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NOTES, INFORMATION & NEWS

Consumption of Pelagic Red Crabs by Black Abalone at San Nicolas and San Miguel Islands, California

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Black abalone, *Haliotis cracherodii* Leach, 1817 (Prosobranchia: Haliotidae), are common in rocky intertidal habitats from northern California to southern Baja California Sur, Mexico (McLean, 1978). Black abalone feed primarily on drifting fragments of kelps and other algae (Cox, 1962; Leighton & Boolootian, 1963; Abbott & Haderlie, 1980). Fragments of foraminiferans, bryozoans, hydroids, sponges, and sea urchins occasionally occur in the guts of black abalone, but ingestion of animal parts is thought to be incidental to consumption of algae (Leighton & Boolootian, 1963). Intentional capture and consumption of macroinvertebrates has not been reported, to our knowledge, for any species of abalone.

During a morning low tide on 3 June 1984, VanBlaricom searched for evidence of feeding among several hundred black abalone in a rocky cove (33°16.5′N, 119°33.5′W) at the west end of San Nicolas Island, California. About 15% of the abalone observed were feeding on fragments of kelps. In addition, three abalone were consuming pelagic red crabs (*Pleuroncodes planipes* Stimpson, 1860) (Anomura: Galatheidae). The abalone were all >100 mm in maximum shell diameter, and the crabs were 40–50 mm in total length. The abalone held the crabs against the substratum with the anterior portion of the foot, as they do when consuming algal fragments. When the abalone were removed from the rocks, it was noted that abdominal and posterior thoracic tissues (including the exoskeleton) of the crabs had been rasped away. Crabs held by abalone were dead, but were moist, flexible, and bright red in color. Crabs in the water near black abalone were alive, active, and bright red in color. Dead crabs were only seen high on a nearby beach and were dry, brittle, and bleached. Therefore, it seems likely that abalone captured the crabs alive, although post-mortem capture cannot be ruled out.

Stewart made similar observations on 10 February 1985 while examining a group of approximately 300 black abalone near Otter Harbor (34°3.5′N, 120°25′W) on the north shore of San Miguel Island, California. Many of the abalone were feeding on kelp fragments. Live and dead red crabs and body parts were scattered throughout the rocky intertidal zone. Five abalone held red crabs (dead in all cases) with the anterior part of the foot, and several others held only fragments of crabs. Therefore, it seems likely that some abalone were feeding on crabs captured post-mortem.

During normal oceanographic conditions, pelagic red crabs are common in the coastal waters of Baja California south of 29°N latitude (Boyd, 1967). During El Niño-Southern Oscillation (ENSO) periods, anomalous northward currents carry populations of red crabs to California. As a result, mass strandings of red crabs become common south of Pt. Conception (Longhurst, 1966), and can occur farther north (Glynn, 1961). The 1982–83 ENSO was perhaps the strongest of the century (Cane, 1983), producing striking warming of the coastal waters of California (Fiedler, 1984). Stranded red crabs were observed frequently at San Nicolas Island from January 1983 through November 1984 (Stewart *et al.*, 1984; VanBlaricom & Stewart, personal observations), and at San Miguel Island from January 1983 through February 1985 (Stewart *et al.*, 1984; Stewart, personal observations). Mainland strandings occurred as recently as March 1985 at sites as far north as Monterey Bay (Jameson, Baldridge & Deutsch, personal observations). Strandings and nearshore concentrations of red crabs in California have provided unusual feeding opportunities for gulls (Stewart *et al.*, 1984), sea otters (Deutsch, personal observations), and intertidal sea anemones (VanBlaricom, personal observations), in addition to black abalone.

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LITERATURE CITED

Abbott, D. P. & E. C. Haderlie. 1980. Prosobranchia: marine snails. Pp. 230–307. *In:* R. H. Morris, D. P. Abbott

& E. C. Haderlie (eds.), Intertidal invertebrates of California. Stanford Univ. Press: Stanford, Calif.

Boyd, C. M. 1967. The benthic and pelagic habitats of the red crab, *Pleuroncodes planipes*. Pacific Sci. 21:394–403.

Cane, M. A. 1983. Oceanographic events during El Niño. Science 222:1189–1195.

Cox, K. W. 1962. California abalones, family Haliotidae. Calif. Dept. Fish and Game, Fish Bull. 118:1–113.

Fiedler, P. C. 1984. Observations of the 1982–83 El Niño along the U.S. Pacific coast. Science 224:1251–1254.

Glynn, P. W. 1961. The first recorded mass stranding of pelagic red crabs, *Pleuroncodes planipes*, at Monterey Bay, California, since 1859, with notes on their biology. Calif. Fish and Game 47:97–101.

Leighton, D. & R. A. Boolootian. 1963. Diet and growth in the black abalone, *Haliotis cracherodii*. Ecology 44:227–238.

Longhurst, A. R. 1966. The pelagic phase of *Pleuroncodes planipes* Stimpson (Crustacea, Galatheidae) in the California Current. California Cooperative Oceanic Fisheries Investigation Reports 11, 1 July 1963 to 30 July 1966:142–154.

McLean, J. H. 1978. Marine shells of southern California. Natur. Hist. Mus. Los Angeles Co., Sci. Ser. 24 (Revised edition):1–104.

Stewart, B. S., P. K. Yochem & R. W. Schreiber. 1984. Pelagic red crabs as food for gulls: a possible benefit of El Niño. Condor 86:341–342.

Soviet Contributions to Malacology in 1980

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INTRODUCTION

As in past years, herein is provided a listing of malacological papers by Soviet scientists included in, and frequently abstracted by, the 1980 issues of the Referativnyy Zhurnal (see Veliger 27[3]:339–346 for the last such listing and references to previous ones).

We follow the categorical arrangements as utilized by the Referativnyy Zhurnal itself, although occasionally we may place selected titles in more approriate categories.

Certain publications this year are major contributions to the field, the most important of these being Golikov's monograph of the Buccininae of the world in which he treats 93 species and subspecies (several as new) in great detail; this extensive work is illustrated by plates showing the shells as well as enlargements for sculptural detail; also presented are figures of egg capsules, radulae, operacula, and anatomy as well as maps and charts indicating geographical, bathymetric, and ecological ranges and parameters. The bibliography includes nearly 1100 citations.

Although a number of new species were introduced, several papers also established new family-level taxa or revisionary arrangements of previously studied groups. Thus, Starobogatov and Izzatullaev divided the freshwater prosobranch family Thiaridae into three independent familial units: Thiaridae *s.s.*, Melanatriidae, and Melanoididae, new family, on the configuration of the pallial gonoducts; further, they subdivided the widely distributed, often parthenogenetic *Melanoides tuberculatus* into four species, two of which are new. Among "hydrobioid" taxa Izzatullaev discussed the little known pomatiopsid taxa of Tadzhikistan, describing two new species, one in *Kainarella* and another in *Pseudocaspia*.

Special attention to mollusks of the Kuril Islands is reflected in Gul'bin's paper on prosobranchs and Sirenko's on chitons, the latter work considering the chiton fauna off a single island, Simushir; the densities of these animals are high (*e.g.*, 3100/m^2 for *Juvenichiton albocinnamoneus*). Further, an entire book by Volova, Golikov & Kusakin was devoted to the shelled gastropods of the geographically adjacent Peter the Great Bay; 119 species in 43 families were noted and figures, descriptions, ranges, and ecological notes provided.

Among cephalopods, considerable attention was given to the exploitation of the neritic niche with papers by Nigmatullin on the economically important ommastrephids and by Nesis on sepiids and loliginids. Further, in a short review of the whiplash squids of the family Chiroteuthidae by Nesis, the new genus *Asperoteuthis* was established.

Popov & Skarlato reviewed the bivalve family Carditidae in the North Pacific, describing a new species of *Cyclocardia*, while Kafanov reconsidered the living cardiids in the Black Sea, making several nomenclatorial alterations. Of particular interest to those working on cardiids is a paper by Zaiko, Zaiko & Krasnov who assert that temperature effects the number of ribs on the shell, rendering narrowly circumscribed rib-counts rather suspect for taxonomic purposes. Izzatullaev examined the five species in the freshwater bivalve family Corbiculidae in Central Asia.

Kuznetzov, Kozaka & Isibasi investigated the relationship of gill-size to palp-size in several bivalves, concluding that the deposit feeding Tellinacea have proportionately much larger palps than suspension feeding bivalves like mytilids or venerids, an adaptation documented earlier by other authors.

For a continental Palearctic freshwater fauna, that of Siberia seems extremely rich: Dolgin & Johansen discussed in some detail 31 species and recorded 65 species of freshwater mollusks from northwestern Siberia, and even in the more isolated Kureyka River, a tributary of the Yenisey above the Arctic Circle, 41 species of fresh-