'. Sociology itself grew out of and still perpetuates a secularized world-view. Thus at certain points it is at presuppositional variance with a Christian position. Yet the weaks spots of

contemporary Christianity are often precisely those to which sociology can speak helpfully, and truly. An understanding of the biblical view of knowledge throws light on this apparent paradox, and informs a positive Christian attitude.

The concept of secularization has a variety of meanings. As David Martin has noted, it is often the tool of counter-religious ideologies; in particular Marxism, Optimistic Rationalism, and Existentialism.[1] Sociology has been influenced by all three. However, Bryan Wilson has a definition which is adequate here: "The process whereby (explicitly) religious thinking, practice, and institutions lose social significance."[2] From a Christian point of view, and using this definition, secularization could be seen both as a 'good' and a 'bad' thing. It is possible that religious traditions, maintained in the name of Christ, yet based on a distortion of Scripture, would be dropped in a time of secularization. An example of this might be the use of the idea of "Christian contentment" to divert Christians from engaging in Social reform. Equally likely, however, is the loss of some fundamental Christian insight, such as the notion of 'vocation' in work, to the detriment of society at large.

Thus Christians can conscientiously hold an ambivalent attitude towards secularization since, in the sense of our definition, it need not always be a bad thing. But we must explore the idea a little more if we are to have a fuller Christian understanding of secularization. I deliberately slipped the word 'explicitly' into Wilson's definition, in order to make this point. The consistent teaching of the Bible is that all men are religious in the sense that they feel bound to some ultimate concern, or seek a 'total' explanation of the cosmos, but that they are divided at root-level as to what their religion should be. Thus those who do not acknowledge and worship "the Immortal God" are said to have "exchanged the truth of God for a lie" and consequently "worship and serve created things rather than the Creator".[3] In other words, to leave the living God out of account is to have a fundamental imbalance and dislocation in one's thinking, and this must, logically, affect one's whole outlook. So to make our definition more precise, the secularization of

Western culture is the loss of social significance of (what was taken to be) Christian thinking, practice, and institutions. If we are to take the biblical teaching seriously, we must understand that these have been 'replaced' by secular religion; the 'truth', we recall, is 'exchanged for a lie'. This, of course, need not take a traditionally 'religious', or cultic form, and, given our current pluralism and lack of direction, is likely to be only inconsistently and implicitly held and practised.

Although it is likely that men have always been socially self-conscious, and this is very evident in the writing of, for example, Amos or Plato, sociology as a discipline in its own right, is a relatively recent phenomenon. The modern discipline emerged during the period of decisive secularization of thought in the late nineteenth century. The history of the 'classical sociologists' demonstrates this thesis, namely that the sociological perspective grew out of non-Christian thought. But we must pause and ask ourselves exactly what we mean by this. Is it either fair or useful to make this kind of differentiation between Christian and non-Christian thought, in the area of sociology?

Following the Apostle Paul's teaching in his letter to the church at Rome, we must argue that a man's 'world-view' is always rooted in a religious orientation directed to, or away from, God. In a 'world-view' is included one's definition of reality and purpose, and some prescriptions of behaviour. Moreover, conceptual frameworks, within which the thinker (in this case the sociologist) works, are informed by his world-view, and so they, too, must be directed towards or away from God. That rather clinical description may be logical enough: in practice, however, things are not so clear-cut. Still in chapter one of *Romans*, Paul writes that all men know God in a limited sense (v. 19) but that they deliberately suppress the truth that they know (v. 18). This means that the non-Christian sociologist may have true knowledge of social reality, but lacks the God-given perspective from which to interpret that reality. He may, for example, 'observe' the demise of the so-called 'extended family',[5] but imply in his 'observation' a denial that there are any 'extended family' responsibilities. And it is futile to claim, when every

existing sociological category is value-loaded, and sociological 'findings' are often used for social welfare and reform, that the sociologist has nothing to say about 'responsibilities'. Sociology should be accepted in its own right, and with its distinctive categories. Sociologists do not need to pretend it is either a precise science or an 'art' in the sense of classical humanities. But we shall come to that later.

But are we suggesting that the Christian sociologist is somehow 'superior' to his non-Christian counterpart? Far from it! Although his premises may be consonant with Scripture, he can only 'know in part'[6] while he is here, because his faculties are still affected by the warping action of sin.[7] That is certainly no basis for academic arrogance! The Christian does, however, refer to God as his ultimate source of authority, whereas the non-Christian cannot do this. Instead, the unbelieving sociologist will often claim an unwarranted authority to suggest what 'ought' to be in society. This is not always explicit. What most frequently happens is that the sociologist defines the area which may be discussed, thus precluding consideration of topics which the Christian may deem indispensable. In that way, an aura of authority may be given to sociological utterances which, incidentally, gives weight to the idea that sociology itself can become a 'religious' world-view. So Peter Worsley, reviewing a sociological 'reader', claims that the editor's view rests "on the elitist notion of sociology as a (the?) science which will bring an 'international community of the wise' into being".[8]

The idea of sociology as a 'religious way of life' also appears in a recent article in the *British Journal of Sociology*.[9] This fascinating speculation by R. J. Martin describes the 'cultic aspects of sociology' in an illuminating way. His contention is that sociological orientations have been viewed as 'ways of knowing' rather than 'ways of life', but that in fact much light can be thrown on the sociological pursuit by seeing it as an occupation. More specifically, speaking of it as a 'religious occupation', he notices that sociology exhibits certain features including piety ('the sense of what properly goes with

what'), mystique ('unrecognised knowledge', that is, 'implicit presuppositions'), prayer, and even conversion. By 'prayer', he understands the means of conveying the mystique ('professional conversations, specific methodological technique'), and by 'conversion', being 'born again' into a new perception of mystique. Even taken with the proverbial pinch of salt, there is much to reflect upon in these parallel pictures! One might add a comment of Professor Andreski on the sociologist as holy man, or preacher. He points out that these latter-day prophets, while they possess the psychological make-up of the dogmatic preacher, are all too often lacking in what used to be a basic requirement of a prophet — a moral code.[10a] And this fits well with the thesis outlined here: that a crucial aspect of the history of sociology is its emergence during a period of secularization, when the whole basis of thought and ethics was being radically questioned.

Both the biblical witness, and sociological self-consciousness, then, suggest that there could be religious aspects of sociology, and that sociology can be seen as a secularized world-view. We shall now take a look at some of the historical origins of one or two pioneers in sociology, and see whether they offer corroboration of what we have discussed so far.

Secularization and 'classical' sociology

To say that knowledge in modern societies is incomparably more 'secular' than in previous periods is to utter a truism, but it is still instructive to probe this statement in search of deeper meaning. Those who would remind us of the more 'secular' state of knowledge and science may imagine that science is now somehow 'a-religious', having dispensed with all metaphysical assumptions. Susan Budd, however, has remarked that:

> Most people now trust and believe in 'science' without understanding in the same way that they might once have assumed that 'religion can explain it' or 'god must have had a reason'. They believe in the superior powers of science in part because it *has* enabled men

> to control the world, but in part because of a myth in our culture about the power of science which is socially supported in much the same way as for example, witchcraft is for the Azande, and part of the myth is about the clash between religion and science which was resolved in favour of science. [10b]

This latter myth of which she speaks had its origin at the same time as sociology began as a serious self-conscious discipline. Moreover, we can see that sociology grew up in a mutually-supportive relationship with the 'science-victory' myth.

The 'religion-science' clash, as far as we are concerned with it here (that is, in the context of the secularization of knowledge) took place in the last third of the nineteenth century. Secularization of values and social structures had been steadily increasing throughout the rapidly industrializing Victorian era, but it was not until the 1870's that thought became openly and decisively secular. There was dissatisfaction with much religious (that is 'church') life the objectives of which seemed irrelevant to urbanized industrial life. Moreover Christian cosmogony seemed sterile in comparison with the new evolutionary ideas which had made such an impact since Darwin. Theologians and churchmen seemed to suffer some kind of nerve-failure when, at the same time, assaults came from another quarter — that of the (German) 'higher critical school'. There was, indeed, a real 'crisis of faith' as Christianity was apparently beleaguered from without and corroded from within.

The main issues that emerged in earnest public debate, crudely simplified, may be touched upon here. The great question was "If supernatural religion is false, then what will replace it?", and, following from this, others: "What, then, is the basis of science?" and "What is the basis of morality?". These very questions were reflected in the history of early sociology, which was not simply concerned with religion as a feature of social life (although this was obviously a central issue with Marx, Comte, Weber, Durkheim *et al*), but rather as something intrinsic to the human condition — something 'necessary'. When discredited in one form, religion needed a surrogate. As Roland

Robertson, a sociologist of religion, writes: "The idea that sociologists of this period dealt in *religious* issues arises because they sought to replace a conventional-Christian position by another position".[11] This idea of sociologists trying to replace religion is one that is very often ignored today, but it is one that must be remembered if we are to understand the relationship between secularization and what I am calling 'classical' sociology. Linked with this was the attempt to establish a 'religionless morality', in which, once again, sociology had a part to play. It will suffice here to point out that the disciplines that we would describe collectively today as 'social sciences' were, more often than not, known as 'moral sciences' at the end of the nineteenth century.

Perhaps the thought of Marx and Comte is the most readily susceptible to an 'alternative religion' analysis, and much work has, of course, been devoted to this theme. Seeing them as 'founding fathers' of sociology, however, commentators tend to concentrate on their social 'scientific' work at the expense of their 'religious' outlooks, thus artificially isolating them from their nineteenth century setting. There is, though, a sense in which both their 'systems' were based on their 'religions'. Comte's opponents mocked his 'Religion of Humanity', in which mankind replaced God as the object of worship, and said that it was simply "Catholicism minus Christianity". Comte maintained that, on the contrary, it was "Christianity plus Science", meaning that it was a 'scientific religion'. Comte's 'god' was the 'Great Being', or in other words, all who have in the past laboured for the improvement of mankind. He sought, in his sociology, to realise his ideal society in which industry would be triumphant, all would have opportunity for mental development and for work, and wars and internal revolutions would cease. His sociology was, then, a doctrine of progress, "a secularized successor to theology as the mistress of the sciences."[12] One can see how false it is, therefore, to separate Comte's sociology and his religion. The two are interdependent.

With Marx, on the other hand, the issue has been somewhat clouded by a century of debate over 'what he really said', and the more obvious political repercussions of his thought. Marx

the social scientist undoubtedly rejected the possibility of supernatural religion as such, as well as the specific institutional forms that he encountered, but remained preoccupied with precisely the kinds of questions raised by a religious commitment for the rest of his life. His sociology, (although he probably did not call it that) was an all-embracing system of life, with an assumed 'ideal' man and an assumed 'ideal' society. This he called 'human' or 'communist' society. As his system offered a 'total' explanation of the world's events, and a 'hope' for the future, it is not surprising that it has been called a "messianic religion". [13] This sociology was (albeit unconsciously) designed to compensate for the rejection of traditional religious forms. Once again, the 'social science' cannot properly be divorced from the 'religion'.

But there is another, perhaps more neglected, founding father of sociology, to whom I shall draw attention, namely, Herbert Spencer. Comte's sociology had been noticed and taught by several devoted followers since the mid-nineteenth century, even though Comte himself remained a nationalistic Frenchman. Marx's sociology was not appreciated in England until at the earliest the pre-First World War period, though he received more attention in the 1930's. Spencer, on the other hand, was the first English-speaking person of any consequence to use the word 'sociology' to describe his work, and his influence is far greater than is commonly acknowledged in undergraduate textbooks. [14] The major sociological school known variously as 'functionalism' or 'structural functionalism' owes much of its methodological direction to Spencer. [15] He was certainly well known during his lifetime in Victorian England, and other famous contemporaries had a high opinion of his work. His system, however, was soon dismissed as an irrelevant dogma of a passing age.

Spencer's work, as in the other examples, represents a rejection of Christianity. He was born into a family which, though Nonconformist in name, had departed from the faith of the fathers. His own father travelled the road from Evangelicalism, through Quakerism, to unbelief. In an essay entitled "The genesis of of science", written in 1854, Herbert Spencer simply dismissed

" every metaphysical doctrine at variance with ordinary credence ". By the 1860's he had been welcomed as a co-fighter against the so-called ' theological party '. T. H. Huxley (Darwin's ' bulldog ') wrote to him, likening his own work to hemp-yarn and Spencer's to rope: " Work away, then, excellent ropemaker, and make us more ropes to hold on against the devil and his parsons ". [16] When he published his *First Principles* in 1862, it was seen both by himself and the public as a contribution to the religious controversy which had become public in 1859 with the publication of Darwin's *Origin of Species* and Mansel's *Limits of Religious Thought.*

The conclusions reached in the *First Principles* were foundational for his later work (including *The Study of Sociology* and *The Principles of Sociology*) which was published in the 1870's. Spencer contended that an incomprehensible God could not be the object of rational discourse, and that reason could only deal with things finite and relative. On these grounds, however, he then denied the reality of supernatural religion or the possibility of a self-revealing God, thus making ' reason ' the final arbiter, and ruling out discussion of those kinds of religious issues by definition. Thus ' religion ' was placed beyond rational defence and criticism, and became an ostensibly ' taboo ' subject in sociology, as far as its veracity was concerned. But Spencer could not ignore the manifestations of religious life in society, and recognised that there must be some ' need ' for religion in man. He therefore gave it a pragmatic defence, much in the style of William James. Although he held that all dogmatic religious positions (atheism, theism, and pantheism) are inconsistent and unacceptable, he did think that beyond phenomena there is an " Unknowable Power ". But again by definition, the Unknowable neither communicated or related in any way to mankind. Spencer's own system of thought was therefore quite closed.

The key to an understanding of Spencer's work is the idea of evolution " by which he meant the process of increasing differentiation (that is to say, specialization of functions) and integration (by which he meant mutual interdependence of the structurally differentiated functions)." [17] In other words, he saw

society as an organism, with its social structure arising from its social functions. His *Principles of Sociology* is largely taken up with the increasing specialization of functions and the accompanying differentiation of structures which characterise "cultural evolution". But behind all this apparently solid 'scientific' jargon, there was an undeniable metaphysical (or 'religious') belief in the mysterious force guiding cultural evolution in a progressive direction. A quotation from the *First Principles* makes this clear:

> Based as the life of a society is on the animals and vegetal products and dependent as these are on the light and heat of the sun, it follows that the changes wrought by men as socially organized, are effects of forces having a common origin with those which produce all the other orders of change . . . to this same reservoir are traceable those subtler and more complex manifestations of energy which humanity as socially embodied, evolves. [18]

Thus Spencer built into his work certain assumptions which are antithetical to Christian ones. A whole system of social thought was erected on this foundation which, especially in the hands of American sociologists, went under the name of 'science'.

Those indebted to Spencer include Durkheim, Malinowski, Radcliffe-Brown, Merton, Talcott-Parsons, and a host of others. They have perpetuated his views — always with the underlying (sometimes implicit) non-Christian assumptions. The sociologists of the 1940's, in particular, used a version of Spencer's functionalism as an analytical tool and produced the famous 'grand theories' of society which are under attack today. The notion of a 'value-neutral' science of society is now scornfully denounced as 'scientism'. This is hardly to be wondered at, as this so-called sociology managed, in the 1940's and 1950's, to turn its back on the most pressing issues of the age in the name of 'science'. (An American sociologist has shown that, in the heyday of structural-functionalism and 'scientific' sociology the lowest ebb of interest in race coincided with the greatest

intensification of black agitation for equality.[19]) Disenchantment with the scientistic attitude, which stemmed partly from Spencer's system, has led to the contemporary (much-publicised) crisis of Western sociology. It would be a mistake, though, to underestimate Spencer's (indirect) influence on modern sociology, as scientism and progressive evolutionism are still conspicuous features of the subject as taught in our universities. Often, however, they are so 'taken-for-granted' that sociologists may be quite unaware of their implicit beliefs.

There is little point in trying to build an argument on the sandy foundation of an individual case but, as I have shown, Spencer was an important figure in the development of modern sociology. Along with others, he contributed to an unchristian consensus of social thought. This was opposed by various groups who argued for a 'Christian sociology' at different times from the late nineteenth century on,[20] but the dominant consensus has always tried to be 'a-Christian', or 'a-religious'.

So we have argued that modern sociology grew out of a secularized world-view, and that, mainly by restricting the area of discourse, it has perpetuated elements of that world-view. The so-called 'science of society' is always rooted in some metaphysical assumptions (such as the innate goodness of man, or the inevitability of progress) which have to be accepted by some kind of intuitive faith. Arising in a climate which was opposed to biblical Christianity, sociology has developed a distinct position apart from Christian assumptions. This sociology, in time, claimed to be able to predict what would happen to society, given certain conditions, and to provide a basis for social action. Thus, as sociology (or 'moral philosophy' or 'moral science' as it was often known at first) was taught, and found practical outlet in social work, education, and so on, the non-Christian world-view which produced it was disseminated into diverse areas of society.

Sociological and Christian world-views

The sociological outlook can be seen as a 'world-view'. We

have already glanced at this kind of idea in Martin's ' sociology as cultic occupation '. Subjectively, one can understand that it is a ' world-view ' to some by undertaking a course in sociology. Once equipped with the ' sociological imagination ', it is extremely difficult to remember how one saw the world previous to sociological enlightenment. It is often presented very convincingly as a total explanation of the way society functions, and, moreover, why it functions in a particular way. As a world-view, sociology does present a challenge to the Christian faith.

Although it is possible to speak both of Christian and sociological world-views, it would also be fair to say that, at the present time, both world-views, as such, are in a state of disarray. One does not have to look very far to see that there are serious anxieties both within the ranks of those who call themselves Christians, and those who call themselves sociologists. (To say nothing of those who would dare to be both !) There is a mutual uncertainty and insecurity, as both seem unsure of their own, and the other's status and authority. A Christian, for example, may complain of the sociologist's ' obsession ' with the connection between environment and action, [21] and the sociologist may make oblique swipes at the Christian in statements like: " Sociology is concerned with studying the nature of social systems, not with passing moral judgments about what it finds." [22] Why is this ? We shall try to understand, in a simplified way, some of the causes of crisis in sociology in general, and in Christianity specifically as it is affected by sociology.

Sociology is uncertain about the right means to acquire its knowledge. Steven Box, introducing the reader to his book, [23] openly admits that sociologists " either collect facts and never get round to relating these to theories, or, like me, they start with theoretical perspectives and then attempt to illustrate them." This really sums up the situation. It is, of course, a ' youthful ' discipline, although it is popular all over the world. It has struggled to gain acceptance in the face of opposition from those who would dismiss it as an elaboration of the patently obvious, or on the other hand as a form of blueprint for totalitarian manipulation. It has been dogged since its classical days with

a debate as to whether or not it is a science and this identity crisis has yielded much confusion. Nowadays, far from there being any one single entity which is recognisably 'sociology', there are numerous 'sociologies', all growing from different ideological soils.

Sociology also lacks a 'mandate'. The physical sciences can be thought of as attempts to control and channel nature, but the use of this concept produces difficulties if applied to sociology ! If this parallel were made, sociology would be expected to provide guidance for society, that is, in a sort of 'priestly' role.[24] With sociology in its present state, at least, this alignment with the 'powers-that-be' would be nothing short of a nightmare. Yet numerous sociologists still hanker after this kind of role.[25] Maybe this is not such a bad thing, in the sense that they thereby recognise the need for a coherent set of shared values and norms as prerequisites for a stable society, but while they both veil their own values and norms, and disregard a Christian world-view, there can be little hope for the utility of this form of social science. It has been shown, too, that even those who claim to take sides with the underdog, the underprivileged, apparently making a clear value-stance, may in fact be supporting an 'Establishment' sociology.[26] And an 'Establishment' sociology, which justifies a paternalistic welfare-state control agency, is also inimical to Christian belief.

In short, the questions of the nature and uses of sociology are still bugging its practitioners in a critical way. Very often, the subject matter of sociology (society !) is lost sight of in a maze of new 'approaches', to the confusion and frustration of both those 'inside', and 'outside'. But we shall leave sociology for a moment, and glance at the reaction of some Christians to the rise of the sociological perspective.

As already suggested, many Christians are profoundly suspicious of sociology, and especially its popular image which has percolated down through the popular Christian press. This may be due to the apparent threat of sociology's uncovering unintended consequences of particular teachings, or, more likely,

the link between sociology and socialism, of which the latter is often rejected without consideration. It is true, anyway, that what Peter Berger calls the "debunking motif" of sociology enjoys a successful career of unsettling Bible-believers. Sociology is seen (often justly) as an attempt to explain away religious belief and practice in terms of its socially integrating function, or as ideology. The 'ideology' is not likely to be 'designed', but rather to emerge in a muddled way, and then subsequently to function to maintain the status quo. No wonder the sociological perspective is intimidating to the Christian undergraduate, and so many professing Christians either drop out of sociology courses or else become disillusioned with their faith.

The real trouble, from the Christian point of view, is that no one seems to have any answers. Frequently basing what they think on second-hand information, the Christians have only an oddly unbalanced view of the true nature of the sociological 'explanation', and no hint of a 'Christian attitude'. But why are there 'no answers'? I believe that the answer can be found back in our look at nineteenth century secularization. The paucity of Christian dialogue with non-Christian thought has an embarrassingly long history. 'Liberal' thinkers put Evangelicals to shame here. Whether 'Christian Socialists' or 'Incarnational theologians' they have at least attempted to apply 'Christian minds' to the problems of social life and sociological theory. 'Social gospels' and 'secular cities' are motes to be removed from the eyes of others after the beam of insulated uninvolvement has been shifted from the Evangelical eye.

We have already touched on the 'myth' of the 'victory' of science in the religion-science clash of mid-Victorian England; we shall now explore the idea a little further. The myth, (or, more accurately, fiction) is simply that faith was annihilated, and that, in compensation, science would be able (eventually) to answer all human questions. (The latter half of the myth is perpetuated by the *Reader's Digest* and *Time-Life* mentality.) What actually happened was that there was a 'victory' (in the educated periodical press at least), but the scientific coup was executed without Christians fully realizing what was happening. The

church, as such, was still happily worshipping (the period was one of expansion and church-building in many denominations), but was blind to cultural movements outside her doors. Hardly anyone realized that some assumptions of the Christian Faith had been undermined and replaced by the kind of naturalistic 'closed systems' that characterised new disciplines such as sociology and psychology. The real tragedy was that nobody noticed what was going on at this deep and fundamental level until it was too late, and dazed articles like "What has happened to original sin?" began to appear in the Victorian periodical press. [27]

Of course, there were eruptions of unbelief which Christians tried to counter in debate, but all too often the debates were between those who had completely abandoned their 'faith' and others who held to a creed which had been drained of any kind of Christian-biblical content. Thus unbelievers were never faced with serious opposition. Either their antagonists had retained their 'Christianity' for sentimental reasons, and were quite happy to drop any beliefs which appeared to conflict with 'scientific' findings, or else they were so bound up with 'church' life and issues that they had no weapons with which to fight. These latter had no grasp of the crucial biblical assumptions necessary to understand the situation and resist 'unbelief', and so the 'victory' was largely by default. [28] There was a 'crisis of faith' for many Victorians, but the actual battles that raged tended to be between 'liberals and conservatives' within the church, or 'agnostics and vague theists' outside. Among those Christians, in other words, who still claimed to hold to Evangelical or Reformed Christian belief there was a lack of cultural awareness, intellectual engagement, and social understanding. Hardly anyone was contending for the Faith from a Christian world-view stance. [29]

In spite of the assertions of sociologists such as Comte or Spencer, that civilization had progressed beyond the religious or theological stage in its evolutionary development, religion proved to be a resilient factor in social life. Indeed, sociologists Weber and Durkheim, and later Troeltsch [30] found religious life to be

one of the most fruitful sources for social inquiry. The 'Christian world-view' which they 'observed' was not, however, one of which most Christians would be particularly proud! Nevertheless, it is instructive for Christians to see exactly what sort of 'public image' they have.

Nowadays, both Christianity and sociology seem to be accepting each other's presence uneasily. Sociology still finds that it must accommodate religion within its scope (the sociology of religion is a fast-growing industry), and there is always a new book or article appearing on "the persistence of religion" or on some aspect of religious behaviour.[31] Christians, too, are taking note of developments in sociology, often in a genuine attempt to come to terms with the position of the church in its contemporary urban-industrial setting. The Bishop of Liverpool, David Sheppard, has recently published his *Built as a City*,[32] which deals with the city church. John Benington previously produced *Culture, Class and Christian Belief*,[33] which is a brave attempt to relate sociological insight to working-class evangelism, but which, sadly, ends with a very muddled 'Christian belief'. But these are only isolated efforts, and neither gets much nearer to a radical solution to the paradox outlined at the beginning of this essay. The paradox is that sociology is often built on an 'unchristian' basis, or at least that it precludes discussion of issues which Christians would wish to include within the scope of sociology, and so can be a 'secularized world-view'; and on the other hand that Christianity is blind to certain sociological issues, and needs a biblically-directed world-view.

Balaam's sociological ass

The story of Balaam's ass provides an example of a parallel situation to help us out of the dilemma posed by a sociology which needs Christian insight, and a Christianity which needs sociological understanding. Balaam, like that other reluctant worthy, Jonah, needed a hefty jolt from an unexpected quarter before he complied with the wishes of God. He was too easily persuaded to compromise God's message, when he should have

known better. It took a heated conversation with his ass, a most improbable advisor, to bring him to his senses. As a result, God's directives were clearly and unequivocally spelt out. [34a] Now, while we must recognise that the sociological 'world-view' has a different presuppositional base from a Christian 'world-view', it may, nevertheless, have a 'prophetic' role *vis-à-vis* the church, like the ass. We may not be expecting a challenge from godless sociology, but there may well be something in sociology of which Christians should take heed. This comes, I suggest, on two levels, which are inter-related. These are what we shall call 'evangelism' and 'world-view'. The former has to do with the theology of redemption, and the latter, with creation and providence. [34b]

This is not the place to give details of how sociology 'speaks' to contemporary Christianity, so we shall limit ourselves to one or two examples. Just to touch on 'evangelism' first of all, perhaps the most obvious use of sociology is in the area of language. If Christians are truly to "hold out the word of life" to our "crooked and depraved generation", [35] then we must hold out words that our generation understands. There is no communication between two people who understand the same basic term in different ways. [36] Some 'evangelism' may therefore be missing the mark altogether. This inevitably spills over into analysis of class. Is the class language or attitude of the local church preventing certain sections of the population from ever crossing the threshold ? This is the kind of issue that is poignantly raised by the sociological study of evangelism. [33, 36, 37]

Closely related to evangelism, but in a sense 'following' from it, is the question of world-views. Involved in this is the Christian understanding of society, social relations, and social institutions. There may be some confusion at this point, simply because Christians have been content for so long to allow non-Christian assumptions social dominance by default that we have forgotten what it is to exercise the 'mind of Christ'. [38] To give an example, then. Our culture puts a tremendous emphasis on 'economic growth', and values this more than any other end. The social consequences of valuing economic growth instead of (surely fundamentally Christian) economic stewardship have beeu

disastrously inhuman. But apparently no Christian voices have been raised against the social evils of economic growth, and no Christians have developed a socially human theory of economic stewardship, let alone put it into practice.[39, 40] In saying this, we have moved from sociology 'speaking' to Christians, to Christians 'speaking' to sociology, but this is only to be expected. The Christian who is a sociologist studying some aspect of the social consequences of an 'economic growth' - directed policy should inevitably come to question the very notion of economic growth, and to look for radical alternatives. (That is, alternatives which are consistent with his Christian 'roots'.)

Examples could be multiplied. We desperately need a biblically-informed theory of social change, one which can cope with a constantly moving society, unencumbered with static notions of society. We need to examine institutions such as the so-called 'Welfare State' to see whether they have in fact ameliorated social life, or whether the main effect has been an erosion of real social responsibility. The idea of 'community' is enjoying a vogue in Christian as well as non-Christian circles, but what is a community? Is it a notion which can be justified on biblical grounds, and if so, is its manifestation primarily geographical or attitudinal? It is sociology which raises these kinds of questions, but who is to answer them? Unless Christians speak up on these issues, words like stewardship, responsibility (or duty), love, and forgiveness are not likely to feature in the sociology of the future.

We might go further, however, and argue that the sociological perspective may be reminding us about the very nature of man, the 'Christian view' of which has been compromised for so long with Humanistic individualism. If the 'image of God' has so much to do with our 'common humanity', as the Dutch theologian G. C. Berkouwer suggests, then this should have an extensive influence on our sociological thinking. He writes:

> When God in his grace preserves man's humanness from demonization, from complete disintegration in mutual enmity, He does this in the relationships of society.

> It is and remains one of the most striking features of the actuality of fallen man that we see relationships between man and fellow-man function in the midst of the corrupting power of sin, which certainly is directed especially against society and against my feeling of responsibility towards the other. Cf. Cain's question, "Am I my brother's keeper?" (Genesis 4: 9). This social sense is not a superadditum, but pertains according to God's intention to the most essential components of humanness. [41]

Sociology, if Berkouwer is right, becomes the study of God's Providence, or his 'Common Grace', working through social relationships, and of the effect of sin on those relationships. And 'prescriptive' sociology becomes the recommendation of biblically-informed ways of preserving certain social relationships in order that man's life may be more human.

Conclusion

We have argued, then, that current sociological thought is often at presuppositional variance with a Christian world-view. However, the 'Christian world-view' is seldom seriously worked out, with the result that attitudes to sociology are varied and confused. Hence the need for Christians to understand the social implications of Christian belief, and develop 'Christian minds' in the area of sociology. It is not the study of sociology that is to be avoided, but rather the unthinking acceptance of certain sociological axioms which are inconsistent with Christian belief. (Such are cultural relativism in family studies and the the idea of 'ethical neutrality' in social research.) Man, we have shown, suppresses truth that is nevertheless there, and some truth often finds its way into sociological theory and description. Christians must humbly acknowledge this fact, while also working to inform their own sociological position with Christian insights. Sociology need no longer be a vehicle of secularization (understood now as a 'bad' thing); rather, Christians could develop sociological thought which harmonises with biblical teaching. This applies mainly in the area of

'Common Grace' or 'Creation theology', but has implications, obviously, for direct 'evangelism' in which the local church is perennially engaged. Sociology, therefore, although at first sight it may not appear to be 'prophetic',[42] has much to say to modern Christianity. Christians must listen and react appropriately. Remember Balaam! Simply clobbering the ass will get us nowhere.

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19. Simpson, cited in Freidrich's, *A Sociology of Sociology*, Free Press, 1970, p. 72.
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24. For a discussion of the 'prophetic' and 'priestly' mode in sociology, see 19.
25. e.g. A. Etzioni in *The Active Society* and in Rex, see above, note 6.
26. c.f. A. Gouldner's critique of Becker in "The sociologist as partisan" in *For Sociology*, Allen Lane, 1973.

27. J. Hogarth, "What has happened to original sin?" *MacMillan's Magazine*, Oct. 1880.
28. A Christian in the 1860's, for example, stood up in a public meeting, and said: "The Bible teaches us nothing about science. It was not written to teach us science. It was sent to appeal to our affections, not to our intellectual nature." From this JOURNAL, 1866, **1**, 206.
29. There are exceptions to this of course. I have been trying to sketch only the general picture here. J. Reddie, founder of the VICTORIA INSTITUTE, seemed to have a 'Christian world-view' position. Men like Muller, Shaftesbury, and Spurgeon showed considerable Christian social awareness. And there were several non-Evangelicals who saw the issues very clearly, and tried to work out their own answers.
30. E. Troeltsch, *The Social Teaching of the Christian Churches*, 1931.
31. e.g. A. Greely, *The Persistence of Religion*, S.C.M., 1973, or Pickering, "The persistence of rites of passage" *B.J.S.* March 1974.
32. D. Sheppard, *Built as a City*, Hodder, 1974.
33. J. Benington, *Culture, Class, and Christian Belief*, Scripture Union, 1973.
34. (a) *Numbers* 22–24; (b) "This must not be understood as an advocacy of a sacred/secular dualism which is, of course, inimical to the whole tenor of this essay. Biblically, the two 'levels' cannot be separated, but recent confusion over phrases like 'the redemption of society' makes a distinction between talk of individual rebirth and social-structural renewal necessary."
35. *Philippians* 2: 15–16 (N.I.V.).
36. This is brought out in chapter 4 of D. Moberg, *The Great Reversal*, S.U., 1973.
37. J. A. Walter, "The Class-bound church", *Christian Graduate*, June 1973.
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39. E. Schumacher, *Small is Beautiful*, Blond & Blond 1973, (Abacus 1974), highlights several important issues of which Christians should take note.
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Reviews

R. C. Zaehner, *Our Savage God*, Collins, 1974, 319 pp., £3·50.

The late Professor Zaehner (he died 24 November, 1974) was a leading authority on comparative religion. He wrote this book, he says, to show that the murders committed by Charles Manson and his accomplices in the Californian desert in 1968 – 9 were the logical outcome of an 'enlightenment' akin to that of the Buddha. This explains, he says, Manson's 'holy indifference' to right and wrong and his diabolical insensitivity to the sufferings of others.

In evidence Zaehner draws attention to (1) a possible 'enlightenment' of Manson when he was exhausted and near death in the desert; (2) a possible absorption by Manson of Hindu ideas through his (limited ?) association with the Solar Lodge of OTO (Ordo Templis Orientalis) to which Aleister Crowley (see this **JOURNAL, 100**, 223) and Aldous Huxley had belonged; (3) a similarity between a few of Manson's remarks on the one hand and quotations from Crowley and Hindu writings on the other. (CM, "There is no good, there is no evil"; AC, "There is no good. Evil is good"; the "beyond good and evil" teaching in the Upanishads, etc.)

A further contention is that Manson read the Bible which poisoned his mind (!). Again, the evidence for Manson's bible reading proclivity is slender. Two quotations or near quotations, one about not judging and the other, quite out of context, about not repenting of murders (Revelation 9: 21) are assumed to prove the point. Like Alex in Anthony Burgess's *Clockwork Orange*, thinks Zaehner, Manson must have enjoyed everything nasty he could find in the OT but passed over "the all preachy talk".

For all its scholarship this is a sad book. Rebelling against a spineless public school religion Zaehner turned RC in 1946.

He remained in the RC church to the end but became increasingly unorthodox. The woman of Revelation is the RC church, he claimed — the adulterous bride of Christ. In this book he speaks of Mary, mother of Jesus, as a " silly little Jewish girl " and of " my mother the not-so-holy church ". Some passages suggest that he was hanging on to Christianity quite desperately, as to a straw. His reading of the OT did not differ greatly from that of Alex — hence the book's title, " Our Savage God ". Largely, though not entirely, he ignores the tender side of Jehovah's nature. He does not tell us if he thinks Jesus thought of God as savage.

The gist of what Zaehner says is that, even if to our way of thinking, God is not fair, or even just, we must accept Him. Clay does not argue with the potter. Fair enough: but this makes the choice of the word ' savage ' all the more objectionable. For ' savage ' is an emotive word: it implies judgment — the very judgment which, according to Zaehner, man has no right to use against his Maker.

Why did Dr. Zaehner write this book ? Did Manson matter to him ? Hardly. Manson is the peg on which the author displays his own opinions — and his erudition. The book is (or seems to be) propaganda for the following views. (1) That oriental religion (" perennial philosophy "), because it denies involvement, obliterates the distinction between right and wrong ; (2) that the private reading of the Bible, the " bloody book ", is dangerous and undesirable (hardly up-to-date RC teaching !) ; (3) that the Western world is a clockwork orange society in which efficiency is rated god-like and man is dehumanized. These themes recur again and again ; the cases for (1) and (3) are well put.

Zaehner's enthusiasm leads him to uncritical and absurdly exaggerated statements. Doctors who practice abortion are more guilty than Manson who murdered a woman with child ; Manson is defended and even put on a par with our Lord ; a whole chapter is devoted to proving that bees are divine ; Aristotle is here an intellectual and spiritual hero. Yet despite all there is much of value here and much to make one think. There are

interesting asides (e.g. a very readable account of Aristotle's views) not often encountered in books. Also the author manages to impart his feeling of disgust at the anti-Christian turn the Western world has taken in a manner which makes an indellible impression.

I. G. Barbour, *Myths, Models and Paradigms*, SCM Press, 1974, £2·95.

Dr. Barbour's skill in simplifying, summarising and selecting the views of others is unsurpassed: in this book it is seen to perfection. He considers philosophical difficulties which have been raised against Christianity in recent decades and subjects them to ruthless but understanding analysis.

There is so much material here, and it is so concisely put, that an adequate summary would be impossible. Barbour's aim is to draw attention to the fallacies in the arguments which sceptics have used and to point to solutions. His conclusions are well reasoned and most of them will command assent from the Christians who read his book. Much of the discussion centres around the meaning of words such as *myth*, *parable*, *analogy*, *paradigm* and *model*. Near the end he outlines the agent and process models of God, of which he prefers the latter.

Typical of the book is the treatment of Flew's famous argument. Flew (1955) argued that unless one can specify the observations which might in theory make the proposition that God exists false, the assertion itself is vacuous. Barbour points out *inter alia* that Flew is classifying all assertions into those which are falsifiable and those which are not, whereas, in fact, as any one acquainted with science knows, this just cannot be done. Among theories there is a whole spectrum of degrees of resistance to falsification. Flew's argument can be turned as readily against science as against theology. In science paradigms tend to cluster near the middle of the falsifiability spectrum; in religion they lie near the unfalsifiable end, yet not right at the end. Flew's idea that theism is killed by a thousand

qualifications has its scientific parallel but without the expected death !

There is a good discussion of the status of theories. In science it is obvious that " naive realism " cannot be true, at least in the sense that no one supposes that atoms are simply replicas of billiard balls on a diminutive scale. Yet such ' models ' of reality are not to be judged true or false by their usefulness or otherwise as calculating devices. They are not just " props for feeble minds " as Duhem supposed. The only tenable theory is that of " critical realism ". Theories are representations of the world ; valid theories are true as well as useful. Even the theories of quantum physics warn us not against the use of models but against literalism. Here Mary Hesse is quoted: " If we are forbidden to talk in terms of models at all, we should have no expectations at all, and we should be imprisoned for ever inside the range of our existing experiments . . . The particle and the wave models themselves cannot be regarded as simply descriptive of reality, but when taken together in this complicated way they can be regarded as giving us knowledge of the real world."

Religious models can be interpreted in similar ways. The simple Christian may have a " naive realist " view of God seated on a literal throne in heaven with Jesus at His right hand. Theologians with a Duhem-type of mind will regard such models as purely mythical but useful in that they inspire a religious attitude to life. A wiser view sees them as true as well as useful, always remembering that, as in science, one single model can never represent the whole truth.

This raises the question of complementarity. Barbour thinks it is a mistake so to extend the principle as to make it possible to speak of the complementarity of science and religion, or to use it to justify any uncritical acceptance of dichotomies. It can be applied only, he says, when the realms of discourse are the same, as they are with wave and particle. Besides, " We do not say that an electron *is* both a wave and a particle, but that it exhibits wave-like and particle-like behaviour. In physics

the use of one model limits the use of the other; they are not simply alternative models having different domains or functions". Science and religion are better seen as "alternative languages using alternative models (p. 78).

There is much else of interest in this book but though the author comes down every time on the side of the angels it must be said that the discussion is a little arid. Never a touch of humour, an anecdote or a story to enliven interest! The language, too, though faultless, is on too even a keel. Nevertheless the book is a masterly survey of the field.

John Beloff (ed.), *New Directions in Parapsychology*, with postscript by A. Koestler, Elek Science, 1974, 200 pp., £2·00.

Books on psychical research tend to make for dull reading. Until recently there has been so little that is new; so much that could have been written a century ago. Now things are changing and the collection of essays in this book, ably edited by Professor John Beloff, opens up new and interesting horizons. The book is especially welcome because the material, though to be found in journals, is not so easily accessible to the public.

Helmut Schmidt, the physicist, gives a good account of results obtained with his random number generator. An electronic circuit oscillates at up to 300 or more cycles per second (+1, −1 or on/off). Lamps are arranged in a circle so that if a radioactive decay particle enters a Geiger counter when the cycle is at the (+1) phase the next lamp reckoned in a clockwise direction lights up, but at the (−1) phase the next lamp to light is the anticlockwise one.

In the absence of people the machine works entirely at random so that there is no statistically significant rotation of the illuminated lamp. But various subjects, knowing nothing about how the machine works, can, by wishing, impose a rotary motion on the random walk of the illuminated lamp in a highly significant

way. Even when random numbers are generated so fast (300 a second) that attention to individual events is out of the question, the effect still persists. It seems proved that human beings can, by thinking, influence atomic events. This is a startling conclusion but it is hard to see how Schmidt can have gone astray, especially as his work has proved repeatable and no serious criticisms appear to have been raised.

Do the results imply that mind affects only the statistical laws of nature, leaving other laws like the conservation laws for energy and momentum untouched? We do not know. In a rather sophisticated discussion Schmidt argues that the thought-influence, or what ever it is, probably travels at infinite speed, not at the speed of light. An interesting point — but the argument is not easy going.

C. Honorton discusses the possibility of altering states of consciousness so as to make PSI more effective and K. R. Rao looks into the relations of PSI and personality. John L. Randall deals with biological aspects. Here results are a good deal less definite but for what they are worth they suggest that PSI powers may be widespread in nature. Perhaps pigeons home by PSI.

Professor Hans Bender of Freiburg is almost apologetic for being such a know-all about poltergeists, some 35 cases of which he and his department have investigated since the end of the war. He describes three cases in detail. In the Rosenheim case (1967 – 8) involving electric equipment in an office, many experts were called in. Two from the prestigious Max Planck Institute were completely convinced as to the facts, but utterly unable to give an explanation compatible with accepted science.

All so worrying, so like witchcraft, in fact! "Did the sun of the Enlightenment shine in vain?" asks one of Bender's critics. Of course it is now agreed that the effects are not due to malicious spirits, even though remarkable intelligence is evident — even to suggest such a thing would be to put the clock back centuries.

Perhaps the essay of greatest interest to Christians is that of W. G. Roll on "A New Look at the Survival Problem". Roll stresses the worthlessness of much of the supposed evidence for survival — evidence which has been accepted much too uncritically in the religious world.

> Sometimes a communicator has a clear memory of an event which never took place or he may 'remember' something which happened in the life of another communicator. There are occasional communications from persons who later turn out to be alive. At other times entirely fictitious communicators appear; these are not only accepted by the medium as genuine but also by the other communicators. Sometimes a communicator who first announces himself as one person, later turns out to be somebody else. If the personality which survives death is essentially the personality which existed before death, we might expect lapses of memory. It is more difficult to explain confusion about the very 'ownership' of memories and about personal identity.

Spiritualists make the excuse that these confusions are due to unconscious processes in the medium and so must be left out of account in assessing evidence for survival. But if such excuses are valid, it is surely "a short step to say that this is also true for the verified communicators and that they too are fictitious characters built around a core of ESP information which the medium has obtained from existing sources."

Broad held that consciousness results from stimulation of the personality. In the after life, because it lacks stimulation, the personality which survives might then be unconscious. Roll thinks, however, that the state might be more akin to the mystic trance.

Though the presentation is uneven this is an excellent book for the seriously minded reader. He will find some dull patches but there will be much to interest him.

Geoffrey Rowell, *Hell and the Victorians*, Clarenden Press, 242 pp., 1974, £4·95.

Those who have thought of Evangelicals as being the chief preachers of hell-fire and damnation in the last century, will perhaps be surprised to learn from this book what a prominent place eschatology of this type took in the teaching and preaching of Free Churchmen, Tractarians and Roman Catholics. The author, who is Chaplain of Keble College, Oxford, seems to be more at home in his researches into what Liddon, Farrar, Keble, Pusey, Faber and Martineau believed than he is with Evangelicals of whom he quotes only Bickersteth and Spurgeon. He makes a particular study of F. D. Maurice who lost his professorial chair at King's for his views on eternal punishment — his belief that the wicked would continue hereafter alienated from goodness and truth and thus be "in the deepest pit of hell", metaphorically speaking, was not acceptable in 1853.

The author tells how the doctrine of conditional immortality, powerfully supported by such divines as Matthew Arnold, R. W. Dale and J. A. Beet, began to take the place of the more extreme views of earlier days. There is an interesting account of the conflict in the Evangelical Alliance which led in 1868 to the resignation of its Secretary, T. R. Birks, who was also Vicar of Holy Trinity, Cambridge. His modified views of eternal punishment which struck a balance between universalism and a rigorist Calvinism seem to have represented quite a wide field of evangelical opinion and he was happy to continue a member of the E.A.

Mr. Rowell's wide-ranging study ends with a more contemporary look as he refers to Berdyaev, Paul Tillich and Ian Ramsay all of whom found a place for eschatology in their preaching. To those who bemoan the fact that 'The church today does not preach about hell as it used to do' this book will provide a valuable insight into what the Victorians really did believe about eternal punishment. The church in those days was very much divided in its interpretation of judgment, purgatory, hell and damnation. But its positive message of hope in Christ

compares well with that of our own age of lesser faith.

H. EVAN HOPKINS

John Passmore, *Man's Responsibility for Nature*, Duckworth, 213 pp., 1974, PB, £1·95.

Professor John Passmore is a scholarly man: that much is evident from a glance at any page of this book. A little too scholarly for every one's taste, perhaps, for he sees so many fences in his meadows and can rarely make up his mind on which to sit or on which side. Every ecological, or quasi-ecological problem is here: all possible views on how to control, or not to control, population; whether animals have rights or feel pain; whether men are greedy; whether our distant progeny needs our thoughtful consideration, or history is cyclic or state control is desirable, or people ought to enjoy sex . . . a regular hotch potch this new ecology game, and very interesting it is too! Discussion here centres not on Europe only but is world-wide. Yet it is a little lifeless, for the long meaty chapters are apt to end anticlimactically with; "My conclusions are limited and uncertain", which is just as things should be, says the author, for our world is so complex that it is often impossible to know beforehand what is best for mankind.

Professor Passmore shows no obvious leanings towards Christianity and is often critical. This makes his treatment of the ecology problem all the more interesting. Indeed, the early part of the book is especially rewarding because in the past so few have treated ecology from the historical angle.

The discussion on White's views (that Christianity must be blamed for our ecological crisis, see this **JOURNAL**, **99**, 169) is masterly. The Jewish-Christian doctrine hits the right balance, he reckons, as between the view that nature is divine ("mother nature" the goddess) held by most peoples in the past, and the materialist's view that it is wholly unconnected with God if there is a God. For Jew and Christian nature is neither God, nor

divorced from God. It is God's creation ; in part at least God's gift to man, but it exists to glorify God who is separate from it and stands above it. Most definitely it does not exist to glorify man. But man is free to understand nature and to make use of the knowledge he gains. In doing so he does not tamper with the sacred, nor does he live in dread of hubris when he diverts a river, takes to the submarine world or to the air, or visits the moon. The irony of it is that until very recently Christianity was praised for making science possible: today the Christian is being blamed for arrogance in that because he is told to take dominion, he has become the progenitor of a diabolic technology ! As the saying goes, You cannot win !

Though the earth was put in man's power (Genesis 1: 26) it is a Greek, not a Christian doctrine (despite Origen and Calvin) that nature exists for man alone. Origen, unable to defend this doctrine from the Bible turned to the Stoics for support. It was the Stoic Chrysippus who first argued that fleas exist to wake sluggards up in the morning and mice to make men tidy ! However, many biblical passages speak of Providence in the absence of man (e.g. Psalm 104 ; Proverbs 12: 6).

Recognizing nature as God's creation, man must feel deep concern if he upsets its harmony. Japan illustrates the power of the Western outlook without Genesis to lend it support: it has " developed an industrial civilization second to none in its offensiveness to ear, eye and nose " (p. 26). . In Mao's China (as in Communist Russia) the stress is on struggle against nature: this contrasts with the older Chinese view that one ought to co-operate with nature.

Passmore then passes on to consider the theory that man is a steward or farm manager of nature. Few Christians have held this view, he claims. In the NT man more often appears in the guise of a servant than a steward. Another view is that man perfects nature by co-operation (as in landscape gardening). Yet another is Chardin's view that nature is self-creative and this also receives attention.

The rest of the book covers more familiar ground but there is much unusual and interesting material. Here is a mixed bag of points made:

> It might well seem odd that the conservationist . . . is so confident that he knows how to save posterity when he cannot even save his own contemporaries. Over a large part of the globe . . . the 'needs of posterity' are already being used to justify not only tyranny but a conspicuous failure to meet the needs of the present (p. 79).

> As late as 1909 . . . the US Bureau of Soils officially committed itself to the view that the soil, at least, was an infinite resource. "The soil" so the Bureau pronounced, "is the one indestructable, immutable, asset that the nation possesses. It is the one resource that cannot be exhausted; that cannot be used up" (p. 89).

> The author points out that in the 19th century the Christian West regarded infanticide and exposure of infants as crimes. Mothers proved guilty of these practices were punished with the utmost rigour of the law. Yet foundling children were common (up to 36% of all birth). Such children were cared for in Foundling Hospitals where, through neglect and cruelty, the mortality rates were 80 – 90% in Italy and nearly as high elsewhere. So the population was held in check ! (p. 112).

> Only once does the question of callousness towards the lower creation arise in the biographies of St. Francis of Assissi, proverbial friend of animals — and then disconcertingly. "One of the brethren, taken ill, told Francis's disciple Jonathan that he had a longing for pigs' trotters. 'In great fervour of spirit', Jonathan cut the trotters off a living pig. Francis rebuked him, but made no reference whatsoever to his callousness. He urged him only to apologise to the owner of the pig for having damaged his property."

Passmore develops the theme that in the Christian tradition animals have received no consideration and have been denied all rights. Though this view is now supported by the official

teaching of the Roman Church, the long succession of animal trials held in past centuries, entirely overlooked by Passmore, proves that his verdict is one-sided. The same might be said of the status of women, which he says, declined under Christianity. Here he seems to forget that 80% of Roman women were slaves with minimal rights, or none. But such lapses are rare. The book is well informed, well written, well-balanced and well worth the money.

J. D. Douglas (ed.), *The New International Dictionary of the Christian Church*, Paternoster Press and Zondervan, 1974, xiv + 1,074 pp., printed in two columns. 24 x 16 cm. Weight 1 · 85 kilos, £10 · 00.

This is a well bound and well printed volume containing around a million words and 5,000 entries, mostly bibliographical and historical. Editor apart, there are 182 contributors, the names of many of whom will be familiar to readers of FAITH AND THOUGHT.

The scope of the Dictionary is much wider than that of F. L. Cross's *Oxford Dictionary of the Christian Church* (1957), the work which otherwise it most nearly resembles. All shades of belief are well represented and the Dictionary succeeds admirably in its declared aim to be primarily factual.

It would be impossible in a short review to indicate the width and scope of the entries. The Editor of FAITH AND THOUGHT has made good use of the volume over a number of weeks and only on about 10% of occasions has he failed to find entries where they might possibly have been expected. The Dictionary is so good that it would be difficult to find grounds for criticism. The most serious might be the complete lack of documentation of the less important entries. This contrasts with Cross which is, if anything, over-documented. References when given are usually highly selective, a great advantage to those who are looking for information quickly. It is obvious that the work is not intended for the meticulous scholar but for the

ordinary teacher and preacher to whom it will prove a mine of valuable information. Considering the size and scope of the book it is not expensive by present-day standards, though the price is bound to deter many who might otherwise buy it.

Joseph E. Duncan, *Milton's Earthly Paradise*, University of Minnesota Press and OUP, 1972, 329 pp., £6·25.

Milton's *Paradise Lost* is a consummation of Renaissance commentaries on the first chapters of Genesis. The author of this interesting and scholarly book set out to study all the works which Milton had at his disposal. The result is an invaluable and very readable reference book in which one may find details of virtually all early speculations about Adam and Eve. Did the first creation of man take place long before Adam came on the scene? Did God create men quite often down the ages and in various countries, Genesis 2 referring only to the last of these creations and Adam being the name of a particular individual? And what about chronology? It is all here and much more beside.

One is left with the feeling that a good deal which today passes as an attempt to reconcile Genesis with modern science is not so modern after all. Even the idea that there are alien beings on distant planets has its counterparts in earlier speculations. For instance, our fathers wondered if the antipodes existed: if they did, did they constitute a separate world, so to speak? Did this world also have another Adam and Eve in a duplicate garden of Eden?

Norman Anderson, *A Lawyer among the Theologians*, Hodder and Stoughton, 1974, 240 pp., PB, £1·00.

It is not often that specialists in fields other than theology digress at length into this realm, and the fact that this book — written by a well-known lawyer — seeks to pronounce on issues in theology must make it almost unique.

Professor Sir Norman Anderson, one of the illustrious Vice-Presidents of the VICTORIA INSTITUTE, is esteemed throughout Europe and the USA as a christian academic He is well-known for his incisive defence of the resurrection of Jesus, a theme he developed some years ago as a dialogue in *Christianity Today*. This is still much appreciated by undergraduates.

This book, written in the author's usual crisp style, is based on a number of inaugural lectures delivered by Sir Norman for the Bishop John McLean Lectureship in the University of Saskatchewan and the University of Emmanuel College, Saskatchewan, in 1972. Not surprisingly, a number of less conservative theologians come in for some pretty rasping criticism. It is the author's intention to allow one theologian to answer another, the author, (and by implication his readers) occupying the judicial chair, weighing up the overall case and deciding " which opinion seems to me to accord most closely with the evidence " (p. 10).

Evidence, if it is to be acceptable to the legal mind, must be firmly established. Early in the book the reader is supplied with a number of primary rules relating to evidence as laid down by law, and in consequence the legal structures which appear in the pages to follow are fairly devastating. At once, therefore, the reader is left in no doubt as to what Sir Norman will accept in his court and what he will reject.

Of course, the theologians on their part, may question whether such rigid rules of ' evidence ' should (or indeed can), be applied all the time in theological study. The author complains about the presuppositions of his theological defendants, but they too, given the chance, might complain with regard to the presuppositions of the plaintiff. It is one thing to be genuinely convinced already with regard to the substantial accuracy of the New Testament and the historicity of the events to which it appeals. It is quite another thing to examine the *sitz im leben* of the New Testament and the primitive Church and recognize the religious and cultural factors which influenced them together.

Bultmann, for example, sets out his hermeneutic with considerable precision. It rests (in part) on the conviction that contemporary preaching overlooks the fact that the thought forms of the world in which the Gospels were written have passed out of currency. Our task today, therefore, is to say what the NT and its classical doctrinal formulations are essentially saying and to re-say it in terms of the twentieth century world-view. I mention this because it might be argued that Sir Norman has not paid sufficient attention to Bultmann's method or to what can surely be regarded as the more positive merits of the form critical approach to the Gospels.

There is an interesting discussion on the resurrection of Jesus, (pp. 66 – 149) in which the author turns his attention to the problem of the Ascension and dwells on the contributions of C. F. Evans and A. M. Ramsey. The book is eminently readable and is certainly worth having. Perhaps one of the more fundamental points raised by Sir Norman is that there must, in the last analysis, be something unsatisfactory about any theologian who is one kind of theologian on Sunday and quite a different theologian on a week-day. Yet even here, one suspects that theologians of the calibre discussed by Sir Norman would not be unaware of such dangers unless they happened to be singularly unintelligent.

DAVID J. ELLIS

John Sladek, *The New Apocrypha: a Guide to Strange Science and Occult Beliefs*, Hart Davies, 1973, £3·25.

This a delightfully written book, grossly unfair at times but humorous and never malicious. Its coverage is very wide, much more so than Patrick Moore's otherwise rather similar book (see this **JOURNAL, 100**, 188). The author tends to give the impression that he accepts all orthodox science just because it is orthodox and even men of the calibre of S. G. Soal and C. D. Broad are butts for his ridicule when they take psychical

research too seriously. (However, even JS is convinced by Schmidt's machines, see **99**, 180, which he says afford "the first convincing indication of precognition".) His criticisms of Velikovsky and von Daniken are apt and amusing. As for UFOs he asks, Why no crashed ones? Why do they come? Not to contact us! Or to avoid us! Not even to study human behaviour for they by-pass cities and pow-wow with Adamski behind a dune! Riddle unsolved!

The author reads *Plain Truth* and dilates on the implications of J. E. Portune's article of 1970 which depicts the ark with 40,000 cages. Mr. Noah is kept busy blowing husks off the budgies' seed and is well stocked with fresh roses for the benefit of a perverse breed of ant that won't feed on anything else. Teilhard de Chardin, too, is cursorily dismissed with a quote from P. B. Medawar (who later changed his view!) and a final thrust to the effect that Chardin's information/noise ratio is very low indeed.

Again, much of this is grossly unfair. Yet the book is so lightly and entertainingly written that few will have the heart to be angry! Surely a suitable book to give to some of those whose minds are captivated by the rubbish that passes for science in some quarters today.

O. R. Barclay, *Reasons for Faith*, IVP, 1974, 142 pp., PB, 40p.

This is a simple straightforward account, written at 5th to 6th form level, of the reasonableness of Christian faith. The stance is orthodox (none the worse for that!) and takes the traditional line that reason may bring us face to face with truth but cannot make us accept it, just as the horse may be brought to the water but cannot be made to drink. The style is simple and appealing.

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