

## PERSONS IN THE UNIVERSE

by *Ernan McMullin*

The astronomical discoveries of recent decades have given fresh impetus to the speculation that there may well be persons like us in many other parts of the galactic universe. What would the implications of such a state of affairs be for traditional religious beliefs? Could one still take the Christian doctrines of incarnation and redemption seriously if there were millions of developed civilizations dotted throughout the universe?

This is the stuff of science fiction, one of whose central themes always has been the effect on the human perspective of scientific advances. Arthur C. Clarke comes back to it again and again, most notably in *Childhood's End*, in *2001: A Space Odyssey*, and in his most often anthologized short story, "Star." Frank Herbert's *Dune* trilogy describes the coming of a messiah on a distant, different planet. James Blish and Walter Miller found one of their most effective themes in the impact on religious faith of the discovery of thriving civilizations elsewhere in the galaxy.

Philosophers and theologians, though not averse to speculation on their own account, have shown themselves so far rather more earth bound. In a memorable presidential address in 1971, L. W. Beck exhorted the members of the American Philosophical Association to make use of their skills of analysis to clarify, and where possible resolve, the many questions that the presence of rational life elsewhere in the universe would pose.<sup>1</sup> But theologians have been silent on these questions, no doubt feeling that the problems of earth are more than enough to occupy them.<sup>2</sup>

Roland Puccetti's *Persons: A Study of Possible Moral Agents in the Universe* is one of the very few theoretical works on this set of issues.<sup>3</sup> This alone would make it worth attention despite the fact that it is sketchy and often poorly argued. Puccetti begins from an analysis of

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[*Zygon*, vol. 15, no. 1 (March 1980).]

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the concept of person, in the spirit of recent Oxford philosophy, and goes on to argue for the "exobiological" claim that intelligent organisms qualifying as "persons" in the fullest sense are likely to exist in millions of centers throughout space. Then, in a brief final chapter, he brings these two themes together to argue that "a correct analysis of the person-concept, combined with the not-unreasonable belief in extraterrestrial persons, undermines belief in God" (p. 143). The next "Copernican revolution," he concludes, will be the withering away of all the great world religions because their inevitable particularism will not be able to survive when forced to confront the vastness and diversity of the inhabited cosmos.

Though religion itself must be jettisoned, a broadly "religious" attitude still may be maintained, he suggests, because humanity still can stretch out to the "otherness" this community of unreachable worlds offers (p. 144). It is this striving to overcome individuality that most clearly characterizes what we know as "religious" faith:

It could comfort us to know, or have some scientific foundation for believing, that there are other natural persons in the universe somewhat like us physically, organized into moral communities and sharing some of our own values. . . . If we are convinced such societies exist, though too distant for us to confirm our belief, we may have confidence some of our values will outlast our civilization. . . . [This] could lay to rest the provincial humanist dogma that if we abandon belief in the Divine, we have nothing to fall back on but Man's values. What we have to fall back on are the values . . . of a potentially universal community of persons from which we are detached by the accidental dispersion of matter in the cosmos. That is pallid comfort, yet comfort of a kind. [P. 118]

Pallid indeed! But if his arguments carry conviction, it can be the best comfort available to us. There are, however, well-known logical traps associated with the issues on which he focuses: the criteria of the concept of person, the extent to which consciousness can be attributed to machines, the probability of extraterrestrial intelligent life, the applicability to God of concepts drawn from everyday human experience. Puccetti falls into too many of these traps, and so his argument in the end fails. Its interest for us lies in the ambition of its aim.

His analysis of the concept of person leads him to claim that persons must be corporeal and capable of feeling. From this he infers that personality cannot be attributed either to God or to machines. But it can be attributed to the products of organic evolution elsewhere in the cosmos. And since extraterrestrial civilizations are so numerous, a personal Christ cannot possibly become incarnate in all of them. Let us look at this argument stage by stage.

TO BE A PERSON

Puccetti's analysis of the ordinary-language use of the notion of person depends heavily on P. F. Strawson's well-known treatment of this topic.<sup>4</sup> Strawson picks out certain predicates (*M* predicates) that are applicable to material bodies generally and others (*P* predicates) that apply to persons only; these latter all involve consciousness, one way or another. He asserts that the notion of person is logically prior both to that of body and to that of conscious state. Anything properly called a "person" must be capable of having both *M* and *P* predicates applied to it; hence a person must have corporeal attributes. No bodiless entity can be called a "person" correctly.

Puccetti interprets this characterization as a specification of the necessary and sufficient conditions for something to be called a "person" and goes on to amend it in a fundamental respect. He notes that many of Strawson's *P* predicates (such as "is smiling," "is thinking hard") are applicable to animals as well as to men. These he proposes to mark off as a special class, *C* predicates, that is, those which "suggest consciousness but not necessarily person-status" (p. 4). Such predicates ("is sad," "feels hungry" are further examples) apply to animals and men alike but not to plants or inanimate objects.

His second move is to distinguish two special classes of *P* predicates. One set (of which "predicts rain" would be an example) implies the ability to think not merely in the sense in which an animal might be said to "think" but in the stronger sense that requires the possession of a language and an abstract conceptual scheme. The other (of the type of "is tolerant") implies the ability to pass aesthetic or moral judgments. Since "one of the conditions of ascribing predicates of a moral character to an entity is that this entity be capable of assimilating the conceptual scheme in which moral words and phrases have a natural place" (p. 9), it follows that the applicability of intellect predicates to an entity is a necessary condition for the applicability to it of "moral" predicates.

Is it also a sufficient condition? Puccetti holds that it is not. Take the predicate "is in anguish," which he assumes to be a typical "moral" predicate. Anguish is "logically rooted in" the notion of pain. More generally all moral predicates are rooted in *C* predicates such as "lust after" and "is happy." (Though no argument for this is given, it might run something like this: A moral predicate indicates the taking of a moral attitude toward something; such an attitude necessarily involves feeling as well as judgment.) For something to count as a person it is clear that moral predicates must be applicable to it. (Again no

argument for this is given other than a review of a long list of predicates ordinarily regarded as characteristic of persons. Among these are of course moral predicates, but whether such a review can show that the applicability of moral predicates is a necessary condition of personality seems doubtful.)

He is led then to conclude that anything which properly qualifies as a "person" must be able to experience the sensations and emotions which allow the attribution to it of moral predicates, of sensations and emotions which may be experienced also by entities lacking the status of person (p. 11). An entity which does not share *C* predicates in this way with the animal world therefore cannot count as a person, even though intellect predicates may be applicable to it. Such an entity "could say it was 'in anguish,' but because it is not the sort of entity which could be reasonably described as being 'in pain,' this would be an improper application of the person-predicate, 'in anguish.' . . . The proper application of moral predicates to an entity is the *sine qua non* of correctly designating that entity a 'person.' . . . It is the moral nature, more than anything else, of persons which distinguishes them from other conscious entities" (pp. 11-12).

Puccetti believes he has shown in this way that "moral agency" is the most distinctive characteristic of person status and that this characteristic further entails a bodily nature. Furthermore, "it has been shown theoretically possible to have an entity to which intellectual-type predicates apply but typical moral-type predicates do not, and that such an entity would not constitute a 'person'" (p. 12). All in all, this is a remarkable set of conclusions to have derived from nothing more than inspection of a set of predicates attributable to entities ordinarily identified as "persons."

The reader may well be puzzled by his usage of the term "moral." One would be more likely to choose as moral predicates "unjust" or "avaricious" than "in anguish." But Puccetti does not have moral action in mind, despite his frequent use of the terms "agent" and "agency." Predicates such as "unjust" are obviously not rooted in *C* predicates and so would not serve the purposes of his argument. His "moral" predicates have to do with judgment or with the taking of an attitude (whether moral or aesthetic; Puccetti tends to lump these together). But now the unargued assumption that such predicates are a necessary condition of person status becomes less plausible. Why must an entity be capable of such aesthetic judgments as "considers green an ugly choice" in order to qualify as a "person" (p. 10)? That aesthetic judgment, as we know it, is linked normally to perception is surely true. But then so are the learning of language and the function-

ing of our intellect generally. One might argue as readily that *C* predicates (such as "sentient") are a necessary condition for most of our intellect predicates and not just for the so-called moral predicates.

Puccetti is willing to concede that if intellect predicates alone were a sufficient condition for person status, a person would not have to be corporeal and a machine could be a person. The crux of his argument lies in the claim that something more is needed to constitute a person, namely, moral sense, and that this entails abilities of perception and feeling and thus possession of a body. But why should intellect not be a sufficient condition for moral sensibility? Why should the latter entail *C* predicates such as "is in pain"? And, even more seriously for Puccetti's argument, why should the attribution of *C* predicates (i.e., consciousness-related predicates applicable to animals other than man as well as to man) necessarily entail bodily status? There seems to be a simple fallacy here. The fact that "is afraid" (one of his examples of *C* predicate) can be used of animals other than man does not mean that it can be used only of animals or of corporeal beings. The fact that "is afraid," "is angry," "is sad" are ordinarily used of corporeal beings does not imply that corporeality is a necessary condition of their use. This is the sort of error into which conceptual analysis based on ordinary usage can fall all too easily.

Puccetti himself appears to realize this. He notes that the attribution of personality to God, who is not corporeal, is after all equally a feature of ordinary-language usage. Thus, if such usage is to be the warrant, one cannot make the applicability of *C* predicates requiring corporeality a necessary condition of personality. Indeed he is critical of Strawson for overlooking this very point. To deny personality of God can come only from some sort of "revisionary metaphysics," not from an inspection of usage alone. The latter alone always would allow (as he notes) an opponent to respond that the concept of person applies to God in a special way.

He moves therefore to a different sort of argument: "Even if God does not experience certain sensations and emotions as arising through a body, He must know what these are . . . because very often they constitute, or are associated with, human persons' motives or impulses in performing various moral acts and in taking particular moral attitudes. If God is to judge humans morally . . . He must know [their feelings, sensations, and emotional states] qualitatively" (p. 16). But if God is not to have these experiences himself (and how could he have feelings, e.g., of lust or jealousy?), Puccetti continues, he must be supposed to have "direct access" somehow to my experience. Yet this will not avoid the same difficulty: "The only way I can see for an entity

to know what another's experiences are, when he has 'direct access' to them, is to have had similar experiences himself with which to compare them" (p. 18). This is true for human beings where there is no question of "direct access" (we cannot, he supposes, understand, e.g., sexual perversion, unless "we have experienced relevant emotions in *some way*"). Thus it also must be the case where there is a "direct access."

This leaves us back with the claim that God must experience and perceive, that is, must be corporeal, in order to be a valid moral judge of man. Puccetti's conclusion is that the usual notion of God as simultaneously moral judge and as incorporeal is inconsistent; this is (he says) a dilemma from which theism cannot escape and which ultimately refutes it as an intellectual position. It is worth noting that this argument, the crucial one for establishing Puccetti's main conclusion, is in no way dependent upon the earlier Strawsonian analysis of "person." What is shown (if anything) here is that the same entity cannot be both moral judge and incorporeal. This is logically independent of the issue of whether the term "person" is properly applicable to God and what the criteria for such application would be.

What type of argument is he using here? On what sort of warrant does it rest? Puccetti appears to realize (though he never explicitly admits this) that an inspection of linguistic usage is of itself insufficient to support the sort of substantive claim he wants to make: There is no such thing as a Z because it would have to be both X and Y, and these are incompatible. So he falls back on a sort of phenomenological "the only way I can see . . .": To judge morally one must know the perceptual and emotional states involved in the actions of those who are judged, and the only imaginable way in which one could know what these would require is to have experienced similar states oneself.

One criterion here is clearly imaginability. Yet Puccetti himself is quite critical of Strawson's use of this criterion, for example, in speculating what survival after death would be like (p. 23). The other criterion is ethical in nature: For someone to judge justly he must share in the kind of experience that is being judged. But Puccetti does not produce the ethical analysis that such a claim would need in its support. And, on the face of it, it seems simply false.

Furthermore, to say that God must experience lust in order to be able to know what lustful acts are is surely anthropomorphic. The Judeo-Christian concept of creation implies that God knows my actions not by some sort of external omniscience but by holding me (and my actions) in existence. The ground for my experiencing anything is God's support of me in being. He can judge my lust not because he

has experienced lust but because my lustful act (and the total order within which this act appears as lustful) is his creation, is dependent for its sensual quality on his act of existence giving. Puccetti's claim that adequate moral judgment must have a basis in emotional-perceptual experience is simply irrelevant to the traditional Christian view of God which asserts from the beginning that God's creative act lies outside the limits of human imagination.

In the course of his book, however, it is more often on a straightforward analysis of language use that Puccetti relies. There is, he says, "no other way to determine what persons are than by finding out how we use language related to the concept of a person, which is to say by looking for common features of person-predicates" (pp. 6-7). The main difficulty here is with the assumption that one can work out in this way a set of necessary and sufficient conditions for the correct application of terms such as "person." The falsity of this common assumption was brought out a long time ago by Ludwig Wittgenstein who used the idea of "family resemblance" to make the point that the terms we use are for the most part not univocal. One cannot assume that they retain the same core meaning in all contexts, that there is a well-defined set of "essential" predicates there to be discovered. There is rather a complicated set of resemblances that lace the contexts together but in nothing so tight as a set of necessary and sufficient conditions.<sup>5</sup>

#### MACHINES AS PERSONS?

This same difficulty reappears in Puccetti's next attempt to prove an exclusion ("X's can't possibly be Y's"). His notion of *C* predicates leads him to argue that machines cannot possibly be persons. He is willing to allow that machines of the future may be described correctly as "capable of thinking"; there is no reason (he suggests) why any particular intellect predicates may not be in principle capable of application to some machine. But, in his view, to qualify as a "person" a machine also would have to be able to feel and to perceive (as a prerequisite for so-called moral agency). And this, he asserts, is strictly impossible for a machine made up of inorganic constituents.

Both segments of this argument are open to objection. The question "could a machine be constructed that would be able to think?" requires both empirical information (and speculation) about the capacities of machines and a preliminary investigation of the lexical meanings of "machine" and "think." This latter inquiry is complicated by the fact that meanings change, that concepts are broadened or sharpened to meet new situations. Puccetti seems to think that the

"diachronic" problems of language arise where "technological and scientific advances provide new contexts for old concepts" rather than where the concepts themselves change. A new "standard use" is acquired "without changing the meaning of any of the words." His example of a "deviant use" (taken from Hilary Putnam): "I am a thousand miles from you" (said before the invention of writing) (p. 30). And his question: Granted "This machine is thinking" is "deviant" in contemporary linguistic usage, could it acquire a "normal use" in the future (without any change in the meanings of terms) because of new developments in machine technology?

This question is misleadingly put. The reference to changes in "linguistic use" may lead one to suppose that the question has something to do with possible linguistic changes. But in fact the change from "deviant" to "normal" usage involves for him only nonlinguistic changes of a technological sort: "Our question is not really whether machines can be said to think, in terms of contemporary usage" (p. 31). Yet this really is his question: not whether any present machines can think but whether any "machine" of the future possibly could be said to "think," in our contemporary usage of these two terms. The sense in which the saying "I am a thousand miles from you" was "deviant" before the invention of writing is a trivial one; it merely means that it had at that time no context of use. But the criteria for its use were even then clear-cut, and, had the proposition been used, it simply would have been false.

Our problem with "This machine is thinking" is to know what the criteria for its correct use today are and whether its use is necessarily "deviant" (in his sense), that is, whether the context for its correct use can ever be realized. Puccetti does not help us on these points. Indeed he complicates matters by asserting that (in the present sense of these terms) an entity can be said to "think" without necessarily also being "conscious." But this is a truly deviant usage, as these terms are used at present. His instance of such an entity (a self-guiding car that pauses to calculate traffic flow) is not a machine of the future; cybernetic machines of this sort are already common (in missile guidance and factory control, for instance). Yet we do not say they "think," or at least, if we do, someone surely would object.

The real problem here is not change of context (new types of machines) but gradual changes of concept and verbal usage. How is one to legislate or predict such changes? When computers were introduced, their properties were in certain respects new. It was more convenient to adapt old terms (such as "memory," "sense") to the new context than to invent new ones. But adaptation affected the sense of these terms. It is correct (or at least common) to speak today of certain



machines as possessing a "memory"; but this would be incorrect if the earlier sense of the term were retained. What has happened here is not just that the context has changed or that it has been discovered that "memory" (in its original sense) does not after all involve consciousness as it had been thought to do and so may be predicable of machines. Rather the sense of the term itself has changed; a new context of use has been added where the implications of the term are no longer the same as they were.

This is where the "diachronic" dimension of language manifests itself. The term "think" may very well be modified in the future so that "This machine thinks" becomes a commonplace expression. There is no accepted way to legislate such changes; this is the way in which language always has developed and in which the "family resemblances" spoken of by Wittgenstein become ever more intricate. The question whether it will ever become normal usage to say "This machine thinks" is thus an unanswerable one. The only interesting question is whether in some now specified sense of "think" and "machine" one can assert that it is in principle possible or impossible that a "machine" can "think." And this comes back to inquiring into the specifics of human activity and the intrinsic limitations of machines. These are not questions of verbal usage; it is ultimately unhelpful to cast the issue in linguistic terms, as though the main problem lies there. The real problem lies in deciding what men can do and what (if anything) man-made products cannot do. The strictly linguistic dimension of this inquiry is treated satisfactorily by stipulating convenient and precise senses of the vague terms in which the original question was put. But the substantive issue cannot be solved so easily.

The other main point Puccetti wishes to make in his treatment of machines is the impossibility of constructing a machine which would be capable of feelings and perception and the consequent impossibility of "person-machines," since he already has argued that ability to feel and perceive is a necessary condition of personality. At this point "we seem to have reached a logical limit to machine technology. A machine can think (and possibly think consciously), be intelligent, . . . assimilate human language—including the language of sensations and emotions—and even be self-reproducing. But so long as it is truly a *machine*, it will not have feelings. . . . What really cuts a machine off from the community of persons is not, therefore, a necessary lack of consciousness, but a highly probable lack of feeling" (p. 49).

An "impossibility" claim needs strong evidence in its favor. This is no longer in any sense a linguistic point; he is claiming that it is impossible from inorganic constituents to construct an entity which

can be properly said to “feel.” His reasoning is that feeling states originally arose in the context of organic evolution, of the gradual acquisition of organs and sensory equipment requisite to survival in a competitive biological environment. The components of a machine, however sophisticated, “are all outside that story, and no organization can suddenly make them part of it” (p. 44). Pain, for instance, has a definite survival value for organisms, so we expect the ability to feel pain to develop in them. But there is no reason to expect it in a machine made to simulate a “parahuman information-system”: “How could one credit [a machine] with feelings if none of its constituent elements ever developed as part of an organic system in which some feeling-states—such as pain—have a natural and scientifically understandable place. . . . No organization of [hard objects], no matter how ingenious from a technical point of view, can lead on to a reasonable ascription of feeling-states to them. Sensations of pain arise from contact *with* them in the course of evolution; to suppose that once they are properly organized, pain will also occur *to* them is just to close one’s eyes to their nature” (p. 45).

This is only one stage removed from a *petitio principii*. It is all very well to say that to suppose it possible for a machine to feel pain is “to close one’s eyes to [their] nature.” But do we know the potentialities of matter so well that we can claim this sort of insight into their limits? Why should a potentiality that developed in the course of organic evolution not be capable of being simulated by some other material configurations? What is it about the testing of material potentialities involved in the operation of natural selection that makes it unique, incapable of being duplicated in its effects by an intelligence-guided deliberate search? There is a failure in consistency here: Puccetti maintains that a conscious machine could be developed (though he gives no argument of any sort for this). But surely consciousness has a survival value. What is the difference between feeling and consciousness in this regard? Both are products of evolution. If this eliminates one from machine duplication, why not the other?

There are hints in Puccetti’s argument of several other considerations. At times he seems to be arguing that machines deliberately developed to simulate a particular human capacity, such as computing, are hardly likely to have the capacity to feel pain also. Since they are structurally so different from men, one cannot safely infer from the possession by them of one human capacity to the possession of another. This is surely correct but scarcely relevant. The question is not whether a machine built for computing purposes might also by chance feel pain but rather whether a machine might not be built with

an interlocking set of capacities that would include the ability to perceive or to feel. Since one organization of matter does have these abilities, why could not another? To require organic constituents seems to have no real justification. True, the nearer one gets to familiar organic structures, the more likely one would be to discover abilities similar to those of organisms. But this does not exclude the possibility of finding similar abilities in altogether different material complexes.

A further complicating factor in Puccetti's argument is the suggestion that the difficulty is epistemological rather than ontological: that it lies in the difficulty of our knowing for certain that a machine is perceiving and not just in the intrinsic impossibility of machinelike structures possessing this capacity (p. 45). This would carry more weight if he had not maintained that if machines can compute "there seems to be no good reason whatever for insisting that they are not conscious while doing so" (p. 41). No good reason to insist that they are not, it is true; but does this give a reason to assert that they are? It might be supposed that the attribution of feeling states to material structures very different from ours would involve the same general sorts of epistemological problem as the attribution of consciousness. Puccetti rightly stresses the difficulty of discovering that a machine feels pain. In the case of human organisms we assume an analogy to hold, so that if they report pain or seeing green we assume this to mean what it does for us because the physical basis of such capacities is the same in both cases. In the case of inorganic structures, however, such an analogy would not hold, and one would need much more evidence for the proper attribution of feeling or sensation. But to say this is surely not to say that it would be in principle impossible ever to attribute feeling states to a machine, even though in fact it did possess them. One, it is true, cannot assert that the perceptions or feelings of a machine (or for that matter of an organism different from us) are qualitatively the "same" as ours; there is, in any event, a notorious problem about the meaning of "sameness" here. But this still leaves open the ascription of something like our perception or our feeling states, sufficiently like, at least, to allow us to use the corresponding generic terms drawn from human discourse. This would require the machine to display evidence of creative intelligence, an ability to find ways, not directly and artificially programmed into it, of describing its states.

Thus, when Puccetti questions whether the ability to use feeling language on the part of a machine can be a sufficient criterion for the possession of feeling states, much depends on what is meant by "using" a language. If it means no more than the uttering of expressions,

## ZYGON

he is right; "I am in pain" may simply be the programmed way of communicating "one of the circuits is defective." But if the machine (or alien organism) could discuss with us our use of the language of feeling and perception, we could come gradually to a reasonable assurance, by noting its responses to new contexts, its metaphors and ways of interrelating its self-descriptions, that it can be said to "feel" and to "perceive." If in fact a particular machine were to be a conscious intelligent entity, there does not seem to be any intrinsic reason why it should not be able to find ways of (admittedly) analogical communication concerning its own states of consciousness.

Puccetti finds no difficulty in the suggestion that organic artifacts could be manufactured to simulate any desired human ability, including feeling and perception. He even supposes it possible in principle that these artifacts might be sufficiently organically identical with men to allow interbreeding and notes that there would be no reason then to refuse them the status of persons. (He assumes that since their constituents are organic they cannot qualify as "machines," even though they are manufactured.) Now it may be that consciousness and the abilities to perceive and to think are so specialized that they can appear only in a very small range of material structures, all of them involving cell structure and the other familiar features of organisms. Organic evolution may have hit upon the only biochemical constitution that would allow such dispositions to manifest themselves. But this cannot be assumed; it must be shown. There does not seem to be any reason *prima facie* why the knowledgeability of organisms necessarily should be linked with biochemical structures whose main function is replication, nutrition, or growth. Much of the structure of the organism derives from the necessity for it to grow and reproduce itself. The linking of any of the abilities of organisms (whether perception, consciousness, or thought) to organic constituents as such seems to require far more precise biological evidence than Puccetti offers us.

### EXTRATERRESTRIAL CIVILIZATIONS

How likely is it that there may be persons elsewhere in the cosmos? Puccetti's conclusion is that "life, and possibly intelligent life, is really a fairly common development in the universe rather than an extremely accidental and therefore almost unique one" (p. 67). Or even more confidently: "Belief in extraterrestrial intelligence has acquired a scientific basis in our time" (p. 85). Or strongest of all: It is "certain" that civilizations have developed frequently enough in our galaxy "to justify efforts to contact them" (p. 96). No qualifications here!

The material on which these chapters are based is drawn from a number of the popular works on exobiology of the previous decade.<sup>6</sup> Puccetti reproduces their arguments for extraterrestrial intelligence (ETI) with very little analysis or criticism. Yet the logical and methodological assumptions underlying these arguments deserve the closest philosophical scrutiny. It is disappointing to find them passed over so lightly here. But at least it does afford the occasion for a thorough review of the basic moves the ETI arguments typically require one to make.

To estimate the likelihood of intelligent life elsewhere in the galaxy, four well-defined subsidiary probabilities must be established: (1) One must know how likely it is that stars should develop planetary systems. (It is assumed that life could develop only on planets, not on stars or in interstellar material.) (2) One must know what conditions are required in order to make a planet "habitable" and how likely it is that on a habitable planet life in fact will develop. (3) One must know how likely it is that intelligence will develop on a planet where rudimentary forms of life have taken hold. (4) One must estimate how long intelligent life is likely to last once it does develop on a particular planet.

In making estimates of this sort two rather different types of probability may be utilized. Inductive probability is based upon a frequency count of outcomes; we count the heads and tails in a sequence of coin tosses, or the deaths through lung cancer in smokers and nonsmokers of a given population. To do this does not require one to understand the processes involved; the assumption is that the ratio of outcomes of one type to the total number of outcomes in contexts where the same sets of causes can be assumed to be at work is significant in estimating the future likelihood of this particular outcome. On the other hand, where these causes are understood, at least partially, a theoretical probability may be calculable. If the simplest regularities of falling motion are known, one can calculate the theoretical probability of a coin coming up heads, even if one has never tossed a coin.

Inductive probability will not be of much use to us in making any one of the four estimates mentioned above. We know only a single planet where life definitely has developed. There has been evidence for some time (of which Puccetti seems to be unaware; see p. 69) that several of our nearest neighbors, such as Barnard's Star, are accompanied by at least one dark companion, presumably a large planet. This would give the beginnings of an inductive basis for estimating the first of the probabilities above. But on the whole we have to rely on theoretical probabilities. This presupposes that we can give some

## ZYGON

kind of warranted theoretical account of (1) the origin of planetary systems, (2) the origin of life, (3) the evolution of intelligence, and (4) the longevity of intelligent species. Unfortunately this is very far from being possible. We know a great deal more about origins than we did, but to say we have a specific theory would be a gross exaggeration in three of the four cases above, the exception being the first.

Take the origins of life, for example. It is possible to synthesize complex organic molecules by mixing together the right constituents; also strands of DNA can be made to replicate themselves artificially. Indeed, if one were to believe the newspaper headlines, it might seem that the artificial creation of life is at hand. Yet this is by no means the case. Although Arthur Kornberg has synthesized DNA, it has been only with the aid of a "primer" of DNA provided by an already living system. Without such a "primer" the synthesis of some polynucleotides is possible, but the pathway to DNA from constituents entirely abiological in origin is not known. And beyond that the step to even the simplest cell involves complexities of organization that may very well make direct "construction" of the cell technologically impossible. Of course such "construction" is not necessary in order to understand how living cells came about. But without the assurance that such an experimental retracing of the paths of synthesis would give, it is clearly going to be a laborious task to construct theories of the complexity requisite to the task of providing even the roughest probability estimate. In short, although many interesting and partially testable hypotheses have filled out A. I. Oparin's and J. B. S. Haldane's first speculations of nearly forty years ago, it is simply not the case that there is as yet a single, consistent, adequately warranted theory as to how the first living cells developed. Suggestive hints about some of the steps are the best we can do for the present.

We cannot specify what the necessary conditions for an environment in which life might develop would be. One can say with some plausibility that carbon and water would be needed, that temperatures should not range much outside  $0^{\circ}$ – $100^{\circ}$ , and so forth. But this is only a beginning: If a single necessary condition (a causal factor without which life would not have developed) is overlooked, a probability calculation based on the theory may be drastically in error. It may be that some relatively rare environmental factor (zero magnetism, high cosmic ray intensity, or the like) is involved. Until laboratory duplication has been achieved, it is difficult, however, to decide which factors can be ignored and which really play a role.

At the present stage of biophysical theory there is simply no way of generating an even moderately reliable figure for the probability of

life originating in a particular planetary environment. It may well be that given a sea, a temperate climate, and a small handful of common chemicals, living systems necessarily will develop. But it also may be that the requirements are far more demanding than this, in which case life might develop in only a tiny fraction of the apparently “habitable” planets.

Four systematic fallacies keep recurring in discussions of the probability of extraterrestrial life. The first is that, given a long enough time, the probability of any natural outcome depending on universal natural processes increases to virtual certainty. If all that is required for the origin of life is an extremely improbable combination of molecules attainable by simple mixing, then in any environment containing these constituents and providing a means of mixing them life ultimately would appear. But that a random mechanical juxtaposition of this sort would be of itself sufficient seems most unlikely. Instead a gradual process of biochemical development in which a host of unknown interdependent environmental factors played an essential role seems far more plausible. And, in that case, lengthening the time scale might not be of the least assistance; if one necessary factor were lacking at the proper time, the entire development might cease, never to begin again.

A second, even more pervasive fallacy may be called the “uniformitarian” fallacy: If life develops once, then it will develop whenever anything like the same circumstances recur elsewhere. The assumption is that the necessary conditions are simple and few and are likely to be fulfilled on virtually every habitable planet. The possibility that life might be a very unlikely occurrence is set aside as “unscientific” because it seems to suggest that our own vantage point is unjustifiably privileged. The same natural processes occur everywhere in the universe; if life is a basic cosmic phenomenon, it cannot therefore possibly be found in only one place or in a small number of places. Science does not (it is argued) admit uniqueness of this sort. If the capacities of matter are such that life can develop naturally in one place, then it simply must develop in many other places too.

That this sort of reasoning is fallacious is not hard to see. Until we know with some assurance what the natural processes were that brought life about on earth, we have simply no way of knowing how likely it is to happen elsewhere. The capacities for life, it is true, are known to be locked in the biochemistry of the matter that is spread from here to the farthest galaxy. But how often these capacities have been unlocked is something that cannot be answered until one knows how “special” a context is required, how likely it is that the same

constellations of factors would be repeated. The anthropocentrism of the past, which assumed that terrestrial man had to be unique, has been succeeded in some quarters by an anthropomorphic "we can't be alone" sort of assumption. Each of these extremes is likely to be based more on emotional grounds than on hard scientific analysis.

And this brings us to the third of the fallacies that mar so much of the writing on extraterrestrial life, the fallacy of large numbers. With  $10^{21}$  stars in the visible universe one still can arrive at a huge number of inhabited planets while making conservative-sounding, low-probability estimates along the way: "Let us suppose that only one in a thousand stars has a planetary system (of course the real figure is surely much higher); let us suppose that only one in a thousand of these is broadly habitable (the real figure is surely higher since life has shown itself so adaptable to wide environmental extremes on earth); let us finally suppose that only one in a thousand of these has the surface chemistry required (but of course the real figure is likely to be higher since stellar spectroscopy shows a fairly uniform distribution of chemical elements throughout the universe). This still would give us  $10^{12}$  inhabited planets. But now let us put in a 'safety factor' of  $10^6$ —this still leaves us with a million locations in the cosmos where life has developed."

This kind of argument (associated especially with the writings of Harlow Shapley and Frank Drake) can be extraordinarily persuasive. But of course it is fallacious. Until we have a theory of some sort, we cannot attach a theoretical probability of any kind to an outcome. To suggest a lower limit of one in a thousand planets as having the right surface conditions for the origin of life is baseless unless one can give a fairly specific idea of what these conditions are. It may turn out that when we are ultimately able to do this the lower limit could be one in  $10^9$  or  $10^{18}$ —or 10. It cannot be overemphasized that there is no responsible way of separating these numbers except in the light of a detailed and properly warranted theory.

Lacking this, plausible-sounding "conservative estimates" that end up with a hundred million inhabited planets are less than honest. When a scientist gives a number, rather than just using an open verbal term such as "possible" or "likely," he is taking on a responsibility of justifying this number rather than some other one. And, as noted at the beginning, the only way open to him to do so in this context is to present a definite developmental theory of the structure in question. It is not enough to point to vague generalities about the uniformity of nature or the universality of evolutionary principles.

This brings us to the fourth and last in our collection of fallacies dear to the exobiologist. It consists in the use of the theory of evolu-



tion as a predictive theory: Once life originates on a planet the operation of natural selection will lead gradually and inevitably to the emergence of more and more complex life forms and ultimately intelligent organisms of roughly the same type as man. Despite the fact that leading evolutionary theorists, such as Theodosius Dobzhansky and G. G. Simpson, have attacked this use of evolutionary theory as methodologically unsound, one still finds it appearing over and over.

Puccetti's entire fourth chapter furnishes an excellent example of it. He is aware that "eminent biologists" are critical of this predictive use of evolutionary theory, but he feels called on to "formulate a firm stand" against such a "pessimistic view" (p. 95). (The use of the term "pessimistic" is significant here.) His firm stand consists of nothing more than assertions, such as, "given an Earth-like environment, life will arise spontaneously and take a number of diverse forms in a liquid medium"; in his view this evolutionary line always will end with the appearance of vertebrate predators among whom intelligence of a human sort develops.

But what is the argument for this? It is not enough that one can explain terrestrial evolutionary history by pointing out the advantages for survival that the various features of this history possessed. To show how intelligence developed in predatory land mammals is not to say that in all conceivable evolutionary histories this is where intelligence would develop—much less is it to show that predatory land mammals inevitably develop in any evolutionary sequence. To claim this is to overlook (among other things) the role played by contingent environmental factors (such as climatic changes). The evolutionary mode of explanation points to plausible advantages accruing to past organic developments. But this does not mean that, given a certain stage of evolutionary development (say, the stage terrestrial organisms reached a hundred million years ago), one could predict what the next hundred million would bring. In this context, explanation and prediction are not symmetrical; to make them so is to misunderstand what it is to "explain" in the context of historical process.

Puccetti is aware of the fallacious character of the argument from large numbers (p. 63). He also seems to be aware that the necessary conditions for the emergence of life are not fully known:

The probability, in a somewhat vague sense of that word, of planetary systems with broad "habitable" temperature zones and ample time for the emergence of intelligent life is agreed upon. Beyond that we have no further data which can establish the true frequency of occurrence of intelligent and "communicable" life in our galactic vicinity. If this is really very frequent, then there might be technologically advanced societies within a radius of only twenty light-years. . . . But if, due to imponderable factors I shall not discuss here, these occur only rarely, then the nearest may be hundreds or even thousands

## ZYGON

of light-years distant. I repeat that no one can show why the former and not the latter must be the truer case. [Pp. 77-78]

This is an admirably agnostic statement of the case. One could wish that he would have discussed the "imponderable factors" or at least let the reader know what type of restriction he had in mind. His conclusion here is the same as the one I have been advocating above. Unfortunately elsewhere in the book one still gets the impression that he somehow has shown that inhabited planets are relatively common. At a crucial point in his closing chapter he even suggests the figure of  $10^{18}$  as a working estimate of the "probable sites of extraterrestrial natural person-communities within the known galaxies" (p. 139). Despite therefore the occasional cautions he inserts here and there, and his perceptive analysis of the very low likelihood of successful communication among inhabited planets, he does not do enough either to analyze the logical confusions that pervade the literature he is discussing or to dispel the suspicion that he shares some of them himself.

### IMPLICATIONS OF EXTRATERRESTRIAL LIFE FOR RELIGIOUS BELIEF

In a final chapter Puccetti argues that "the prospect of extraterrestrial intelligence . . . generates a profound suspicion that terrestrial faiths are no more than that" (pp. 125-26). He gives four reasons that purport to apply especially to Christianity. First, one would expect that the bible would contain some reference to extraterrestrials, if indeed they were divine in origin. Yet nothing is said of them, even though they would have to be part of the scheme of salvation. Second, the particularity of all world religions, East and West, becomes quite scandalous in the face of the cosmic universality of persons. How could the news of Christ's coming be spread to all the galaxies, and how otherwise would these extraterrestrials be saved? Third, if one supposes an incarnation on every inhabited planet, it might involve God in as many as  $10^{18}$  incarnations and perhaps as many as  $10^9$  "at the same time."<sup>7</sup> But (and here Puccetti returns to the Strawsonian analysis of the concept of person) nothing properly called a "person" can be in more than one place at the same time. Nor can even God be two distinct corporeal "persons" at once. Fourth, belief in union with Christ in the afterlife runs into this difficulty: what if there are  $10^{18}$  species of resurrected persons—and  $10^{18}$  Christs?

One supposes (indeed hopes) that these "objections" are partly tongue in cheek. To the extent that they are not, they betray a lack of imagination in the realm of theological possibility that contrasts strangely with the uninhibited imagination of the scientific specula-

tion earlier in the book. Puccetti's understanding of the notion of revelation, for instance, is pre-Galilean, even if his science is not. "If the Christian religion were in some sense 'true,' " he urges, one might well expect "the revelation of factual matters beyond the scientific understanding of men in ancient Palestine." Indeed "the Copernican picture of the solar system and the fact of human evolution . . . could certainly have been understood, since Greek science advanced these hypotheses several centuries before Christ. They do not seem of much religious importance, I admit, and no doubt Christianity can be rendered consistent with them by overlooking what the Bible actually says. Nevertheless God did 'reveal' a contrary account of the movement of heavenly bodies and of human origins, presumably knowing His creatures would some day discover this is not the case" (pp. 123-24).

In some of the most effective paragraphs of his classic work on the relations of science and the bible, the "Letter to the Grand Duchess Christina," Galileo showed why this naive account of the manner and function of revelation was unacceptable from the Christian standpoint.<sup>8</sup> Indeed, a thousand years earlier, in response to Manichaeic criticisms (not unlike Puccetti's) of the account of cosmic origins given in the opening chapters of *Genesis*, Saint Augustine in one of his most influential works, the *De Genesi ad litteram*, emphasized that the language of the bible is the everyday one of those for whom its books were composed and that the biblical account of origins must be understood as metaphor in certain respects at least.<sup>9</sup> That the Copernican picture might have been understood, in broad outline, by the ancient Hebrews is utterly irrelevant if the purpose of the biblical narrative (as Augustine and Galileo, as well as a host of other commentators have insisted) was to announce in outline the story of salvation. It is disingenuous, to say the least, on Puccetti's part to ignore this constant tradition and to set up his own easily destroyed man of straw. From the silence of the bible in regard to ETI nothing whatever can be inferred in regard to either ETI or the reliability of the bible.

A similar use of the literalist approach in the effort to discredit is to be seen in the various criticisms Puccetti makes of the application of the concept of person to God or to Christ. These objections take on a certain irony when it is recalled that this concept originated in the theological discussions of the fourth century centering around the Trinity and the incarnation. Theologians always have insisted on the analogical character of the concept of person and on the "negativity" of our knowledge of God generally.<sup>10</sup> If a human "person" cannot be in two places at once, does it follow that if God incarnate can be, the term "person" is inapplicable to him?

Puccetti's conclusion is that the univocal Strawsonian concept of person does not apply to Christ. One is tempted to respond: so what? Who has ever supposed it does? Puccetti's intent unfortunately is not to suggest that a different and more flexible concept should be applied to Christ in the light of new claims for his possibly multiple incarnations. Rather it is to argue that the whole Christian doctrine of incarnation makes no sense in this new cosmic context. There is an odd, ungenerous fundamentalism at work here, a refusal to allow for the expansion of concept, the development of doctrine, that is after all characteristic of both science and theology.

It must be conceded, however, that Puccetti in the end does have one important point to make, the point that has rendered it worthwhile to devote a lengthy essay to his book. It is that the new context of thought opened up by recent astronomical discovery has not yet received the attention it deserves from either philosopher or theologian. The discovery of new lands during the Renaissance forced Christians to rethink some of their particularistic beliefs about membership in the visible church as the only means of salvation. This challenge to particularism continues today, as religious believers of East and West become more and more aware of values and beliefs very different from their own. Puccetti is right in this, at least, that a religion which is unable to find a place for extraterrestrial persons in its view of the relations of God and the universe might find it difficult to command terrestrial assent in days to come.

NOTES

1. L. W. Beck, "Extraterrestrial Intelligent Life," *Proceedings of the American Philosophical Association* 45 (1971-72): 5-21.
2. The only theologian I know who has treated them seriously is E. L. Mascall in his *Christian Theology and Natural Science* (London: Longmans, 1956).
3. Roland Puccetti, *Persons: A Study of Possible Moral Agents in the Universe* (New York: Herder & Herder, 1969).
4. P. F. Strawson, *Individuals* (New York: Doubleday & Co., 1963).
5. Ludwig Wittgenstein, *Philosophical Investigations* (London: Macmillan Co., 1953); see pars. 66-77.
6. N. J. Berrill, *Worlds Without End* (New York: Macmillan Co., 1964); A. G. W. Cameron, ed., *Interstellar Communication* (New York: W. A. Benjamin, Inc., 1963); F. Hoyle, *Of Men and Galaxies* (Seattle: University of Washington Press, 1964); Carl Sagan and L. Shklovskii, *Intelligent Life in the Universe* (New York: Holden-Day, 1966); Harlow Shapley, *The View from a Distant Star* (New York: Basic Books, 1963); W. Sullivan, *We Are Not Alone* (New York: McGraw-Hill Book Co., 1964).
7. If one is going to introduce the results of contemporary science into theological discussion, then why not also special relativity theory, according to which the expression "at the same time" would have no absolute meaning when applied at the level of interstellar distances?
8. Galileo, "Letter to the Grand Duchess Christina," in *Discoveries and Opinions of Galileo*, ed. and trans. S. Drake (New York: Doubleday & Co., 1957).

9. For a fuller treatment of this topic see my "How Does Cosmology Relate to Theology?" in *The Sciences and Theology in the Twentieth Century*, ed. M. Hesse and A. R. Peacocke (Oxford: Oxford University Press, in press), chap. 2.

10. For a recent discussion of this dominant theme of medieval theology see D. Burrell's *God and Action* (Notre Dame, Ind.: University of Notre Dame Press, 1979).