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Information for Contributors appears on pages 37–39 of the 7 January 1994 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005.
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LETTERS

PCR Products and CITES

Brian Bowen and John Avise's letter, "Conservation research and the legal status of PCR products" (4 Nov., p. 713) questions the policy of the Office of Management Authority (U.S. Fish and Wildlife Service) on whether polymerase chain reaction (PCR) products require permits under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) or other wildlife or plant conservation laws of the United States.

It is the policy of the Fish and Wildlife Service that DNA samples derived directly from animal or plant tissues are subject to all permitting requirements of CITES, federal conservation statutes, and implementing regulations. Although the CITES parties have not discussed DNA samples directly, the issue of whether blood and tissue samples to be used for DNA studies are covered by CITES was discussed at the Eighth Conference of the Parties in Kyoto, Japan, in 1992. The CITES parties rejected Denmark's draft resolution and agreed that such tissues should not be exempted from CITES controls. The parties agreed, however, to endeavor to achieve efficient and timely issuance of permits for perishable samples.

However, the issue of the application of CITES to DNA samples derived from animal or plant tissues is distinguishable from the regulation of synthetic DNA samples under CITES. Synthetic DNA samples contain no part of the original template. If PCR products are cleaned using techniques such as the magnetic bead procedure, the resulting amplified DNA is 100% synthetic. Therefore, it is the policy of the Fish and Wildlife Service that synthetic DNA samples are *not* subject to permitting or other requirements of CITES or federal conservation statutes, such as the Endangered Species Act, the Marine Mammal Protection Act, or the Migratory Bird Treaty Act.

The purpose of CITES and other wildlife conservation laws and treaties is to regulate trade in animals and plants and their parts and products so that the survival of a listed species is not jeopardized. The Fish and Wildlife Service is satisfied that trade in synthetic DNA samples will not adversely affect the conservation of, or the effective regulation of, trade in CITES-listed species and their parts and derivatives.

The Fish and Wildlife Service recognizes the contribution of DNA synthetics in wildlife forensic investigations and the conservation of endangered species.

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Coral Reef Catastrophe

The article "Catastrophes, phase shifts, and large-scale degradation of a Caribbean coral reef" by Terence P. Hughes (9 Sept., p. 1547) relates the sad story of the decline of scleractinian coral populations in Jamaica over the past two decades. The article is a rare example of the long-term research needed to document trends on reefs; however, the monitoring program design appears to have excluded at least one potentially important causal factor, and the solution offered does not address sociopolitical reality.

The data in the study by Hughes show a rapid decline of coral populations initiated by a 1980 hurricane. Coral cover declined further after the reduction of an herbivorous sea urchin, *Diadema antillarum*, resulting from disease, while the cover of fleshy macro-algae bloomed. Thus two natural events, hurricanes and disease, have decimated Jamaica's coral reefs. It is not clear what effect human activities have had on fleshy algae on these reefs and what, if anything, we can do to help the coral.

Hughes makes the logical case that overfishing of herbivores and the die-off of urchins have allowed macro-algae to outcompete corals. No recent fish stock assessment data are presented, so the relation between differential fishing pressure on predators and herbivores, and variations in urchin populations, is not clear. Reefs in other places such as the Philippines [where fishing pressure is maximal (*2*), *Diadema* are not particularly abundant, and typhoon damage is frequent] have not experienced similar events (*2*, *3*). Not all coral reefs in the Caribbean that experienced overfishing and the *Diadema* die-off have experienced the same pattern of coral loss. For example, the 10- and 30-meter zones in Saint Croix maintained coral populations between 1982 and 1988 despite overfishing, increased algal growth, and few *Diadema* (*4*).