Adequate Protection

The recent letters of Goodman (Letters, 21 July, p. 210) and Grigas (Letters, 1 Sept., p. 746) describing the disability and real tragedy that can occur when a research worker becomes allergic to rodents prompts me to write this letter. Although I can be thrown into a state of respiratory collapse within minutes after exposure to rodents, I have found a regimen that allows me to work with impunity around the little beasts.

I protect myself first by wearing an industrial dust mask (be sure to get one certified by the Bureau of Mines "for protection against inhalation of dust not significantly more toxic than lead"). I have found that the Glenaire respirator made by the Glendale Optical Company, Woodbury, Long Island, New York, to be the most comfortable, and the price is only about $5. I also wear the industrial goggles made by the same company for protection against the terrible eye burning and tearing that the allergens produce. I have found these two items very helpful but insufficient. Apparently allergens also cling to my hair and clothes, and when I take off the mask, trouble begins. So I also wear a closely knit surgical gown (ordinary laboratory gowns are a poor second best) with tightly fitting knit cuffs. Finally I wear a surgeon's cap and disposable gloves. The gloves should be put on surgeon fashion, over the knit sleeves of the gown.

With this costume I am able to work freely with rodents for an entire day. It is essential to be absolutely rigid in adherence to all aspects of the costume and to check very carefully that everything fits snugly. The only real annoyance is that you will look a little weird, and you will constantly be asked questions. On the other hand, it is gratifying to note how many of your questioners are pretty girls.

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Modern Taxonomy

In their article "The origins of taxonomy" (17 Dec. 1971, p. 1210) Peter H. Raven, Brent Berlin, and Dennis E. Breedlove paint a dismal picture of modern taxonomy. They argue that the present hierarchical system of classification, based upon the binomial species, is hopelessly inadequate to deal with the millions of kinds of living organisms. They suggest that only radically new systems dependent on the rapid retrieval of information from computer banks can solve the problem. However, they do not specify what these systems might be or how we could hope to make reductions in the highly skilled labor required to obtain and record them.

The problem is not in existing classification codes, which are at least adequate, but in the amount of effort devoted to taxonomy. Real taxonomists—the experts who record information about diversity on a continental or global scale—are in very short supply. Consider the ants, for example. Although these insects are dominant in most terrestrial ecosystems and comprise more than 7600 known living species—evidently only a fraction of those that exist—I know of only five entomologists in the entire world who work on their classification full time, and a scattering of others who contribute occasionally. If there were 50 such specialists instead (still a minuscule subpopulation of the entire international scientific community), one could expect to see the greater part of the world ant fauna elucidated, through conventional means, by no later than the end of this century. The ants are typical in this respect among the insects, which are the most species-rich of all organisms, and they are probably typical of most other groups of organisms as well.

Let us grant that 10 million kinds of organisms might be alive today, the extreme (and disputable) figure suggested by Raven *et al.* The inventory of even so great an assemblage is not beyond the reach of existing taxonomic methods, contrary to what the authors suggest. Most "alpha" taxonomists, that is, biologists who are concerned full time with the initial process of discovery and recording, master as many as 1000 species in their lifetime. (The upper limit is undoubtedly represented by one dedicated dipterist who has personally described over 10,000 new species of flies.) The entire task of alpha taxonomy, then, could conceivably occupy approximately 10,000 specialists for their lifetimes. It might be virtually finished—should it be undertaken—in 50 years. If the results were recorded by conventional means in books and journals some 10,000 volumes, filling 1 mile of shelves, would be required. The cost would be approximately $10 billion spread over two generations. This is not to deny that computer technology will greatly reduce the time and cost of analysis and recording, and render the mile of shelves unnecessary; in fact, the development of such methodology is already well advanced. Nor am I seriously suggesting a Linnaean NASA for the purpose of finishing alpha taxonomy by conventional means. My purpose is to dispute the fundamental contention of Raven *et al.* that it is "clearly out of the question" to complete a survey of many groups of organisms and that "our present taxonomic system is, in the face of the job for which it has responsibility, inadequate." This is defeatism, unrelieved either by necessity or by formulation of any concrete alternative.

Even more defeatist is the authors' belief that completing a world biotic survey has no merit in itself. They seem awed that only 15 percent of the kinds of organisms have been described. Surely the exploration of the remainder of life on Earth is not only justified but one of the most exciting and potentially fruitful tasks lying ahead.

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Raven, Berlin, and Breedlove remark that "the taxonomic system we use appears to communicate a great deal about the organism being discussed, whereas in fact it communicates only a little." Does it? If I state that a certain organism is a fly, I immediately say a good deal about its structure, life history, and ancestry. If I place it in the family Drosophilidae, I specify the structure of adult and larva in considerable detail, and if I place it in the genus *Drosophila*, even more information is immediately implied. To state the species group to which an organism belongs is to describe the major features of its mating behavior, cytology, and so forth. If there is a better system of information retrieval, it is not to be found in the broad generalities these authors provide.

Having labeled the "biological species concept" as "spurious," without documentation, the authors proceed to make a series of statements that can be questioned: "We implicitly assume [from the classificatory process] that we know as much about a mite from the