

FOOD PREFERENCES OF *HEMIGRAPSPUS NUDUS* (DANA, 1851)
(DECAPODA, GRAPSIDAE) ON SAN JUAN ISLAND,
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BY

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Hemigrapsus nudus (Dana, 1851), the purple shore crab, is a commonly found inhabitant of marine and estuarine environments along the Pacific coast, ranging from mid-Alaska (Hart, 1968) to Punta Eugenio on the outer coast of Baja California (R. Brusca, pers. comm.), but its occurrence below Point Conception is rare (pers. obs.). The substrata upon which the crab is found range from rocky intertidal headlands, with relatively little fine sediment, to sediments of rock, sand and broken shell. It apparently does not inhabit areas with finer sediments (i.e., fine muds and gravels), where its congener *H. oregonensis* (Dana, 1851) is typically found (Hiatt, 1948; Knudsen, 1964; Ricketts & Calvin, 1968).

H. nudus co-occurs with *Pachygrapsus crassipes* Randall, 1840, in rocky intertidal areas from Newport, Oregon, to the southernmost extent of its range. There is considerable overlap in the habitats of these two sympatric grapsoid crabs, with *H. nudus* tending to occupy lower intertidal elevations or areas with finer sediments.

Hiatt (1948), in his extensive study of *P. crassipes* and its relationship with other intertidal species, observed that *H. nudus* at Monterey Bay, California subsisted "primarily on detritus and infrequently on algal fronds", in contrast to the diet of *P. crassipes*, which was strongly dependent on macroscopic green algae. Knudsen (1964), in studying a population of *H. nudus* at Titlow Beach near Tacoma, Washington, found that diatoms and desmids formed the bulk of the diet. This paper reports the results of gut content analyses for *H. nudus* from two areas of San Juan Island, Washington, and the results of laboratory experiments on feeding preferences.

Methods. — Specimens of *H. nudus* were collected from the intertidal zone at the Friday Harbor Laboratories, University of Washington, and from a rocky intertidal area immediately south of the entrance to Mitchell Bay on the northwest corner of San Juan Island in July of 1975. The site in front of the laboratories is composed of large boulders and cobble, interspersed with areas of sand and coarse mud. The Mitchell Bay site consisted of small boulders mixed with cobble. A short algal turf was present throughout the Mitchell Bay site and was irregularly present on rocks near the laboratory. Irregularly spaced clumps of larger algae were present at both sites.

Seven crabs were collected from Mitchell Bay and 23 from near the laboratories. The specimens were immediately placed in 95% ethanol and returned to the

laboratory where their stomachs were removed and the contents examined under dissecting and compound microscopes. Estimates were made of the percentage contribution of each of the food items present.

Since identification, to even the generic level, of macerated and partially digested algae is a dubious proposition (Leighton, 1966), confirmation of the apparent preference of *H. nudus* for green algae was attempted, following the methodology of Himmelman & Carefoot (1975). Six crabs were collected from the intertidal zone in front of the laboratory and placed in individual aquaria maintained at 13-14° C on a running seawater table. *Laminaria farlowi*, *Ulva rigida* Agardh, *Porphyra* sp. and *Fucus* sp. were collected from the same area, one inch squares cut from them and all four given simultaneously to the crabs. After 48 hours, the remaining algae were removed and placed on a ruled grid for estimation of the amount consumed.

Results. — Of the 30 *H. nudus* obtained for gut content analysis, 10 had empty stomachs, and digestion had proceeded so far in three that the contents were unidentifiable, beyond being of plant origin. The contents of the 17 remaining stomachs consisted primarily of particles of macroscopic algae and a trace of animal tissue (table I). These data indicate that green algae are of major importance

TABLE I

Estimated gut contents of *Hemigrapsus nudus* (Dana) collected from two sites on San Juan Island, Washington. Mean and range for 17 specimens

	Macroscopic Algae			Animal Tissue
	Green	Brown	Red	
\bar{x}	68.6%	13.9%	15.4%	2.4%
range	10-99%	1-90%	10-90%	1-20%

in the diet of *H. nudus*. An occasional diatom was seen, but so infrequently that they must have been incidentally ingested and of negligible importance in the diet of these crabs on San Juan Island. The results of the food preference experiments (table II) indicate a preference for *Ulva rigida*, a green alga, supporting the results of the gut content analyses.

Discussion. — The results of the gut content analyses presented here clearly indicate macroscopic algae, particularly green algae, to be of major importance in the diet of *H. nudus* on San Juan Island. The feeding preference experiments support the results of the gut content analyses, as *Ulva rigida* is preferentially consumed, but are less clear in explaining the proportions of red and brown algae found in the gut contents.

Previous investigations of the diets of two other Pacific coast Brachyura indicated that, in areas where they are the numerically dominant crab, they rely upon green algae for food. Thus, Kramer (1967) reported that *Grapsus grapsus* (Linnaeus, 1758) in the Galapagos Islands feeds on *Ulva* sp. and Hiatt (1948) observed that