



## **North American AstroPhysical Observatory (NAAPO)**



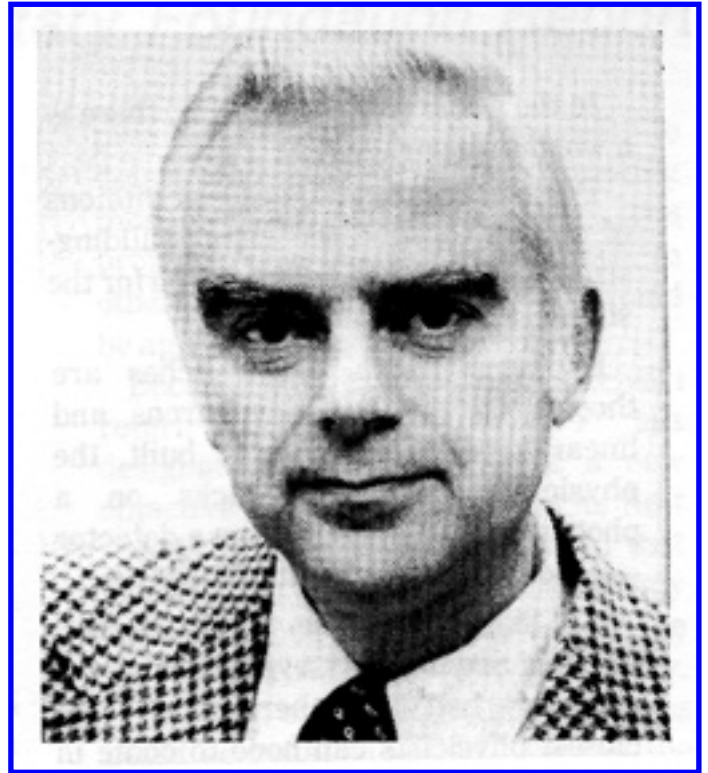
### **Cosmic Search: Issue 10 (Volume 3 Number 2; Spring (Apr., May, June) 1981)**

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# Space Travel and Life Beyond the Earth

By: Frank D. Drake

Is intelligence a fluke? Are we the result of a series of remarkable unique events, the likes of which may never occur in the right order on any of the countless worlds in space? It's an important question, of course, not only because of its religious and philosophical implications, but because the answer strongly affects the plausibility of actions we take to detect intelligent life in space.



The lords of paleontology have not been cordial to SETI on this point. The records in the fossil-bearing rocks seem to show evolution to be a haphazard process, with a unpredictable twist here, another there, eventually leading to an extensive biota of complicated creatures of unpredictable anatomy and maybe, but very improbably, intelligence. However, some people have thought that evolution is not a random walk through the cosmic encyclopedia of possible life forms. They suspect that all of the twists and turns of evolution are like the random wavelets which go here and there across the face of the ocean. Throw in a cork and it bobs to and fro, now left, now right. But wait a while and it will always move overall in the same direction, the result of an invisible but dominant current. Could not the evolution of intelligence be so described? Could it not be that, indeed, nowhere in all of space and time will there be other creatures exactly like us; yet in most biotas there will be an intelligence like ours, the result of an unrecognized but powerful driving force in evolution.

Now there is evidence that this may be exactly what happens. Quietly, a careful, highly admired, paleontologist has made a study of the history of intelligence on earth. He is Dale Russell, of the National Museums of Canada, an expert on the creatures of the Mesozoic era, the age of reptiles including the great dinosaurs. He and others have achieved an important goal, a means of estimating the intelligence

of a creature from its brain weight and body weight, both of which can be deduced sufficiently accurately from fossil remains. A relationship has been developed which tells how much brain mass a creature needs just to keep it alive and functioning like a mindless machine. Brain mass in excess of this can be devoted to intelligent activities. This thinking portion of brain is called "encephalization," a heady word if you will pardon me!

Russell has found, to his and others' surprise, that encephalization has increased at a remarkably uniform, steady rate for at least half a billion years. As reptiles, mammals, birds, and fish have experienced variations in their anatomy and their success as creatures, the "ripple on the sea," the level of intelligence has marched ahead like a well-trained army. The upward trend is visible in even the most recent past, and one can predict future levels in intelligence, providing that the actions of intelligence itself do not affect the rate of improvement either upward or downward. These studies seem to shout loudly that we can expect to find intelligence wherever initial circumstances and time have been sufficient.

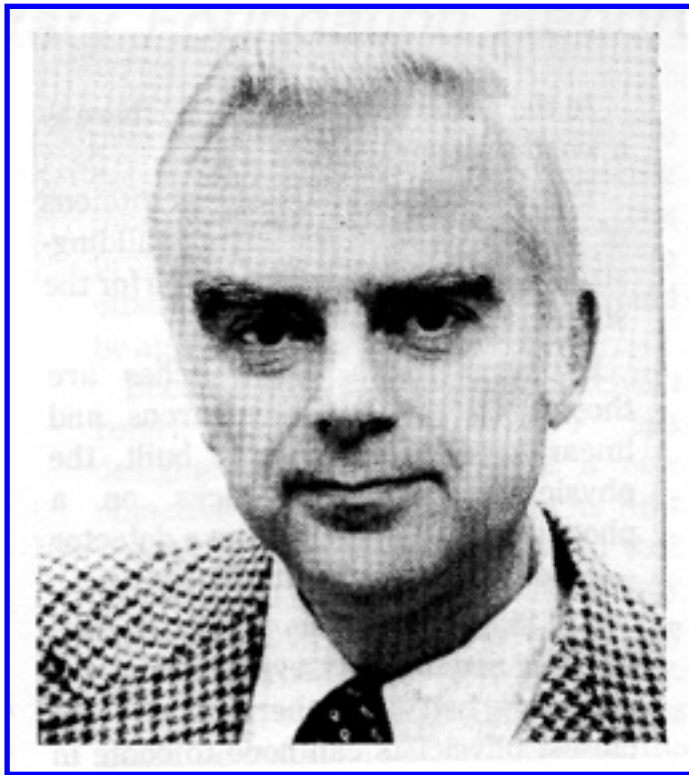
An especially fascinating find is the discovery of some small dinosaurs with such large brains that they were on the verge of becoming intelligent. Saurornithoides, a resident of western Canada and Mongolia was a rather charming creature some four feet tall. It stood on two legs, and had hands with something like an opposable thumb. It could manipulate things with these hands, and was in a sense already a hunter-gatherer. It all sounds familiar, doesn't it? Saurornithoides was not quite smart enough to survive the cataclysm which wiped out every creature weighing more than about 50 pounds some 65 million years ago. That was the extinction of the dinosaurs, an event which wiped out many other creatures as well, and almost surely was caused by the dreadful climatic effects of the collision of a small asteroid with the earth. Had the asteroid waited just a few more billion years to strike the earth, Saurornithoides might have become truly intelligent. It might have found ways to survive a cataclysm. It might have become us, and we might have been small dinosaurs, all millions of years before our time.

Asteroids will smash into the earth again. We are probably smart enough to survive. But if we aren't, then just as it was 65 million years ago, there are candidates for the next intelligent species waiting in the wings.

A short time ago, a famous television newscaster asked me in an interview what the

next intelligent species might be. He expected to hear the name of an exotic monkey or other primate, and that may well be the right answer. But I gave him another name, the name of creatures who are known to all of us, and who have demonstrated not only high intelligence (as anyone with a birdfeeder knows) but already the ability to prepare for long periods of adversity, even the coming of an asteroid. Squirrels! They are already up on two feet and using their hands with great dexterity. They even climb trees better than you or I! Give them a few million years and maybe the squirrels will be us.

The newscaster thought it was a joke and I doubt that you will ever see that part of the interview telecast. But it is not funny to the cosmos; the cosmos has no prejudices as to what form intelligence may take. We now know it gives every creature a real chance at it. The variety of intelligent creatures must be far beyond what we can imagine.



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