LETTERS

edited by Jennifer Sills

Invasives: Sea of Data Still to Come

RECENTLY, THERE HAS BEEN A GREAT DEAL OF DISCUSSION ABOUT TERRESTRIAL AND COASTAL bioinvasions ["Invasives: A major conservation threat," M. Lambertini *et al.*, Letters, 22 July, p. 404; and (*1*–*3*)]. However, our lack of knowledge regarding the natural history of marine groups, especially marine invertebrates and microorganisms, is alarming. This lack constitutes a major impediment to understanding evolutionary histories of these organisms, ultimately making their conservation more difficult.

Top predators are important for the natural dispersal of marine invertebrate populations. As they move between different locations, they transfer genetic material between geographically distant populations. Many free-living species, which include sessile taxa (such as sponges, bivalves, and barnacles) and vagile taxa (such as decapods, gastropods, and echinoderms) live as epibiotic communities on vertebrates (such as fishes, sharks, turtles, sea snakes, and whales). Therefore, long-distance migrations of the vertebrates cause dispersal of a whole biota of marine invertebrates, connecting and even merging previously isolated populations. These new structures are often interpreted as human-mediated introduced species and potentially hazardous bioinvaders, when they are in fact natural distributions. Without a better understanding of the natural history of marine invertebrates, it will be impossible to correctly identify and take environmentally appropriate action to address these species.

Along for the ride. Barnacles travel with a gray whale as it moves to new locations.

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Invasives: Classify with Care

A STATEMENT MADE BY DAVIS AND COAUTHORS (*1*) last month urged "conservationists and land managers to organize priorities around whether species are producing benefits or harm to biodiversity, human health, ecological services and economies." In the ensuing tumult, their ideas have become obfuscated by semantics. In the Letter "Invasives: A major conservation threat" (22 July, p. 404), M. Lambertini *et al*. accuse Davis *et al*. of "propos[ing] downsizing the struggle against invasives." This description is misleading.

There are many terms to describe nonnative species, the degree to which they thrive in their new environment, and their impacts on ecosystems. The word "invasive" is explicitly defined in mainstream textbooks and the invasion literature as "exotic species that have successfully invaded (or are likely to invade) an ecosystem, causing significant ecological, economic, or human health problems" (*2*). In fact, Davis *et al*. never used the word "invasive."

In the midst of this debate [e.g., (*3*–*5*)], it is important to keep the arguments clear. Davis *et al*. are not suggesting a way forward to deal with invasive species, as Lambertini *et al*. claim. Rather, they are reflecting an idea shared by most managers and decision-makers: Species management decisions should be based on goals for the area in question, not solely on the native or nonnative classification of the species.

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Ecosystem Rates of Transformation Matter

IN THEIR REVIEW "TERRESTRIAL ECOSYSTEM responses to species gains and losses" (10 June, p. 1273), D. A. Wardle *et al*. identified an urgent need to develop a framework based on common traits that could be used to combine the effects of species gains and losses on ecosystem responses to global change. When assessing the suitability of species traits for predicting functional consequences, it will be important to differentiate between ecosystems in which changes occur gradually and those in which changes occur abruptly.

Gradually changing ecosystems [for example, those that change in response to climate change (*1*)] differ substantively from systems undergoing abrupt changes [such as those affected by anthropogenic land use (*2*)]. Abrupt changes often occur in species-rich regions such as Southeast Asia, Central America, and the tropical forests in South America, coinciding with the location of a large proportion of extinct or threatened species (*2*–*5*). The primary con-

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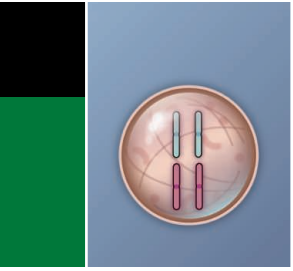

Chromosome number and cancer

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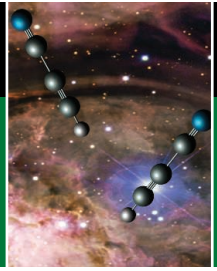

Found rotating in space

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cern under conditions of abrupt change might be not the loss of particular functions but the transformation of the whole ecosystem. For instance, clear-cutting or burning of pristine forests changes whole ecosystems at a rate that clearly shifts the focus from research within ecosystems to research among ecosystems and from likely nonrandom extinction to random and possibly total extinction. Given that such drastic changes of whole ecosystems are often nonselective, species traits may be of little use in assessing extinction risks, although they may indeed be valuable for predicting species gains.

In contrast, gradual changes of ecosystem processes, along with a focus on within-system research and nonrandom extinction, might be expected in regions such as Europe (*6*) or North America, where the climax of anthropogenic land transformation was reached some centuries ago.

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Response

WE AGREE WITH WINTER AND SCHWEIGER that it is important to differentiate between gradually changing and abruptly changing systems. Transformation of tropical regions by land-use change will inevitably have abrupt and profound effects on ecosystem properties, which will be driven both by changes in abiotic factors and by the replacement of one suite of species with another. As such, we maintain that in these cases the species trait concept remains relevant. Even when most or all species are lost, changes in the ecosystem will be driven most strongly by the loss of those species whose traits had the strongest effects on ecosystem processes before the loss occurred.

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Letters to the Editor

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Museums and Archives in Peril

IN A BUDGET REDUCTION SNEAK ATTACK on the eve of the July 4th weekend, the Governor, the Commissioner of Education, and the Chancellor of the Board of Regents of New York State effectively beheaded the century-old (*1*) archaeology program at the New York State Museum (*2*). Heedless of the consequences to extensive research and exhibits collections, ongoing research and education programs, and responsibilities to the state's cultural and historical heritage, and without alerting New York State Museum administrators, the New York State Education Department laid off two archaeology curators and the state archaeologist.

We are living in a fiscal climate that diminishes the value of cultural programs such as museums to economic recovery. New York's draconian measures are the most recent in a series of similar actions across the country (*3*–*5*), and they foreshadow the future of cultural institutions and programs. Some institutions, such as Indiana University, are merging archaeological units, along with their endowments, with larger collections units (*6*). This change allows the previously protected endowment funds to be directed toward broader purposes than originally intended, and in turn puts the long-term stability of the funds at risk. Even members of science programs housed in publicly funded museums, such as the New York State Museum's geology and paleontology curators, are not immune to misguided efforts that target small, relatively voiceless disciplines. The archives of centuries of data collection that they leave behind are also in danger of abandonment.

If we do not vigilantly guard our gates—individually, collectively, and regardless of disciplinary focus—we cannot count on our elected or appointed officials to act in a fashion that protects our best interests as researchers and educators. If we value our hard-won systematic collections and view them as assets to be bequeathed to future generations, we should value and protect the institutions that house them and the people that care for them.

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CORRECTIONS AND CLARIFICATIONS

Policy Forum: "Solving the Sisyphean problem of malaria in Zanzibar" by D. L. Smith *et al.* (17 June, p. 1384). On the *y* axis of the graph, 0.9 should have been 0.6. The online PDF and HTML versions have been corrected.

Reports: "Differences between tight and loose cultures: A 33-nation study" by M. J. Gelfand *et al.* (27 May, p. 1100). Due to an editorial error, an incorrect sentence appeared on page 1103, columns 2 and 3. The correct sentence is "In other words, there is much higher constraint across everyday situations—including the bank, public park, library, restaurant, bus, workplace, party, classroom, and the like—in tight nations, and much lower constraint across such everyday situations in loose nations (*20*)." The sentence has been corrected in the online HTML and PDF versions of the Report.

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