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Editorial

BIODIVERSITY KNOWLEDGE: STILL A MAJOR QUESTION MARK

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The state of our knowledge about biodiversity was put into perspective a couple of years ago by Peter H. Raven, Director of the Missouri Botanical Garden, and Edward O. Wilson, Frank B. Baird Professor of Science and Entomology at the Harvard University Museum of Comparative Zoology (1992).

These two eminent scientists pointed out that on our planet there are anywhere from 9.5 million to 100 million species, but thus far we have identified only about 1.4 million of them. This means that *at best* we know fewer than 15% of the living things in our biosphere, and it is possible that we know fewer than 2% of the species on our planet. Furthermore, Raven and Wilson illustrated by the following examples that our lack of knowledge extends from the more obscure groups, which might be expected, to what are considered to be well-known groups:

1) Eleven of the 80 known living species of cetaceans (whales and porpoises) have been discovered in this century, the most recent in 1991; at least one more undescribed species has been sited in the eastern Pacific but not yet collected.

2) One of the largest shark species, the megamouth, constituting the new family Megachasmidae, was discovered in 1976 and is now known from five specimens.

3) During the past decade, botanists have discovered three new families of flowering plants in Central America and southern Mexico; one, a remarkable relict, is a forest tree that is frequent at middle elevations in Costa Rica.

4) The most recent new animal phylum, Loricifera, was described from the meiobenthos in 1983; many additional new species in the group have since come to light.

5) The great majority of insects in the canopy of tropical rain forests, possibly in excess of 90 percent in some groups, remain unknown.

6) Although only 69,000 species of fungi have been described thus far, a leading specialist estimates that the world total is 1.5 million or more.

7) The number of bacterial species recognized by microbiologists is about 4,000, but the huge majority in existence remain incommunicado and hence undiscovered, because their culturing requirements are unknown. Recent studies in Norway indicate the presence of 4,000 to 5,000 species in a single gram of beach forest soil and a comparably large but different array in a gram of nearby marine sediment.

A recent example of the state of our knowledge is illustrated by Allison, Samuelson, and Miller (1993) on patterns of beetle species diversity in New Guinea rain forest. In a comparative study of insect communities in two genera of oak trees at three different elevations, they collected 4840 individual beetles representing 633 species in 54 families. There was 22–31% overlap in beetle fauna of conspecific trees at the same site, and overlap between sites ranged from 1–12%. Furthermore, 50.7% of the species were represented by single individuals, and the percentage of "singleton species" for individual trees ranged from 48.3% to 62.6%.

According to many scientists, we are in the midst of a modern mass extinction of species. It has been estimated that during the 20th century one million or more species have been lost forever, and that by the year 2000 we could be witnessing the extinction of 100 or more species per day. Even now, conservative estimates indicate that tropical deforestation is causing the extinction of species in that biome at the rate of half a percent per year. As the human population continues to increase at an exponential rate, it is likely that over the next 30 years 20 percent or more of the species in all groups will disappear.

Aside from the moral and ethical questions involved with the permanent destruction of these unique biologic entities known as species, there are important practical considerations. Biodiversity assures the existence of healthy ecosystems in which the living and non-living worlds are more or less in balance. This balanced interface means the maintenance of our great biogeochemical cycles in which water, hydrogen, oxygen, carbon dioxide, nitrogen, and other substances are cycled on a global basis. Ramifications of upsetting this balance include a decrease in oxygen in the atmosphere along with an associated decrease in the ozone layer, and an increase in carbon dioxide in the atmosphere along with an associated increase in temperatures worldwide.

At least as important to the human population, biodiversity provides a potential source of life-sustaining and(or) economically important products such as new foods, medicines, and oils. The importance of maintaining biodiversity becomes evident when one considers that of the roughly 170,000 flowering plants that have been described so far, fewer than 20 species account for 95% of all food that is consumed by humans. In fact, six species account for 80% of the food consumed by the human population. With regard to medicines, approximately 40% of all medicinal products currently in use are natural products or derivatives of natural products. Furthermore, all of our antibiotics come from two of the least known groups of organisms, the fungi and bacteria, and all of the enzymes used for recombinant DNA technology are of bacterial origin.

We may already have lost hundreds of potentially beneficial species. While there is still time, there are thousands that could be identified, studied, and protected. *Selbyana,* a publication devoted to original scientific research on canopy biology and tropical plants, provides an excellent forum for disseminating information on the critically important questions associated with our knowledge of biodiversity.

LITERATURE CITED

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