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FEEDING ON EUPHAUSIIDS BY *OCTOPUS RUBESCENS*

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While conducting remotely operated vehicle (ROV) video transects for fish community studies, we observed *Octopus rubescens* feeding on unidentified euphausiids. *Octopus rubescens* is a small octopus common along the Pacific coast of the United States from Alaska to Baja California found at depths from the low intertidal to about 200 m (Hochberg and Fields 1980). The little information on *O. rubescens* feeding in the wild indicates that they prefer small crabs and hermit crabs, and feed mainly on crustaceans, mollusks, and fishes (Dorsey 1976, Hochberg and Fields 1980). We observed *O. rubescens* (approximately 75 mm mantle length) feeding on euphausiids, a unique prey item, and, due to this unusual encounter, we noted the capture methods and compared the octopus density in areas with and without euphausiid swarms.

Cruises were conducted aboard the Monterey Bay Aquarium Research Institute's R/V *Point Lobos* using the ROV, the *Ventana*. The transects were conducted on mud-sand bottoms at 200 m off Santa Cruz, California, on October 1 and 17, 1991. The ROV travelled at approximately 1.8 km/hr and stopped only occasionally for species identification and maintenance. The ROV was equipped with a three chip video camera and four 400-watt sodium-scandium lights.

The euphausiids could not be identified to species. The size of the euphausiids was approximately 10 mm carapace length, and this was fairly homogeneous throughout all swarms. Euphausiid swarm densities were in the range of hundreds per cubic meter. The euphausiid swarms appeared to occur naturally and were not a result of attraction to the ROV lights. We encountered the euphausiid swarms on two separate days over a 16-day period, and these were only in the same locations. This spatial consistency over 16 days indicates that the swarms were persistent in this area and not a result of

the ROV lights. Also, we came upon octopuses whose webs were filled with euphausiids. Since the ROV was constantly moving, the octopuses must have been feeding on euphausiids before the ROV was in the area.

Octopus rubescens was observed to feed on euphausiids using three different capture methods. The most frequently observed capture method began with the octopus resting on the bottom, then "pouncing" toward the euphausiid and capturing it in its webbing. Once a euphausiid was located (most probably visually), the octopus would slowly crawl toward it and, when close enough (typically closer than twice the mantle length of the octopus), the octopus would cease forward movement while extending one or two of the closest arms. It then would raise up on the remaining arms and throw its body up and over the euphausiid, then descend over it, encircling the euphausiid in it's web. Frequently, the euphausiids were so close together that the octopus would make repeated attacks without having to crawl first. This is similar to the attack method described by Maldonado (1964), Warren et al. (1974), and Hanlon and Wolterding (1989).

Octopus rubescens had a distinctive change in body pattern during its attack. Before any attack posture, the octopus had a dark reddish-brown pattern. An instant before the pounce, the octopus would change its body pattern to white or gray. Upon landing, the octopus would change back to the reddish brown pattern, with a darker, more intense brown. The change in body pattern during attack that we observed differed from that described by Warren et al. (1974) for this species. They observed that the octopus became tranparent enough to see internal organs at the moment of landing on the prey. Warren et al. (1974) believed that these body pattern changes were due to changes in locomotor activity during attacks.

In the second capture method, *O. rubescens* was suspended off bottom, typically more than 1 m. The body was upright and the arms were spread radially. The animal would slowly sink until one of the arms encountered a euphausiid. Upon contact, some of the arms would grasp the euphausiid and the octopus would descend to the bottom and consume the euphausiid. We only observed this behavior from a distance when the octopus was already suspended in the waterThis behavior also has been observed for an unidentified octopus feeding on zooplankton (Clarke et al. 1967).

Occasionally, an octopus tried to capture another euphausiid after its web appeared full. While remaining stationary, the octopus would extend one arm outward and attempt to grasp an euphausiid. This method was infrequently successful and is similar to the "side arm attack" described by Hanlon and Wolterding (1989).

Densities of *O. rubescens* were not significantly different between areas with and without euphausiid swarms (mean abundance = 1,796 and 1,684 octopuses/ha); however, the intensity of feeding behavior varied. As might be expected, in areas with euphausiid swarms, 94 octopuses were observed feeding compared to only 15 in the areas without euphausiid swarms. This suggests that octopuses were not drawn to areas specifically to feed on euphausiids. Rather, euphausiids are probably a patchy and sporadic resource near bottom.

Octopus feeding on euphausiids is unique. The only reference is to laboratory feeding on frozen euphausiids (Marliave 1981). However, pelagic prey has been found

in octopus diets, including mysids, large copepods, and ostracods (Boucher-Rodoni et al. 1987; Nixon 1985, 1987; and Boletzky and Hanlon 1983). Many of these pelagic items were eaten by juveniles. The feeding on pelagic prey by benthic adult octopus has rarely been reported. With the increase of visual observations below SCUBA depths, the knowledge of octopus diets will continue to expand.

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