

ISOLATED MORTALITIES OF THE SEA URCHINS
ASTROPYGA MAGNIFICA AND *EUCIDARIS TRIBULOIDES*
IN PUERTO RICO

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Two presumably unrelated urchin die-offs occurred on the northwest coast of Puerto Rico in the winter of 1984-1985. The die-offs were local in nature and one appeared to be depth dependent. Further mortalities were not seen through April 1985. Recovery from the Caribbean wide *Diadema antillarum* die-off is observed to be taking place in La Parguera.

On 8 December 1984, one of us (A.G.B.) observed an elongated patch of 68 dark colored sea urchins lying in water 0.6 to 1.2 m deep (shallow group) just seaward of the breaker zone at the northern end of Crashboat Beach in Aguadilla, Puerto Rico (lat. 67°10'W; long. 18°27.5'N). The urchins, *Astropyga magnifica* A. H. Clark (Centrochinoida: Diadematidae), were observed to have drooping spines that moved with wave surges and some tests that were partially disassociated. Numerous spines were lying on the bottom around the urchins. A few urchins were observed rolling with the wave action but no urchins were on the beach at that time. Pedicellaria of all urchins were extended and active and there was a conspicuous layer of sediment on the tests. These signs were very similar to those seen during the *Diadema antillarum* Phillipi, long-spined black sea urchin (Centrochinoida: Diadematidae), die-off in 1983-1984 (Lessios et al., 1983). Using SCUBA, we (L.B.W. and E.H.W.) found a large aggregation of the same species of urchin in 21 m of water (deep group) (432 individuals) directly offshore of the shallow group. Another smaller aggregation was observed nearby at 14 m (49 individuals) and some scattered pairs (10-12 individuals estimated) were observed at 11 m on a sandy slope area between the shallow and deep groups. Urchins of the deep group appeared normal and differed from those in the shallow group by the absence of sediment on tests, the ability to direct their spines toward a disturbance and the presence of commensals (sawcheek cardinalfish, *Apogon quadrisquamatus* Longley; young rainbow wrasse, *Halichoeres pictus* (Poey); and the urchin shrimp *Tuleariocaris neglecta* Chase). A total of approximately 560 urchins were observed that day. None of the urchins were collected or preserved. No other organisms in the vicinity showed signs of disease or stress, thus pollutants are not thought to be a factor in the urchin mortalities. The only individuals exhibiting a moribund condition were in the shallow group near the beach. This is similar to the situation observed for *Strongylocentrotus droebachiensis* in Nova Scotia (Scheibling and Stephenson, 1984) where 70% of organisms in shallow water died and only 6% in deep water. These North Atlantic mortalities were attributed to a disease organism that was active when seawater temperatures were at the high point of the annual cycle (annual range = 7-15°C). Water temperature was probably not a factor in the Puerto Rico occurrence since December water temperatures are neither at the high or low point of the yearly range of temperature and the temperature range is more narrow than that in Nova Scotia. The Puerto Rico range of mean monthly sea surface temperatures was 25.6-29.5°C (Glynn, 1973). Returning to the site on 12 December 1984, we found dead, dry urchins on the beach. Attempts to collect moribund or diseased urchins at that time failed

to yield other than healthy live organisms as evidenced by week-long holding and flow-through experiments in aquaria.

On 1 April 1985 the deep aggregation was again observed at the Crashboat site (Yvonne Sadovy, pers. comm.). Apparently no further mass mortality of the *Astropyga* in that area had occurred, unlike the *Diadema* die-off where 95–99% of all the urchins died. Recovery of the *Diadema* is slowly taking place. Small, approximately 1-year-old *Diadema antillarum* can now be found along back reef crests in La Parguera but in very low densities as compared to populations prior to the mass mortalities reported in Vicente and Goenaga (1984). *D. antillarum* have still not recovered in fore reef communities (based on intensive before and after observations; Vicente, pers. comm.) in Cayo Enrique; nor in the deep algal flats off-shore (Ballantine, 1984; pers. comm.) in La Parguera.

Another urchin die-off was observed at Survival Beach on old Ramey Air Force Base in Aguadilla (lat. 67°9'W; long. 18°0.5'N) in early January 1985. Although presumably unrelated to the Crashboat event, 6,000 to 8,000 *Eucidaris tribuloides* (Lamarck) (Cidaroida: Cidaridae) were observed washed up on the beach after a period of heavy wave action during stormy winter weather. The area just off-shore of the beach is composed of outcrops of lithified carbonate sand covered with algae. No further mortalities of this urchin were observed on that beach in the remainder of January and February 1985. We are not aware of other reported mass kills in this urchin order (Cidaroida). Storm effects would not seem to be a satisfactory explanation for this mortality since this urchin strongly wedges itself into cracks and other spaces in the substrate. Also, the urchins on the beach were intact with spines in place.

The mortalities of urchins at Crashboat and Survival Beaches in Aguadilla remain unexplained. These kills were certainly isolated, localized events unlike that of the *Diadema* die-off (Lessios et al., 1984). The Crashboat Beach die-off resembles that of urchins in Nova Scotia in its local nature and depth dependent mortality. The causes of the recent Caribbean-wide, massive die-offs of fishes (Atwood, 1981; Williams et al., 1982) and long-spined black urchins (Lessios et al., 1984) also remain unknown. Mass mortalities of tropical marine organisms occur often, but many such events remain unrecognized and are seldom reported in the literature. Documentation of marine mortalities, and wherever possible, experimental transmission attempts, are vital to help gain an understanding of these events.

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