annual abundance in relatively restricted locations and time periods, are rarely observed.

An additional point, possibly relating to the hazardous conditions of the birth process of a mammal in an entirely marine environment, came to our attention. A Sr. Modesto, a fisherman resident at Matancitas, reported to us that three dead calves had been encountered in Estero de la Soledad during the season of 1977 and none up to the date of our observations in 1978.

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Range Extension and Notes on the Habitat of the Isopod *Munna halei* Menzies

The small asellote isopod *Munna halei* Menzies, 1952, was described from Tomales Point, Marin County, California, from under stones and in kelp (*Macrocystis*) holdfasts in the lowest intertidal zone (Menzies, 1952). It remained unknown elsewhere until Iverson (1974) reported it at El Capitan Beach, San Luis Obispo County, California, from among the spines of the purple sea urchin *Strongylocentrotus purpuratus* (Stimpson) from mid-intertidal rocks.

Munna halei has now been discovered at Cape Arago, near Coos Bay, Oregon. The isopods were living among the spines of the sea urchin *S. purpuratus* which inhabited a relatively open, wave swept, rocky section of the coast. The isopods were collected from four of five study areas around Cape Arago: the South Cove of Cape Arago, the Middle Cove of Cape Arago, Squaw Island, and the rocky intertidal zone to the west of Squaw Island. They were not found at Sunset Bay near Cape Arago, but this may be due to the small sample size of urchins taken from that area.

Sea urchins both in urchin holes and "free-living" were collected from all five areas, placed in individual plastic bags without water and immediately transported to the laboratory where the plastic bags were placed in a seawater drip table in order to maintain them at the proper temperature. Within a twelve hour period the urchins were removed from their bags and individually submerged in a bowl of seawater where they were examined under a dissecting microscope for isopods. The number of isopods that had been dislodged from the urchin and had subsequently fallen into the bag was recorded. The number of isopods that remained on the urchin and their positions were also recorded.

A total of 50 sea urchins was collected and 147 isopods were recovered from 25 of the urchins. The number of *M. halei* per urchin ranged from zero to 18 with a mean of 2.94 per urchin (standard deviation 4.70). At the Middle Cove of Cape Arago, where the majority of samples were collected (27 urchins), the mean number of *M. halei* per urchin was 3.77 (standard deviation 5.51). *M. halei* showed no preference for sea urchins occurring in holes; 74 were found on urchins in holes and 72 were found on urchins not in holes. There was no correlation between the size of the urchin and the number of isopods present on it.

The isopods were observed usually clinging to the spines of the sea urchins rather than crawling upon the test of the urchin (96% on spines, 4% on the test). There appeared to be no oral-aboral distinction in their position on the urchins, with 51% occurring on the oral side of the urchins and 49% on the aboral side.

M. halei exhibited several interesting behavioral traits with regard to its microhabitat. Typically a *M. halei* clung to an urchin spine by wrapping its pereopods around the spine, with no region of the spine appearing to be frequented more than any other. In moving, an isopod, while holding on with its posterior pairs of pereopods, would lean off the spine it was on and grab another spine with its anterior pereopods, pulling itself over and onto the second spine. Occasionally *M. halei* was observed crawling off a spine and along the test surface a short distance before climbing another spine.

The isopods were usually able to move without appearing to disturb the urchin. On occasion, however, the isopods set off a "spine reaction," indicating a local disturbance to the sea urchin. The sea urchin spines would fold down at the point of the disturbance in an apparent attempt to protect the surface. While the spines were folded down the *M. halei* normally was trapped between spines or under a "pile" of spines. If the isopod was unable to squeeze through the moving spines it remained still until the spines became erect and the isopod would crawl away.

On several occasions the sea urchin's pedicellaria were actually observed clutching an isopod's legs. The pedicellaria would hold tightly to the leg and occasionally tug on it as the isopod clung precariously to a nearby spine. The pedicellaria would eventually release its hold and the isopod would crawl away without any apparent harm to the appendage. Usually, however, the pedicellaria in the vicinity of an isopod would not react to the isopod's presence.

On one occasion a single *M. halei* was observed perched approximately halfway up a spine, waving its antennae in the water, and then wiping the antennae across the mouth parts in a possible feeding motion.

In this study two other invertebrates were found to occur regularly in association with *S. purpuratus*. 97 specimens of an unidentified flatworm (Platyhelminthes, Turbellaria) were observed, as were 107 specimens of an undescribed species of the purple amphipod, *Pontogeneia* sp. This same amphipod had previously been collected from *S. purpuratus* at Cape Blanco, Oregon (Barnard, 1954), as *Pontogeneia inermis*. Other invertebrate epizoics of purple sea urchins have occasionally been noted in the literature. The shrimp *Betaeus macginitieae* Hart, 1964, occurs in pairs underneath both *S. purpuratus* and *S. franciscanus* from Monterey Bay, California, south to Santa Catalina Island (Hart, 1964). *Flabelligera commensalis* Moore, 1909, a polychaete worm, occurs among the spines of purple sea urchins (Moore, 1909; Light, 1978). Johnson and Snook (1927: 291) reported that the isopod *Colidotea rostrata* (Benedict, 1898), "lives among the spines of sea urchins, and its coloring resembles that of the sea urchin." MacGinitie and MacGinitie (1949:265) specifically indicate that *Colidotea* occurs with *S. purpuratus*.

It is of interest to speculate that there may be a protective advantage for *M. halei* to live in association with *S. purpuratus*. If a potential isopod predator, such as a small fish, were to attempt to feed on a *M. halei* clinging to an urchin spine, almost invariably a "spine reaction" would be set off, and the isopod would immediately be covered under moving spines out of the predator's reach. Some indirect evidence for this was provided by laboratory attempts to remove *M. halei* from the urchin spines by using forceps, a procedure that repeatedly set off a spine reaction making the isopods inaccessible. The protective array of erect spines on the sea urchin may be a further deterrent to the predators of *M. halei*. The urchins may also provide a low energy microhabitat for the isopods, protecting them from the strong wave action of their environment.

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Species of Demersal Zooplankton Inhabiting a Kelp Forest Ecosystem off Santa Catalina Island, California

Demersal zooplankton are those animals that migrate at various times between the benthic and pelagic environments. Previous studies have concentrated on coral reef habitats (e.g. Emery, 1968; Porter, 1974; Alldredge and King, 1977; Porter and Porter, 1977; Porter et al., 1977; Hobson and Chess, 1979; Ohlhorst and Hutchinson, 1979). Inverted funnel traps were used by Thomas and Jelley (1972) to study demersal zooplankton in an estuarine ecosystem. King and Alldredge (1978) reported on the emergence patterns of demersal zooplankton from a subtidal sand-flat. Diel changes in zooplankton composition over an intertidal eelgrass flat were monitored by Robertson and Howard (1978).

Demersal zooplankton studies are of considerable interest to kelp forest ecology because these organisms may have substantial impact on food availability, feeding strategies, and behavior patterns of other community members, especially the ecologically and economically important kelp forest fishes. The only published study of kelp forest zooplankton is that of Hobson and Chess (1976), based on integrated plankton net collections. In contrast, emergence traps provide discrete samples of demersal zooplankton populations inhabiting specific substrates. The following study provides data from emergence traps on the species composition of demersal zooplankton inhabiting six substrates in a kelp forest ecosystem off Santa Catalina Island, California.

The study site was located on Harbor Reefs, approximately 1 km northwest of the Catalina Marine Science Center, Santa Catalina Island, California (Fig. 1).