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AN ASSOCIATION BETWEEN A PELAGIC OCTOPOD, *ARGONAUTA* SP. LINNAEUS 1758, AND AGGREGATE SALPS

Biologists working in the epipelagic zone of the ocean have reported that representatives of numerous planktonic taxa seem to be closely associated with gelatinous zooplankton, including hyperiid amphipods (Madin and Harbison 1977; Harbison et al. 1977; Laval 1980), gammarid amphipods (Vader 1972), isopods (Barham and Pickwell 1969), decapods (Shojima 1963; Thomas 1963; Trott 1972; Bruce 1972; Herrnkind et al. 1976), cyclopoid copepods (Heron 1973), mysids (Băcescu 1973), cirripedes (Fernando and Ramamoorthi 1974), and fish (Mansueti 1963; Janssen and Harbison in press).

Some symbionts in these groups are morphologically adapted to feed principally on the host and/or on the food material which the host collects, while others seem to associate more intermittently with gelatinous zooplankton, dependent on their nutritional state and that of the gelatinous hosts. Accordingly, symbioses may range from specific, structural associations to temporary or casual associations.

In this note we report a previously undescribed association between a cephalopod and a planktonic gelatinous herbivore. While conducting research scuba studies of gelatinous zooplankton in the western Gulf of Mexico, we collected juvenile pelagic octopods of the genus *Argonauta* sp. Linnaeus 1758, in association with aggregate generation salps (*Pegea socia* (Bosc 1802)).

The salp chains were composed of 40-60 individuals, each approximately 10 cm in apical/basal length. Individuals within the aggregate generation of *Pegea socia* (Bosc 1802) are uniformly covered with fine reticulated gold pigmentation and contain orange nucleii. The individuals each have four noticeable body muscles forming two x-shaped groups. Within each group, the pair of muscles are not fused dorsally. Endostyle bands of each individual are slightly arched.

Two juvenile octopods, a male and female with mantle lengths 8.4 mm and 6.7 mm, respectively, were collected from separate chains at a depth of 5-10 m at lat. 26°21'N, long. 95°45'W, on 26 February 1981. The males and females of *Argonauta* sp. have eight circumoral appendages, none of which are filiform. The body is not flattened, has no fins and no aquiferous pores on the head. The dorsal arms of the female are not

connected by a deep web and have broad terminal expansions modified for secretion of an external shell of egg case when mature. The left third arm of the male is hectocotylized, autonomous, and coiled up in a sac beneath the left eye.

The octopods were first noted inside the branchial cavity of one of the aggregate salps, attached by their tentacles to that individual's pharynx wall; however, they both left their hosts during our capture of the salps in quart jars. We found only one octopod per salp chain, though the salps had many hyperiid amphipods (*Vibilia armata* Bovallius 1887), cyclopoid copepods (*Sappharina angusta* Dana 1852), and fish in association. We found no morphological damage to the individual aggregate salps which had hosted the octopods.

The association of juvenile octopods with salp aggregates may afford a source of food (commensal amphipods), flotation, transportation, and/or camouflage to the octopods. Examination of Formalin[1]-preserved gut contents from these octopods was inconclusive, however, since neither octopod had fed recently and only unidentifiable, residual solids remained in the gut. It is improbable that the octopod was seeking protection by attaching to the salp chain, since moving out from the host was an immediate reaction to in situ visual stimuli and/or local perturbations.

We thank C. E. Lea and G. J. Denoux for their identification of the octopods and copepods, respectively. Identification of the octopods was based on generic characteristics described by Voss (1956). Salps were classified as *Pegea socia* (Bosc 1802) as described by Madin and Harbison (1978). Amphipod identification was based on body shape, eye structure, and character of pereiopods as described by Bowman and Gruner (1973) for genus and Dick (1970) for species. Copepods were identified by body shape, segmentation, and appendage characteristics as described by Owre and Foyo (1967). Research scuba operations were supported by the National Science Foundation, grant OCE78-22481.

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[1]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

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MIGRATION OF A JUVENILE WOLF EEL, *ANARRHICHTHYS OCELLATUS*, FROM PORT HARDY, BRITISH COLUMBIA, TO WILLAPA BAY, WASHINGTON

Juvenile wolf eels, *Anarrhichthys ocellatus*, were rarely reported off the Washington-Oregon coast prior to 1979. One 87 mm juvenile was collected by midwater trawl in 1962, 80 km off Newport, Oreg. (Wakefield 1980[1]). Another juvenile of 468 mm standard length (SL) was caught in 1969 (51 sets) by personnel of the Northwest and Alaska Fisheries Center, National Marine Fisheries Service (NMFS), while purse seining for juvenile salmonids in shallow marine waters (<30 m in depth) adjacent to the mouth of the Columbia River.

While purse seining for juvenile salmonids in these same waters, no wolf eels were caught in either 1978 (49 sets) or 1980 (67 sets) by NMFS, but in 1979 (109 sets), 19 specimens between 467 and 531 mm SL were collected. Oregon State University (OSU) personnel caught 113 juveniles during a 10-d purse seine cruise for juvenile salmonids in 1979 (56 sets) between the Columbia River and Coos Bay, Oreg., in waters >30 m. These fish ranged in size from 281 to 610 mm SL (Wakefield 1980). The purse seine used in waters <30 m deep fished to a depth of about 6 m (verified by the author using scuba). Based on its construction, the purse seine used in waters >30 m by both NMFS and OSU was assumed to fish to about 24 m deep.[2]

Personnel of NMFS, fishing in waters >30 m, collected seven juvenile wolf eels in 1980 (232 sets) between Copalis Head, Wash., and Tillamook Bay, Oreg. These fish ranged in length from 430 to 506 mm SL.

One of these juvenile wolf eels had been tagged on 24 October 1978 off Doyle Island near Port Hardy, British Columbia (Fig. 1), by personnel of the Canadian Department of Fisheries and Oceans (Bailey[3]). The tag was applied incidentally to a purse seine tagging operation for chum

[1]Wakefield, W. W. 1980. Occurrence and food habits of pelagic *Anarrhichthys ocellatus* juveniles collected off the Oregon coast during June, 1979. Paper presented at Sixtieth Annual Meeting of the American Society of Ichthyologists and Herpetologists at Texas Christian University, Fort Worth, Texas, June 15-20, 1980.

[2]J. Jurkovitch, Fishery Biologist, Northwest and Alaska Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. E., Seattle, WA 98112, pers. commun. February 1981.

[3]D. D. Bailey, Chief, Salmon Services, Department of Fisheries and Oceans-Pacific Region, 1090 West Pender St., Vancouver, British Columbia V6E 2P1, pers. commun. August 1980.

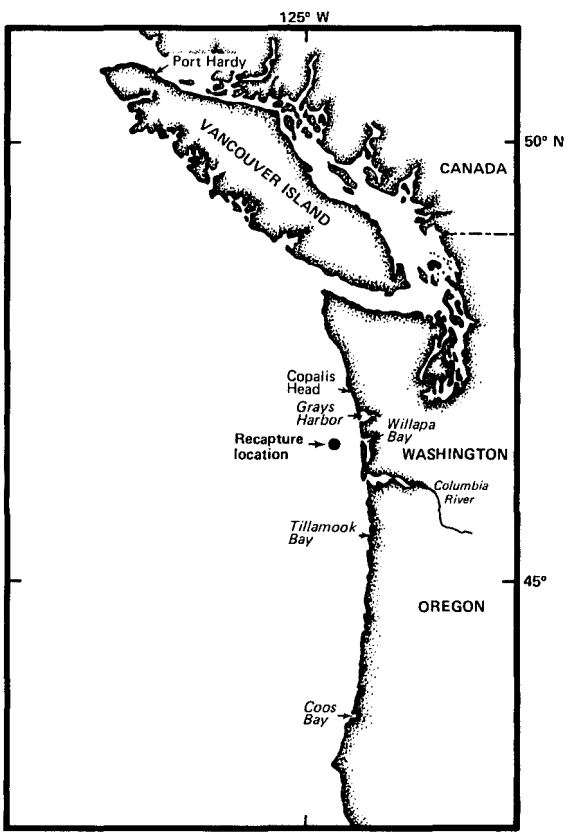

FIGURE 1.—Location of tagging (Port Hardy, B.C.) and recapture (Willapa Bay, Wash.) sites of a juvenile wolf eel.