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Net-Wielding Anachronisms?

The editorial "A revolution in evolution" by Jim Bull and Holly Wichman (25 Sept., p. 1959) disparages empirical comparative biologists as 19th-century anachronisms. As insect-net–wielding curators of a natural history collection, we resent the implication that museum-based research is a dust-laden activity irrelevant to the study of evolution today. Although a fascinating exercise, the experimental evolution of viruses in test tubes tells us perhaps even less about the origins of biological diversity than did Darwin's experiments with fancy pigeon breeds. Instead, the empirical foundation of modern evolutionary biology stems almost entirely from the continuing success of comparative morphological research over the past two centuries. Theories of evolution and the process of phylogeny are explanations for the hierarchical pattern of relationships among taxa inferred from independent empirical data by biological systematists (*1*).

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The editorial by Bull and Wichman highlights the discrepancy between the common view of evolutionary biology as a discipline with little value to society and the current reality of evolutionary biology as an important economic, medical, legal, and scientific force. As directors of museum research collections, we are all too aware of the difficulties posed by similar outdated perceptions about the value of the resources our collections provide. Funding is increasingly difficult to obtain, even as the number of such collections in the United States dwindles. At the same time, we and others in similar positions have seen a need to enhance the relevance of our collections by modernizing—creating archives of frozen tissues, listing our specimens online, making data available in a format usable in relational and other computer analyses, and enabling the emerging field of bioinformatics. The choice of words by Bull and Wichman, "the image of naturalists collecting butterflies and museum curators dusting fossils" typifies the misconception of many people, including, unfortunately, some evolutionary biologists. The reality is that research collections have played the major role in creating this "revolution in evolution" and will continue to contribute to this and other importance advances in the future. The existence of these collections will be increasingly useful in the future, especially given the rapid loss of biological diversity being experienced worldwide. The museum traditions that dictate specimen archival data for future generations and broad-based information sharing have caused collections to evolve in parallel with technical and conceptual developments that are fueling revolutions throughout the biological sciences. For example, upon the discovery of a new hantavirus in 1993, our frozen tissue collections verified its existence in rodent populations at least 20 years earlier and documented that the range of hantavirus in the New World was widespread both geographically and taxonomically. We are currently collecting tissues from native species at Chernobyl and at sites with other forms of pollution to better understand the significance of these events to life forms. The perceived value of research collections has not kept pace with these and other developments and, unlike the case with evolutionary biology, there are limited commercial interests in these resources to enhance their visibility. Natural history museum collections have long provided the underpinning for evolutionary theory (Willi Hennig did not need the current powerful molecular and sophisticated computational tools to develop his important systematic and evolutionary concepts and methods) and continue to play a major role in driving the evolution revolution. The value of these collections to the science of evolution and to society is immeasurable.

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Response

Our editorial did not disparage any field of evolutionary biology. Rather, it referred to the history of a negative image of evolutionary biology and the birth of a change in that image. When the public pays for almost all research on evolution, the field's image should reflect the social and economic ramifications of the work. These applications and our ability to experimentally manipulate evolution also need emphasis to scientific colleagues, many of them biologists, who regard the entire field as an anachronism of soft science.

The revolution in evolution is not displacing the foundations of the field, but is built on a long-held fabric of paleontology, natural history, genetics, and other disciplines. We recognize the continuing contribution of all these disciplines to the field, and the special role of museums (as we have been both contributors to and users of several collections, including those of Baker and Yates). Nonetheless, some directions in this revolution have special relevance to social and industrial goals—such as applications in medicine, biotechnology, agriculture, and bioremediation. Our editorial adopted the view that the wider audience is more appreciative of these new applications and that the public image should acknowledge this relevance specifically, but we did not suggest that the field is abandoning its roots.

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Lectins: More than Insecticides

In the article "Institute copes with genetic hot potato" by Martin Enserink (News of the Week, 21 Aug., p. 1124), it is stated that lectins are a "huge family of insecticides that occur naturally in plants." However, it is well known that lectins are a class of proteins that bind sugars specifically and reversibly (*1*). Lectins are ubiquitous not only in plants but also in animals and microorganisms, their main biological function being cell recognition (*2*). Microbial lectins, such as the influenza virus hemagglutinin or the fimbriae of *Escherichia coli* and *Helicobacter pylori*, mediate the adhesion of these organisms to host cells and thus play a key role in the initiation of infection. In animals, the selectins control the migration of leukocytes to sites of inflammation, while other lectins are involved in innate immunity. No wonder there is considerable interest in potential therapeutic strategies to block carbohydrate binding by these different lectins, in the hope of developing novel antibacterial and anti-inflammatory drugs. The role of plant lectins is, however, still an enigma and, although some have been shown to be toxic to insects (*3*), to refer to these proteins as insecticides is misleading.

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More Salt, Please

In his Perspective of 14 August (*Science*'s Compass, p. 933), David A. McCarron comments on the Dietary Approaches to Stop Hypertension (DASH) Trial 2 (*1*). We would like to correct three of McCarron's interpretations of the DASH results.

First, McCarron indicates that the DASH "combination" diet (described below) lowers blood pressure more than sodium reduction, as tested in the Trials of Hypertension Prevention (TOHP) II study (*2*). It is inappropriate to compare the results of two studies with such different designs. DASH was an 8-week, closely controlled feeding trial in which participants were given all their foods from the