

A LONG, COOL LOOK AT ALIEN INTELLIGENCES

Part III — Modes of Communication

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WE have considered three types of intelligent organism which might exist in other parts of the universe, and now we must consider the means which would have to be employed in order to enable such alien intelligences to communicate with us. There are three principal ways in which communication can take place: (i), Direct Visitation; (ii), Remote Communications; (iii), Ambassadorial Liaison. Any of these means of communication might be employed by any of the three types of intelligence which we have considered.

Direct Visitation

We may begin by noting that alleged sightings have reported entities which could be any of the types of intelligent organism previously discussed. Among the thousands of fresh reports every year there are plenty of humanoid and semi-humanoid species; many others that might be described as humanoid robots (although it is difficult to see what advantage a machine is given by humanoid form), and also there are things like a "Will-o-the-Wisp", "Meteor-like appearances", and "Balls of Fire". All of these could be Plasma Intelligences.

As for the means of transportation, we will try to simplify matters a little by discarding *ab initio* such transcendental devices of science fiction as automatic dematerialisation and re-materialisation by some kind of "ray"; "doors" through some hypothetical "dimensional continuum" which provide a short-cut to the Solar System, and "Hyper-drives" which permit velocities without limit in defiance of General Relativity. The distant entities (whether they use their own bodies as spaceships or employ separate vehicles for this purpose) are now limited by the velocity of light, and, perhaps even more severely, by problems of the strain imposed by acceleration and deceleration. It is also possible that, as with human astronauts, further limitations are set by the need to minimise sensory deprivation and even social deprivation. The probability of visits from communities situated at more than a few hundred light-years from Earth becomes very small indeed under these conditions. Even a visit from our own galactic centre, and assuming so high a velocity as an average, for both outward and return journeys, of 0.5 of the velocity of light (about 335 million miles per hour), would require a voyage of some 100,000 years' duration—a lifetime of an entirely different order from that of any machine which our technology can conceive, let alone that of a biological organism.

It would be an unwarrantable dogmatism to assert that such voyages will always be impossible, but they

are so highly improbable as scarcely to justify speculation. In the light of present-day science and technology it seems very unlikely that it will ever be possible for man to visit worlds more than a few light-years distant, or for man-made machines to visit worlds at more than a few tens of light-years—unless on a one-way ticket. The question then arises, "What is the prospect for finding or being found by Advanced Communities situated within a few light-years distance from Earth?" The answer is clearly related to the time for which such communities generally endure, as well as to the spatial density of habitable planets, and we have insufficient evidence to hazard more than a wild guess. What is certain is that, assuming habitable planets to be more or less uniformly distributed throughout the universe, the farther out one can travel the more there will be. In fact, the number must be proportional to the cube of the maximum range. However, for communication between communities there is no necessity for personal visits, and vastly greater possibilities are opened up by the various known forms of electromagnetic signalling.

Remote communications

Project Ozma was the name given to an attempt made by Dr. Drake of the national Radio Astronomy Observatory, West Virginia, to detect any intelligent signals which might be coming to the Earth from nearby stars. The name of the project came from Queen Ozma, the story-book queen of the wonderful land of Oz, which (according to the story) was very, very far away, very difficult to reach, and full of wonderful and delightful things. The stars chosen were the solar-type stars, Tau Ceti in the Constellation of Cetus (the Whale) and Epsilon Eridani in the constellation Eridanus (a mythical river). An 85-foot radio-telescope fitted with the very latest receiving apparatus was prepared for this experiment, but the project was terminated after only 150 hours of observation (in May, 1961), without any signals having been detected. Calculations made before the experiment was commenced has suggested that, for the known distance of about 10.5 light-years, and a receiver the size of the Jodrell Bank telescope, a transmitted power of 160 megawatts per megacycle bandwidth would suffice. It was hoped that the alien intelligences might have much more powerful transmitters, but if so, they were pointing in some other direction.

Radio equipment is still developing fairly rapidly, and so are techniques for improving the signal-to-noise ratio, which is what really determines how intelligible

a signal will be when it has travelled a vast distance. Lasers, too, now offer hope of many light-years range, although they are less suitable for interstellar communication because they have always to be picked out from the glare of the local sun. It is a simple matter to produce radio sources which are many thousands of times "brighter" than the local star at the same wavelength. Probably the best wavelength to use is 21 centimetres, because it is the wavelength radiated by interstellar hydrogen, and being of great interest to radio astronomers it is highly probable that close attention will be given to this particular wavelength by intelligent entities anywhere in the universe.

The problem of how to carry on a two-way exchange of information is too complex to be entered into here (it is dealt with fully in *OTHER WORLDS THAN OURS*), but there are various schemes which seem quite capable of overcoming the obvious difficulties, and the only really difficult problem is that of transmitting information at any appreciable speed. There are two aspects of this problem; the first is that by reducing the number of "bits" of information transmitted in unit time it is much easier to get a good signal-to-noise ratio, and thus maximise range; the second is that, for anything like a conversation, there is the enormous interval while we wait for the message to reach the distant star, and then wait again for the reply. Even the planets of Tau Ceti or Epsilon Eridani, the nearest stars which seem likely to be able to support life, require twenty-one years for a simple question and answer. With planets at still greater distances the situation becomes quite ludicrous. All that one can do is to transmit an account of one's own civilisation, and hope that one's opposite number will respond in a similar manner. By far the most likely form of contact between races (in my opinion) is by means of space probes analogous (but vastly superior) to our own Venus and Mars exploratory vehicles. Even if the distant community is some sort of assemblage of mechanical intelligences, or a single computer, it is more likely to depute the job of exploring distant systems to lesser machines than to undertake the journey itself. For one reason, lesser machines can be proliferated, launched in all directions, and the exploration of many solar systems and their planets undertaken simultaneously, whilst the central intelligence sifts the reports as they come in.

Ambassadorial Liaison

The NASA organisation in the U.S.A. is already working on plans for extremely sophisticated Mars exploratory vehicles, intended to be launched within the next five years. Those vehicles are intended to put 1800 lb. satellites into orbit around Mars whilst a 2000 lb. capsule full of instrumentation is landed. Later vehicles are intended to fly-past whilst landing capsules of up to 6000 lbs. The orbiting satellites will carry television equipment for mapping the planetary surface, together with other apparatus for monitoring atmospheric changes. The landed capsules will be equipped with complex laboratories capable of analysing soil samples for evidence of life. Such problems of instrumentation are far more difficult than those needed

to send simple probes to other stars, and engineering studies have already been made to find out the feasibility of such interstellar voyages in terms of cost and known methods of space propulsion.

If we accept the probability of innumerable other habitable worlds in the universe, many of them vastly older than our own Earth, then we must clearly accept the probability of other communities having developed interstellar probes unthinkably more advanced than anything which we can possibly imagine. We can reason that fleets of such probes would be sent out, each of which, after its long voyage through interstellar space, would take up an orbit in a planetary system and would "listen-out" for radio signals which might indicate the presence of an intelligent community. When signals were received, the probes would repeat them in the form of a delayed echo, which would show the intelligent race that they had visitors—either intelligent themselves or the product of superior intelligences. Subsequently the probes would store up data for eventual slow transmission (remember, slow transmission gives the maximum range for a given power) back to their home system, perhaps using relay stations which they had set up on the outward voyage.

Have we any evidence for anything like this? Perhaps so. Almost forty years ago, Stormer and van der Pol, both distinguished engineers in the relatively new field of radio, reported powerful and long-delayed echoes from radio stations—echoes for which there was at the time no explanation at all. Today, apparatus capable of producing such echoes is familiar to all microwave engineers. Military aircraft are equipped with apparatus which listens-out for enemy radars, copies their characteristics, amplifies the interrogating signals, distorts them suitably, and re-radiates them so that they are interpreted by the interrogating station as echoes from a much more distant target in a totally different direction.

Space-probes could use similar equipment, not with a view to military deception, but as a simple statement which says, "Here I am; I can analyse and copy your signals, so you see I have logic and a memory. Please send further data." Perhaps Stormer and van der Pol missed just such an opportunity, and the visiting probes went on to other planetary systems, having reported to their base that our radio signals were senseless jumbles—perhaps some kind of natural radiation, like that from Venus or Jupiter. This brings us to another interesting possibility, that the emissions from these planets are quasi-natural, that is to say, they are caused by something like artificial control of weather, and have been given permanence and form by the artifice of intelligent beings. Visiting space probes which found evidence of communities which were just emerging from savagery and starting the long struggle towards technological control of environment, might set up "repeater stations", hoping that when the local race was intelligent enough it would decode the messages and reply. It is quite possible that various phenomena which we accept as entirely "natural" are in fact artificially induced. The radio emanations from Jupiter are very peculiar indeed: far from being incoherent outbursts of radio energy distributed isotropically, they occur as well-defined

“beams” of frequency-modulated waves, much more like a “radio lighthouse” than a natural noise-source. The modulation of the waves, particularly in the region of 10 metres wavelength, is apparently controlled by the position of the third largest satellite, Io. The bursts of radio signals only occur when Io is 90 or 240 degrees from superior conjunction. To complicate matters still more, the rotation of Jupiter itself also enters into the mechanism. The magnetic axis of the Giant Planet is highly eccentric, and as Jupiter rotates the tilt of its magnetic axis is in the direction of Io every 13 hours or so. At 60 degrees before the magnetic axis overtakes the satellite, Jupiter begins to emit radio signals in a direction 90 degrees beyond the satellite, which signals continue fixed in direction with respect to Io until, just before the plane of the magnetic axis catches up with Io, a second set of signals starts up. The new radiation is sent out in the direction (with respect to the satellite) in which the magnetic axis was pointing at the start of the whole sequence. To further complicate this complex procedure, the two sets of radio signals differ in respect of frequency-structure, and both show different patterns of frequency in relation to time. Maybe, when we are a bit brighter, it will turn out that, what seemed only a few years ago to be “severe Jovian thunderstorms”, are actually some patiently reiterated message concerning our nearest intelligent neighbours.

Perhaps, too, we should pay some attention to the “Lagrange Nodes”, the five points in space in the vicinity of every pair of celestial bodies which have

zero gravitational potential, and which thus form convenient cases in the desert of space, where probes can rest without having to orbit any other body. These nodes were predicted by Joseph Lagrange about 200 years ago, and it is only recently that evidence has been produced to suggest that they have a real existence (radio echoes imply accumulations of space-dust at these points). A small probe would not be distinguishable from space-dust with our present equipment, and such a machine may be lying out there waiting for the appropriate signal of interrogation to start up its recorded message

In all the foregoing we have adhered closely to what might be termed Scientific Monism—the concept that all the phenomena in the universe can be reduced to physical laws, even though they be laws of an altogether superior system of knowledge to our present science. But there is another way to look at the universe, which has as many and as powerful adherents as Monism—that is to say Dualism, by which is to be understood that Mind is something of a different nature to Matter, and that although Mind and Matter may interact, this interaction is not necessarily of a causal nature. Once we are prepared to accept Dualism as a respectable hypothesis, we must give consideration to many phenomena of the type known as “parapsychological”, or in an older terminology, as “supernatural”. In Part IV of this article we will see what light can be shed by the concepts of parapsychology upon the question of Alien Intelligences.

Our Cover illustration is a detail extracted from the photograph reproduced on this page.



The photograph was taken by Mr. Franz Trautsamwieser, of Vienna, Austria, during a visit to Venice, Italy, on September 5, 1966. The weather was perfect, with a clear blue sky : the time, 2.00 p.m.

Mr. Trautsamwieser states that he did not see the object. His only interest was to take a picture of the church on the far side of the canal.

Technical details: **Pentina FM** (Pentagon) ; **Lens :** Meier Tele 135 mm.; **Stop-opening :** f 5.6 or 8 ; **Exposure :** 1/125 sec.; **Film :** AGFA CT 18.

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