



## Mass Mortalities of Coral Reef Organisms

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ter wires near the residence, and so forth). We made numerous measurements to verify that those configurations were in fact associated with especially high magnetic fields. We found such configurations unusually often at the homes that cancer patients had occupied.

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### Mass Mortalities of Coral Reef Organisms

Corals and sea urchins are dying in large numbers in the Pacific Ocean and in the Caribbean Sea, respectively. In the Gulf of Chiriqui, on the Pacific side of Panama, we first noticed extensive bleaching (loss of zooxanthellae) and coral mortality in March 1983 (1). This occurred to a depth of 12 meters and on some reefs reduced coral cover to 10 percent of its previous levels. This disturbance also occurred in the Gulf of Panama in June, in Costa Rica in May (2), in Colombia in June (3), and in the Galápagos Islands in April (4). Massive coral death has also occurred in Moorea (5) and the Tokelau Islands (6) in the central Pacific and in Indonesia (7) and the Ryukyu Islands (8) in the western Pacific. Smaller scale bleaching and death of corals and other coelenterates, to a depth of 20 meters, has also been occurring in the Caribbean since June 1983. Affected areas include Panama, Costa Rica (9), Colombia (10), and Venezuela (11).

In the Caribbean Sea, populations of the ubiquitous and ecologically important (12) sea urchin species *Diadema antillarum* have also suffered mass mortalities. The first outbreak was noted near the Panama Canal in January 1983 (13); mortalities were observed in the San Blas Archipelago in April and at the Panama-Colombia border in June. They extended to Jamaica (14), the Cayman Islands (15), and Costa Rica (16) by July. In late July they occurred in the Florida

Keys (17), in mid-August in Santa Marta Bay, Colombia (18), and in late August in the Bahamas (19). In September they reached Bermuda (20). Populations of *D. antillarum* have been reduced to 2 percent of their past levels, but other species of sea urchins have remained unaffected. *Diadema mexicanum* in the eastern Pacific have been similarly unaffected.

At this point we do not know whether the bleaching of the coelenterates in both oceans and the mortality of *Diadema* in the Caribbean are related and whether they are direct or indirect consequences of the climatic changes associated with the 1982-1983 El Niño event (Research News, 2 Sept., p. 940). Important clues about the causes of this widespread mortality can be gained from knowledge of the geographical extent and timing of the outbreaks. We ask scientists in Caribbean and Pacific laboratories who may have noticed similar phenomena elsewhere to communicate with us.

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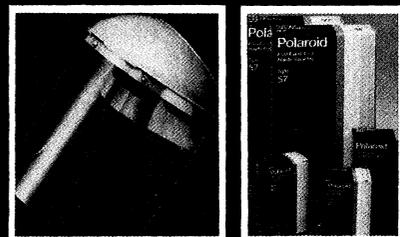
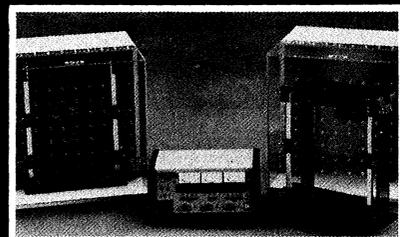
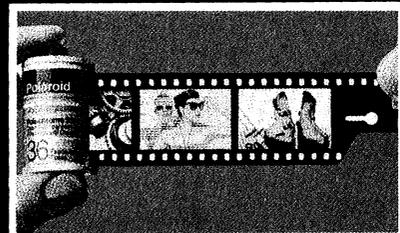
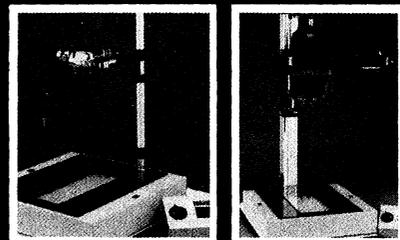
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*Erratum:* In the letter by Peter S. Ashton *et al.* (28 Oct., p. 366), reference 2 was incorrect. It should have read, "E. Marshall, *Science* **221**, 242 (1983)."

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