ABSTRACTS AND SCHEDULE OF PRESENTATIONS

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ROSESMYTH, M. CHRISTINE: GROWTH AND SURVIVAL OF SEXUALLY PRODUCED ACROPORA RECRUITS: A POST-HURRICANE STUDY AT DISCOVERY BAY. Department of Zoology and Discovery Bay Marine Laboratory, University of the West Indies, P O Box 35, Discovery Bay, St Ann, Jamaica.

The apparently heavy dependence of Caribbean acroporids on asexual reproduction by fragmentation has implications for the recovery of these corals, and hence, reefs, following physical disturbance. During Hurricane Allen (August, 1980) the dominant fore-reef acroporids at Discovery Bay were heavily fragmented and many of these fragments subsequently died. Several studies in the Caribbean have emphasized the absence of sexually produced juvenile Acropora from the reefs and, of settling larvae from recruitment studies. Thus opportunities to study the growth and survival of Acropora juveniles are rare. This lack of recruitment may be more apparent than real. In any case, when mortality of the dominant acroporids is high sexual reproduction must play a vital, if temporally less dramatic, role if the reefs are to return to their former condition.

Recruitment, growth, survival and biological interactions affecting survival of sexually produced Acropora spp. recruits has been documented on the west forereef at Discovery Bay from April 1982 to the present. During Hurricane Allen in August 1980 the reef crest and upper terrace region were reduced to a pavement of Acropora palmata flagstones. In spring 1982, at the conclusion of experiments on the survival of A. palmata fragments, recruits of sexual origin were noticed in the former mixed-zone (3-7m). In June 1982 density of recruits was as high as $1/m^2$. Forty-one recruits, tagged at this time in $42m^2$ had a survival rate of 17% to April 84 (mortality of 3.5 %/mo.), (Fig. 1); and an average growth rate in basal diameter of $3.0cm^2$/mo. for branching recruits, and $2.36cm^2$/mo. for branchless colonies, (Fig. 2).

FIG. 1 Recruit Survivorship, Apr 82 - Apr 84

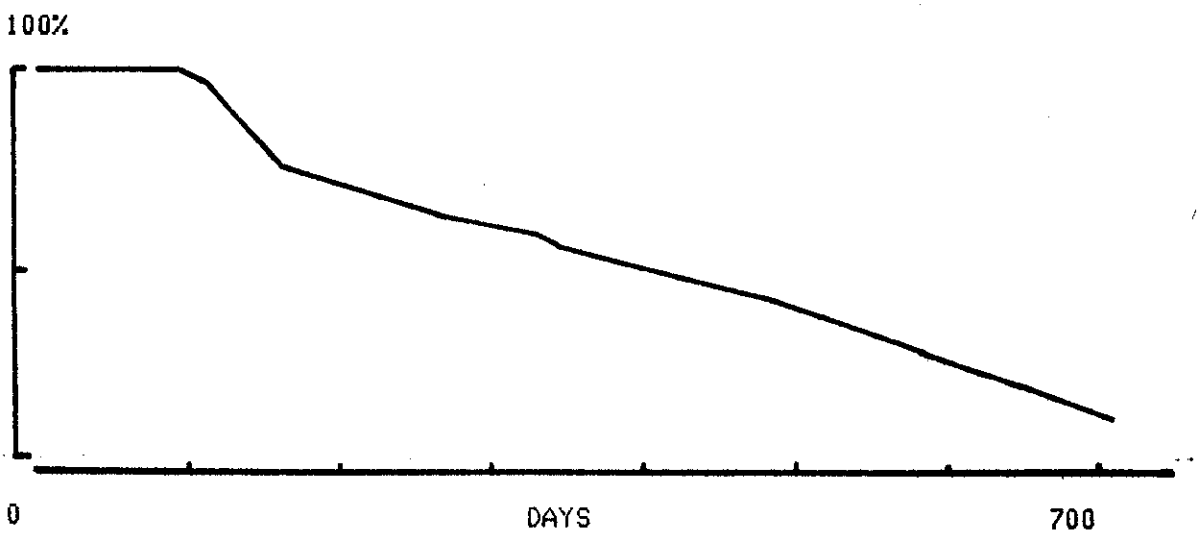
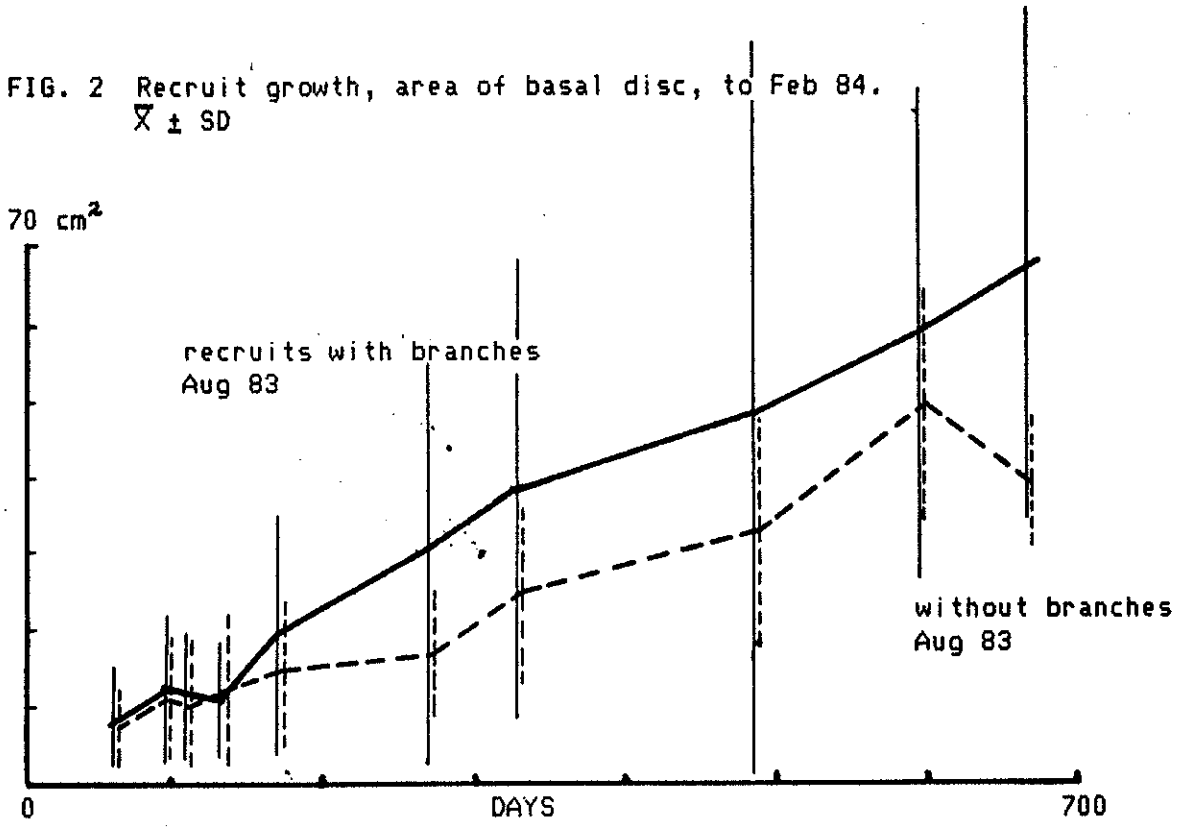


FIG. 2 Recruit growth, area of basal disc, to Feb 84.
$\bar{X} \pm SD$



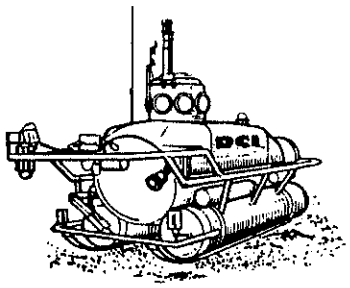
Recruits initially develop as encrusting discs, and most are slow to differentiate into recognizable species. Of the 7 survivors in April 1984, 6 still could not be definitely identified to species.

The major, potential sources of mortality and competition for Acropora recruits are the snail, Coralliophila abbreviata, the polychaete, Hermodice carunculata, and juvenile corals of Agaricia agaricites, Leptoseris cucullata, and Porites astreoides. C. abbreviata was observed to prey on the juvenile acroporids, and was the cause of mortality in all but one case; no evidence of H. carunculata predation was seen, and this is attributed to the growth form of the juvenile corals; interactions with the corals and other sessile organisms were variable in outcome.

Two transect surveys during the study period, in the same zone, to provide additional data, confirmed that the size of recruits in the permanent study site were typical, but density was greater. Furthermore, the recruits on the transects were involved in proportionally more competitive interactions, and with different competitors.

Recruitment continued after the initial tagging excercise, with a vague (due to insufficiently frequent sampling) peak in the following spring. In July 1983 the Diadema antillarum population crashed along the north coast of Jamaica (part of a Caribbean-wide phenomenon), and macro-algae became increasingly abundant. No new recruits have been recorded since February 1984, and the large mats of fleshy algae have either smothered or halted the growth of the Acropora recruits.

ROSESMYTH, M. CHRISTINE & JEREMY D. WOODLEY: THE SUBMERSIBLE RESEARCH PROGRAMME AT THE DISCOVERY BAY MARINE LABORATORY, JAMAICA: DEEP DIVING FOR ALL!, Discovery Bay Marine Laboratory, University of the West Indies, P O Box 35, Discovery Bay, St Ann, Jamaica.



The limitations of diving and remote sampling have left a significant gap in our understanding of reef biology and geology. While SCUBA diving opened up the shallower reef environments to many scientists, the region below 200 feet has been largely inaccessible. For non-diving marine scientists all but the shallowest regions have been off-limits. One way to overcome these problems is to use a submersible. These vessels can provide close-range observation opportunities and some manipulative ability. Excellent data on deep-water organisms and structures have been obtained, but conventional operations are extremely expensive and this tool is therefore out of the reach of many. A new, cost-effective, long-term submersible programme has recently begun at the Discovery Bay Marine Laboratory which allows virtually anybody with an interest in underwater science the chance to view and work in the environment at close quarters.

The submersible, PC-8B, comes to DBML after a long and safe career in North Sea exploration . This 2/3-man observation vessel has a maximum working depth of 800ft. It is equipped with a 36 inch domed anterior viewport and 9 smaller port-holes, a manipulator, external camera and strobe, and an array of powerful lights.

Conventional submersible operations require a large support vessel to lift the sub into and out of the water and provide maintenance. Standing-by is usually as expensive as diving. At DBML we are operating PC-8B from a shore-based support facility using small tow boats to manoeuver the sub to the dive sites. This low cost system makes PC-8B a very affordable research tool.

The key to this shore-based system is the topography of the north coast of Jamaica. The narrow island shelf allows easy access to coral reefs throughout their depth range, and beyond. This feature, which first drew Tom Goreau to Discovery Bay, can now be exploited fully with the submersible. On a typical day's diving the submersible is loaded with life-support supplies, pilot, crew and equipment at a shallow water mooring behind the reef crest. After the safety check-list is completed the sub is towed to the dive site, only a couple of hundred metres away. PC-8B submerges and radio communications are established. The sub completes its trim procedures in a sand channel on the terrace and then proceeds with the dive. Dive duration is typically between 2 and 5 hours. Radio checks are performed with the surface support boat every 30 minutes.

The Submersible Research Programme provides both educational and research opportunities, as does the Laboratory in general. Since the start of the programme approximately 150 dives have been made, and 50 students and 28 investigators introduced to the deep reefs off Discovery Bay. The student programme is designed to complement the courses that are commonly taught to visiting groups. An introductory slide presentation and safety procedures talk precede the two hour dive, which covers all the major habitats to which the submersible has access.

The deep environments below the well-known shallow reefs of Discovery Bay received preliminary description in a group of papers resulting from the work of Lynton Land and others, with Nekton Gamma, in 1972. A near-vertical submarine cliff between -55m and -130m, cut during the Pleistocene glaciations, is veneered with Holocene reef growth. The coral reef, dominated by Agaricia spp. near the top of the cliff, gives way to a sclerosponge reef by -90m. At the foot of the cliff the island slope begins; unconsolidated talus succeeded by a partly lithified slope, occasionally punctuated by massive outcrops of rock. At the maximum depth range of the submersible reef-derived sediments have largely given way to soft pelagics.

PC-8B has been leased from its owners, Research Submersibles Ltd, by the Discovery Bay Research Foundation, to be operated at DBML for an initial period of three years. The Foundation (based in Dallas,Texas) exists to facilitate research and teaching at the Laboratory, and encourages investigators to seek funding for research at DBML. Surveys and systematics are initial priorities, but many other projects are feasible. The following studies commenced in the summer of 1984: social behavior of deep reef fishes, by Murray Itzkowitz of Lehigh University, (with funding from National Geographic Magazine); a long-term investigation of marine endolithic fungi, by David Porter of the University of Georgia (NSF) ; monthly sampling of sclerosponge reproductive state, by Willard Hartman and Philippe Willenz of Yale, (NSF); survey of the deep reef and investigation of sedimentation, by David Liddell and Sharon Ohlhorst of Utah State University; reproduction in deep water echinoderms, by Philip Mladenov (Mt Allison University, Canada) and Roland Emson (University of London) (NSERC); behavior and feeding in stalked crinoids, by Charles Messing of the University of Miami; experimental studies on ultrastucture of deep corals, by Brent Constantz of the University of California (NSF); experimental investigations of Madracis taxonomy, by Judith Lang of the University of Texas; distribution and behavior of echinoderms, J D Woodley; ecological and biological studies of live pleurotomarian slit-shells, Christine Rosesmyth, (Lerner Fund, American Museum of Natural History). Some of these projects will be illustrated on the poster.

Rates for scientific research using PC-8B are: US$350 per 2 hour dive; US$900 per 6 hour day; US$4000 per five day week; additional charges for multiple surfacings and use of external camera equipment and on-board tape recorders are made.