RESOURCE AVAILABILITY AND SUSPENSION FEEDING BY GORGONIANS

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Purpose: Determine whether gorgonians are capable of suspension feeding and the abundance and nature of particulate matter naturally available on the reef of Salt River Canyon (Report No. 80-3)

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Accomplishments: The reef fauna of the east slope of Salt River Canyon is dominated by gorgonian soft corals. This domination can be related to the water quality (particulate rich), resuspension rate, and current. However, the auto-ecology of these species is not well known. Suspension feeding is of particular interest as gorgonians are almost incapable of capturing zooplankton. Like the reef corals, gorgonians also obtain nutrition from their algal symbionts, but it is likely that energetic and micronutrient requirements must be met through some additional mode of nutrition. The comparison of gross primary production and suspension feeding between species from shallow- and deep-water habitats is therefore of use in determining whether deep water and light species have adapted to their environments via photoadaptation or changes in particulate feeding. The work accomplished can be divided into three components: characterization of particulate resources, suspension feeding experiments, and

measurement of photosynthetic rates. The greatest effort was directed at the first two components.

Resource availability will be determined from day and night water samples collected at 15.2 m and 27.4 m on each of the 5 days of experiments, with hand-held Niskin bottles. Samples were taken to determine particulate weight, chlorophyll, Carbon-Hydrogen-Nitrogen (C:H:N) composition, and the presence and abundance of mucous flocs and of proteinaceous particles. Additional samples were preserved to determine bacterial density and dissolved organic content. Zooplankton abundances also were measured and collections designed to provide a broad overview of zooplankton availability. Water and zooplankton samples do not characterize the temporal pattern of resource availability, and the water samples may not represent an "average" condition. Samples are, however, intended as an initial characterization or resource availability which may be useful in a comparative sense.

Feeding experiments were designed to measure capabilities for filtering unbound particles and mucus from the water column. The feeding capabilities of two *Plexaura spp*. were compared (one was most abundant in 24-30 m, and the other at 15.2 m, and both were among the dominant species at their respective depths). Branch tips from each of the species were clipped from a colony and reciprocal transplants made between 27.4 m and 16.8 m sites. During the experiment, the branch tips were enclosed in a plexiglass chamber providing natural light and natural water movement via oscillations of the flexible side walls. Ten-liter and 1.5-liter chambers were used. The colonies' behavior remained

normal in the chamber. Hydrated sephadex heads were injected into the 10-liter chamber and colonies allowed to feed for 10 minutes. They were then placed in plastic bags and immediately preserved by injecting formalin. The colonies were tested in pairs (one from each species and four replicate experiments per site). Particle feeding experiments were conducted at both sites at approximately 1030 hours and at the shallow site at 2130 hours. Mucus feeding experiments were conducted using alcian blue stained mucus from *Porites spp*. as a prey item. At each site three branch tips of the "native" species were placed in the 1.5-liter chamber and the particles injected. Two replicate experiments were conducted at each site. In all, 112 feeding experiments were conducted. Polyps from each of the 260 branch tips collected will be examined for the presence, abundance, and size of food particles.

Photosynthetic rates were determined by measuring oxygen flux of groups of three branch tips enclosed in the 1.5-liter chambers. Initial and final 50 ml water samples were removed from each chamber and dissolved oxygen measured on the surface. Light was simultaneously monitored using Liquantum flux sensors. At the 27.4 m site, readings were integrated over the entire experimental period and an average determined. Spot readings were taken with a meter at the shallow site spot. Measures of afternoon net primary production and light level were made on each of 4 days.