with a new and dangerous pest—namely, *Musca autumnalis* or face fly. This insect is very closely related to the house fly, but it differs in habits. It congregates on the face of cattle, and these miserable animals have no defense. Like its close relative the house fly, it is an extremely effective transmitter of certain disease organisms, such as staphylococci, salmonellae, coliforms, and other enteric bacteria. It even likes the face of man, particularly the corners of the lips. For two summers I have watched this pest on the cattle pastured almost in my back yard. They are miserable animals with sore eyes, and I do not for one minute suppose that their milk is of the highest or most nutritious quality. We have available insecticides which are safe by any reasonable standards, and effective. However, they may not be used legally on dairy cattle because of the fanatical attitude of certain federal officials. The face fly is spreading steadily in the northeastern United States, where nothing is done to control or to eliminate this disease-bearing pest. I wish to point out that this is a very dangerous trend. We are accepting an obvious and well-proved hazard because certain individuals with legal power dream of a possible hazard connected with the use of insecticides upon dairy cattle. We grant that certain insecticides can be dangerous, but there are available today effective drugs that are not hazardous from the scientific point of view. They have been very well studied, and while they cannot be declared absolutely innocent (the absolute has no place in science) they are, when used as insecticides, as innocent as sugar, salt, or milk itself. This is all that a relative science can do, for science can never be absolute.

White's complaint, that insecticides used to control the fire ant are hazardous to wildlife, is out of proper reference. If permitted to spread throughout the southern United States, this pest species will destroy many wild species and their habitats. D. Hey, writing of Cape Providence, Union of South Africa, states, "particularly introduced forms such as the Argentine Ant" have played their part in depletion of wildlife. Evidence of the same "depletion" is recorded for the United States. We should not trade temporary loss of a few species over a small area for permanent loss of many types over a much larger area.

As Francis Bacon stated years ago, we must be willing to accept new remedies, or we must prepare ourselves for new ills. The fire ant and the face fly are merely two of the many ills that presently affect us. I know of many more. They happen to be new to this part of the world, but there are old as well as new problems. These are scientific problems and they must be dealt with by scientific methods. This means that we must open our minds to the relative laws of science and bar therefrom the absolute nonsense that has created the cranberry scandal and is driving us toward a dairy debacle. Every new drug should be adequately tested by the relative laws of science in general and of biology in particular. The use of absolute dicta, of the philosophical zero, such as White seems to approve, will prove disastrous again as in the past. Science can never prove absolute safety—it can prove necessity and relative safety.

Generalization from such limited cases is of uncertain value; the conclusion that the problem is fundamentally biological seems unavoidable. Consequently, the solution must follow the laws of biological science. The virulent poisons produced by staphylococci and other pathogens are a part of the problem. Dogmatic regulations that contravene the laws of biology will prove dangerous and even disastrous. Safety must be defined in terms of biology and not in terms of a philosophical zero, an absolute mathematical formula, or an analytical procedure.

PAUL D. HARWOOD
Hess and Clark, Ashland, Ohio

Electronic Brains?

A few years ago the new electronic digital computing machines were often popularly referred to as electronic brains. However, this practice soon fell into disrepute among scientists and engineers. A cliché which developed said in effect, "A general-purpose digital computer is designed to carry out arith-

metic operations in a predetermined sequence and could never think in any sense of the word." This cliché still represents the dominant attitude of many scientific and engineering publications on both sides of the iron curtain. An elaboration, which often follows the cliché, explains that the sequence of arithmetic and logical operations is completely predetermined by a human programmer, and any appearance of thinking by the computer is merely a manifestation of the thinking of the human programmer. (The general-purpose digital computers do carry out sequences of arithmetic and logical operations as specified by the programmer, but the programmer may specify that the sequence shall vary as a function of the input variable [or sensory] data.)

These projections of their own ignorance by pseudo experts may be amusing to researchers who are daily engaged in mechanized-thinking experiments on general-purpose and special-purpose computers. However, a scientist seeking employment or approval for a new project from a director of a research laboratory may not find these negativistic attitudes at all amusing. Such negativistic statements are almost invariably followed by a challenge to demonstrate the mechanized-thinking process by deriving the general theory of relativity. This seems comparable to requiring the Wright brothers to prove that they could fly by flying nonstop around the world.

It may seem improbable that research directors would be so ill informed concerning subjects relevant to their work. However, this seems to be the rule rather than the exception. It would appear that prominent scientists and engineers should be more cautious about asserting that certain things cannot be done merely because they do not know, at the moment, of any feasible method. They not only leave themselves open to ridicule in many instances but may also hinder the progress of research, for the direction of scientific research may be greatly affected by a simple, negativistic, dogmatic, cliché.

ROGER A. MACGOWAN
Army Ballistic Missile Agency, Redstone Arsenal, Huntsville, Alabama

Conversions

Apropos the editorial on "Metric versus English units" [*Science* **131**, 195 (22 Jan. 1960)] with its implications regarding conversions, I should like to call your attention to the reports on the Tiros [*Science* **131**, 1031 (8 Apr. 1960)] and U.S.S.R. "space ship" [*Science* **131**, 1510 (20 May 1960)] satellite launchings.

Apogee and perigee of the Tiros are given as 407.2 and 378.7 nautical miles, respectively. According to my conversion tables, 1 nautical mile equals 1.1516 statute miles. The corresponding apogee and perigee should be 468.9 and 436.1 statute miles. In the article they are given as 468.28 and 435.5 statute miles, corresponding to a conversion factor of 1.1500 statute miles per nautical mile.

Similarly, the announced weight of the Russian "space ship" was 4 tons, 540 kg. In the *Science* article this is given as 9988 pounds, corresponding to a conversion factor of 2.2000 lb/kg. In fact, the conversion is 2.2046; the weight in English units is apparently 10,009 lb.

For the purposes of the articles in *Science*, accuracy in these details is probably not important. Nevertheless, there is a lesson to be learned about the simplicity of conversions within the metric system and about the retention of significant figures during and after conversions.

PEMBROKE J. HART
IGY World Data Center A, National Academy of Sciences–National Research Council, Washington, D.C.