values based on temperature alone to be of doubtful validity, presumably utilized normal mean period temperatures, which may include below-zero temperatures, when plants are inactive. Plant activity or growth is the same at −5°, −20°, or −40°C, so the inclusion of such data in means obscures the marked differences in plant activity that occur at even less widely separately positive temperatures.

My potential evapotranspiration values should be higher than the observed values for an evapotranspiration battery in moist-to-wet climates, since the former apply to natural, mature vegetation and not to the low, artificially established vegetation of the latter. Contrarily, one would expect my values to be lower than battery values in arid or drier climates, provided the battery is set up with a moist-climate vegetation such as the commonly utilized Kentucky blue grass.

Further, the factors of insolation, humidity, and wind, which, if they differ, would be certain to alter the potential evapotranspiration readings for a given type of artificially established vegetation in distinct areas, are canceled out in natural vegetation by the evolved physiognomic changes in such characters as leaf size, leaf texture, and vegetation height. In fact, the physiognomic variations in natural vegetation provide the theoretical basis for the formula.

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Intragalactic Communication

The "Next question" proposed in the 25 December editorial [*Science* **130**, 1733 (1959): "May not other civilizations [on other planets] . . . be waiting in silence [due to restraints imposed by local fiscal authorities] for our signal before they give their response [and are we to await approval from our own fiscal authorities before beaming signals into space, the mutual wait yielding an impasse]?" is indeed thought-provoking.

In addition to financial considerations there may be other factors responsible for man's not having been contacted by other beings. It has taken the earth some 4½ billion years to cool and evolve life to the point where radio astronomy could be developed. For man to suppose that planet X has arrived technologically in the same decade (10 years compared with 4.5×10^9) smacks of egocentricity and lack of perspective. More probably the galaxy contains planets varying widely

in mass and temperature, with a resultant wide distribution of cooling times, onsets of life, and technological advances on the part of the intelligent beings that have evolved. This is to say that many thousands of years may separate the evolution of planets X and Y to the point of intragalactic communication. It follows that with this sort of "arrival spectrum" a given planet cannot afford to send signals throughout the centuries toward planets in a less advanced stage of development.

It may well be that in the older, cooler planets—located, in general, in the outer fringes of the galaxy—intelligent beings "arrived" technologically many thousands of years ago; in that case, the logical thing for them to do would be to wait for developing societies (like that of Earth) to signal *them,* once the new civilizations have "arrived."

In short, the rule for initiating intragalactic communication could well be: Let the innermost (relative to the center of the galaxy), and supposedly youngest, planet, send signals toward the outermost.

Thus it may well be up to Earth to make itself known by beaming signals of high intensity in narrow bands toward the outer stars in the galaxy. The time and cost involved is the price man must pay for being a curious and sociable being!

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Hello Out There (Project Ozma)

Twinkle, twinkle, little star,
  Out in space so very far.
If you're as bright as we think you are,
  Beam us a signal, little star.

KATHARINE O'BRIEN

Portland, Maine

Olfactory Discrimination

Michelsen recently reported in *Science* [**130**, 630 (1959)] some interesting work from the Harvard Psychological Laboratory on olfactory discrimination in the pigeon. The general findings as summarized in the abstract were as follows: "A discrimination, based on olfactory stimuli, was established in two pigeons by an operant conditioning procedure. Results from control sessions demonstrate that the discrimination can be attributed only to the presence or absence of olfactory stimuli." I was pleased to learn of these findings since they made more tenable the hypothesis