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## SCIENCE/EDUCATION

# Triangle head, big eyes, and it may need batteries

On a recent visit to Dayton, I was reminded of rumors that have been around for a long time. The story has it that a certain hangar on Wright-Patterson Air Force Base contains the wreckage of a very unusual flying machine which crashed some years ago in Texas. And that a cold room there preserves the remains of the crew from the doomed craft. It is said that the bodies are not human and the ship is not from Earth.

These and related stories about visits from extraterrestrials are being repeated in a recent surge of attention, which may be due in part to the promotion of books reporting the experiences of persons allegedly kidnapped by E.T.s. Some abductees have scars which they claim were caused by wounds resulting from medical tests done by the non-human kidnappers.

Physical descriptions of the visitors vary, but they are almost always humanoid. In television stories about

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E.T.s recently aired on local news broadcasts and at least one national TV news show, the interlopers were portrayed as generally child-sized, with large, triangular heads and big eyes. A lot like the movie "E.T."

As I noted in a recent column, a well-trained scientist will never say a thing can't happen unless it clearly violates the known laws of nature. But in the absence of verifiable evidence proving that extraterrestrial, intelligent, technically competent life forms are visiting Earth, a scientist will fall back on general considerations, which can only put some limits on the discussion.

We can assume that any sunlike star has a reasonable probability of possessing at least one habitable planet, and that life is likely to have

developed within a billion years of the birth of the system. This is, in effect, asserting that what has happened on Earth is typical.

We might also suppose that once life appears, the evolution of intelligence is inevitable and occurs within 3 billion to 4 billion years, again as was the case on Earth.

With these assumptions, the question becomes: How many habitable worlds bearing technically advanced civilizations capable of space travel lie close enough to Earth to allow visits? In making this assessment, spacecraft speeds are assumed to be, at most, some fraction of the speed of light.

This limit on the speed of any moving object is described by the theory of relativity, and a violation has never been observed. It seems to reflect a fundamental constraint dictated by the structure of space-time, and no physicist I know of can see a way around it.

In "The Search for Life in the Universe," Donald Goldsmith and Tobias Owen consider the 32 known stars within 12 light-years of Earth to define our immediate surroundings, which is a pretty typical region of the galaxy. These stars are grouped in 23 separate systems since several occur in doubles or triples, with the member stars orbiting each other.

There is no direct evidence of planets around any of these stars. Even for the closest, the faint glow of reflected light from a companion planet would be drowned out by the brilliance of the central star.

Nevertheless, by carefully watching the motion of these stars, the presence of companions with masses comparable to that of Jupiter has been inferred for several. And in such systems astronomers expect to find smaller planets, possibly Earthlike.

Most of these "probable planets" are orbiting stars too small and cool to support life in the region around them. Of the stars within 12 light-

years, 24 are definitely too small. For the rest, only three: Alpha Centauri A and B, and Epsilon Eridani, are large enough to be compared to the sun, and there is no evidence yet that these stars have planets.

Some analysts estimate the probability of Earthlike planets around at least one of these stars at about 12%, and the probability of an Earthlike planet within 22 light-years at 43%.

Because of relativistic effects, accelerating a spacecraft to speeds near that of light requires prodigious amounts of power, thus limiting travel to considerably slower-than-light speeds. That means travel back and forth even to the nearest stars requires years, perhaps generations by Earth measures, even for beings whose mastery of space travel is vastly superior to ours.

Of course, to a life form with great longevity, the kind of limits we can imagine may be inapplicable. If we lived thousands of years, we might be willing to mount expeditions to other

stars and wait all that time for the news of what is to be found on the other end.

Someday we will presumably begin to send probes to other stars with planetary systems, but they will almost surely be robots. These will not be simple cameras or samplers, but complex automatons with artificial intelligence which can use local materials and energy to build a laboratory or system of laboratories for a thorough analysis of the distant world.

Scientists are skeptical of claims about visits by extraterrestrials because of the factors mentioned above. But that doesn't mean that E.T. hasn't arrived, just that the scientific community hasn't seen convincing data. If you think about it, that's just the way it would be if there were E.T.s visiting Earth and they hadn't yet called a press conference.

Perhaps E.T. is a robot not programmed to care about what we think.

THE GATE  
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