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FIRST RECORDS AND RANGE EXTENSIONS OF CRABS IN CALIFORNIA WATERS

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ABSTRACT: Range extensions are reported for 14 species of anomuran and brachyuran crabs (Crustacea: Decapoda), six of them new to California waters. Three cold-temperate species not previously known south of the Monterey Bay area were found to occur south of Point Conception at San Miguel and Santa Rosa Islands, where a strong northern element is present in the fauna. Two species with their known northern limit of range near San Francisco Bay, and one species known only as far south as Oregon, were collected in the area of unusually cold water around Cape Mendocino.

Since publication of Schmitt's (1921) comprehensive review, information on Californian decapod Crustacea has continued to appear. In this paper we report six additions to the crab fauna of California, and extend the known distribution within the state of eight other species. Records are based on material in the Allan Hancock Foundation, from collections made by the "Velero III" and "Velero IV," "Searcher," California Fish and Game vessels, and several individuals, including SCUBA divers.

Measurements refer to carapace length unless there is an indication to the contrary. When two measurements are given for a single specimen, they are differentiated as carapace length (cl.) and carapace breadth (cb.).

SPECIES UNREPORTED FROM CALIFORNIA

Family ALBUNEIDAE

Lophomastix diomedea Benedict, 1904

Lophomastix diomedea Benedict, 1904:621, fig. 1.

Recorded distribution: "Albatross" sta. 2913, off Cortes Bank, Baja Cfa., Mexico, 32°25'30"N, 119°03'30"W; 48 m (Benedict).

Material examined: "Velero IV" sta. 14121-70, 3 mi from Blue Banks anchorage, Santa Cruz I., 33°58'50"-56"N, 119°35'58"-36'35"W; 29-31 m; 17 Apr. 1970; 1 ♂ 18.0 mm — "Velero III" sta. 976-39, N of Santa Barbara I., 33°31'N, 119°01'50"W; 27-37 m, sand; 28 May 1939; 1 ♂ 14.2 mm — "Velero III" sta. 1120-40, off San Nicolas I., 33°18'20"N, 119°28'45"W; 53-60 m, sand and shell; 11 Apr. 1940; 3 ♂ 17.9-22.5 mm — "Velero III" sta. 1122-40, off San Nicolas I., 33°18'N, 119°24'10"W; 55 m, sand, rock, shell; 11 Apr. 1940; 2 ♀ 12.7 and 25.6 mm — "Velero III" sta. 1327-41, ½ mi W of Castle Rock, San Clemente I., 33°02'N, 118°37'20"-35"W; 40-68 m, fine broken shell; 8 June 1941; 1 ♀ 23.7 mm.

Remarks: This is the third genus and species in family Albuneidae to be reported from California waters. The following key will distinguish it from *Lepidopa californica* Efford (*L. myops*

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Holmes of earlier authors; see Efford, 1971:74) and *Blepharipoda occidentalis* Randall:

1. a. Carapace with a single lateral spine; eyes broad, compressed, scale-like, with a rudimentary cornea *Lepidopa californica*
- b. Carapace with more than one lateral spine; eyes slender, elongate, cylindrical, with a distinct cornea 2
2. a. Carapace with four lateral spines; eyes divided into two sections by a submedian articulation *Blepharipoda occidentalis*
- b. Carapace with three lateral spines; eyes not articulated submedially *Lophomastix diomedea*

Family PAGURIDAE

Pagurus ochotensis Brandt, 1851

Pagurus ochotensis—McLaughlin, 1974:57, figs. 15, 16.

Not *Pagurus ochotensis*—Schmitt, 1921:130, fig. 84 [= *Pagurus armatus* (Dana)].

Recorded distribution: Sea of Japan to Okhotsk Sea; Pribilof Ids., Alaska, to Tillamook Head, Oregon (McLaughlin).

Material examined: Just S of Trinidad Head; 12–15 m, soft mucky bottom with patches of boulders; 4 Aug. 1971; Camm Swift; 1 ♂ (juv.) 13.1 mm — “Searcher” sta. 208, about 12 mi S of Point Arena [exact position not recorded]; 90 m or less; 9 Aug. 1971; 1 ♂ 39.0 mm.

Remarks: The only precise Oregon locality that we have been able to find for this species is Tillamook Head (McLaughlin, 1974). The collections of the Allan Hancock Foundation contain Oregon material from off Ocean Park, Winchester Bay, and Coos Bay.

Pagurus aleuticus (Benedict, 1892)

Pagurus aleuticus—McLaughlin, 1974:72, figs. 17–19.

Recorded distribution: Japan to Kamchatka Peninsula; Bering Sea (latitude of Pribilof Ids.) southward to Oregon at 46°01.5'N, 124°43.2'W (McLaughlin).

Material examined: “MV Scofield” sta. 69-S-6-9, off Crescent City, 41°40'N, 124°26.7'W; 164–166 m; 6 Sept. 1969; presented by Howard Ness, Calif. Fish and Game; 2 ♂ 22.0 and 22.3 mm, 2 ♀ 17.7 and 20.0 mm — Off Eureka, 40°41'N, 127° 31.7'W; 208–283 m; 5 Feb. 1969; presented by Don Hendrick, Calif. Fish and Game; 1 ♂ 37.3 mm.

Pagurus caurinus Hart, 1971

Pagurus caurinus Hart, 1971:1528, figs. 1–7. McLaughlin, 1974:132, figs. 33, 34.

Recorded distribution: Kodiak I., Alaska, to Washington (McLaughlin).

Material examined: South Jetty, Bodega Bay; shore, –0.9' tide; 8 Aug. 1949; L. O. Miles and W. K. Emerson; 1 ♂ 8.8 mm, 3 ♀ 6.3–8.9 mm — Los Angeles Breakwater, San Pedro; 6 m, rock; 18 Feb. 1974; Mary K. Wicksten, SCUBA diving at night; 1 ♀ 9.9 mm.

Remarks: In the field, this species should be easy to distinguish from other small intertidal and subtidal *Pagurus* by the bright orange antennae and the broad, intensely white band on the distal part of the propodus of the walking legs.

Family GALATHEIDAE

Munidopsis diomedea (Faxon, 1893), new combination

Galacantha diomedea—Faxon, 1895:79, pl. 25 figs. 1, 1a–e.

Recorded distribution: Gulf of California, Mexico, 27°34'N, 110°53'40"W (Faxon) to off Peru, 18°23'S, 71°13'W (Del Solar, 1972); 1100–3433 m.

Material examined: “Velero IV” sta. 8791-63, 20.3 mi 258° from Castle Rock Light, San Clemente I., 32°54'29"–33°01'40"N, 118°55'00"–119°05'20"W; 1719–1738 m, mud; 17 July 1963; 6 ♂ 13.8–28.3 mm, 3 ♀ 15.0–23.0 mm, 1 juv. 11.0 mm.

Remarks: We follow those writers (e.g. Chace, 1942; Pequegnat and Pequegnat, 1970) who consider *Galacantha* to be synonymous with *Munidopsis*.

Munidopsis scabra Faxon, 1893

Munidopsis scabra—Faxon, 1895:93, pl. 21 figs. 1, 1a.

Recorded distribution: Off Tres Marias Ids., Mexico, 21°19'N, 106°24'W (Faxon) to off Peru, 11°50'S, 77°58'W (Garth and Haig, 1971); 907–1243 m.

Material examined: “Velero IV” sta. 1989-50, 4¼ mi 066° from Avalon, Santa Catalina I., 33°22'05"–26"N, 118°14'55"–56"W; 604 m, rubble; 12 Aug. 1950; 1 ♀ 12.6 mm — “Velero IV” sta. 1865-49, 14-mile Bank ESE of Santa Catalina I., 33°11'20"–12°00'N, 118°03'32"–04'40"W; 567–640 m, mud; 11 July 1949; 1 ♀ ca. 14.0 mm (rostrum broken).

EXTENSIONS OF RANGE WITHIN CALIFORNIA

Family LITHODIDAE

Phyllolithodes papillosus Brandt, 1848

Phyllolithodes papillosus—Schmitt, 1921:153, pl. 22 fig. 2, text-fig. 99.

Recorded distribution: Unalaska, Alaska (Schmitt) to Carmel, Calif. (McLean, 1962).

Material examined: "Velero III" sta. 1415-41, 1½ mi E of Cardwell Point, San Miguel I., 34°00'45"-55"N, 120°15'00"-16°30'W; 37-38 m, sand and rocks; 16 Sept. 1941; 1 ♀ (juv.) 13.5 mm.

Cryptolithodes typicus Brandt, 1848

Cryptolithodes typicus—Schmitt, 1921:154, pl. 20 figs. 1, 2.

Recorded distribution: Amchitka I., Alaska (Barr, 1973) to Monterey Bay, Calif. (Schmitt).

Material examined: "Velero III" sta. 1003-39, Bechers Bay, Santa Rosa I., 34°01'15"-45"N, 120°00'14"-30"W; 26 m, sand and shell; 18 Aug. 1939; 1 ♂ cl. 15.9 mm, cb. 27.1 mm.

Family DIOGENIDAE

Paguristes parvus Holmes, 1900

Paguristes parvus—Schmitt, 1921:124, pl. 17 fig. 1, text-fig. 83.

Recorded distribution: White's Point near San Pedro, Calif. (Schmitt); Arrecife Sacramento, Baja Cfa., Mexico (Haig, Hopkins, and Scanland, 1970).

Material examined: Naples Reef (20-22 km W of U. C. Santa Barbara campus, ½-1 mi offshore); 14-18 m, in kelp bed; 18 Oct. 1970; C. Swift, W. Stewart, D. Divins; 1 ♀ 4.4 mm — "Velero IV" sta. 4822-57, 11 mi 089° from Point Conception Light, 34°27'15"N, 120°14'45"W; 16 m; 17 Jan. 1957; 1 ♂ 3.9 mm — "Velero IV" sta. 5562-58, 5½ mi 092° from Point Conception Light, 34°26'47"N, 120°21'35"W; 19 m, rocky; 28 Jan. 1958; 3 ♂ to 4.7 mm, 5 ♀ to 3.3 mm — "Velero IV" sta. 5164-57, 4½ mi 089° from Point Conception Light, 34°26'40"N, 120°21'45"W; 21 m, shaley rocks; 2 July 1957; 2 ♂ to 4.0 mm, 9 ♀ to 4.1 mm — "Velero IV" sta. 6694-59, 2 mi 262° from Santa Barbara Point Light, 34°24'15"N, 119°45'40"W; 9 m, sand; 3 Dec. 1959; 1 ♀ 4.5 mm — Within or near Big Fisherman's Cove, Santa Catalina I.; 3-12 m; June-July 1973; Mary K. Wicksten; 4 ♂ 6.2-7.8 mm — "Velero IV" sta. 1646-48, Long Point, Santa Catalina I.; shore, rocky headland at -1.2' tide; 30 Nov. 1948; 1 ♂ 4.4 mm — "Velero IV" sta. 1648-48, White Cove, Santa Catalina I.; 16-20 m; 1 Dec. 1948; 1 ♂ 3.4 mm.

Isocheles pilosus (Holmes, 1900)

Holopagurus pilosus—Schmitt, 1921:127, pl. 17 fig. 2.

Recorded distribution: San Francisco, Calif. (Schmitt) to Estero de Punta Banda, Baja Cfa., Mexico (Ricketts and Calvin, 1939); possibly S to Bahía de Santa María, Baja Cfa. (Haig, Hopkins, and Scanland, 1970).

Material examined: Doran Beach Co Park, Bodega

Bay; 1 m, on sand; 16 Aug. 1974; Mary K. Wicksten; 1 ♂ 12.1 mm, 2 juv. 5.5 and 7.1 mm.

Family PAGURIDAE

Pagurus hemphilli (Benedict, 1892)

Pagurus hemphilli—Schmitt, 1921:142, fig. 92.

Pagurus hemphilli—McLaughlin, 1974:149, figs. 37, 38.

Recorded distribution: Queen Charlotte Ids., British Columbia (McLaughlin) to near Carmel, Calif. (McLean, 1962).

Material examined: Diablo Cove, San Luis Obispo Co; 3-6 m; 23 Sept. 1970; C. Swift and R. Lavenberg; 2 ♂ 12.7 and 18.6 mm, 3 ♀ 9.9-16.0 mm — "Velero III" sta. 894-38, S of San Miguel I., 34°01'N, 120°24'W; 9-27 m, rock with kelp; 10 Aug. 1938; 1 ♀ 14.0 mm.

Pylopagurus diegensis

Scanland and Hopkins, 1969

Pylopagurus diegensis Scanland and Hopkins, 1969: 257, fig. 1.

Recorded distribution: La Jolla, Calif. (Scanland and Hopkins).

Material examined: About 2 mi W of Twin Harbors, Santa Cruz I.; 9 m, in pile of rocky rubble at base of reef; 29 Sept. 1974; Mary K. Wicksten; 1 ♂ 7.5 mm — Just E of Fisherman's Cove, Santa Catalina I.; 12-14 m, rock rubble; 16 Aug. 1970; C. Swift, K. Hooker, and C. Gage; 1 ♂ 10.0 mm — Between Blue Cavern Point and Big Fisherman's Cove, Santa Catalina I.; 8 m, in pile of rocks under kelp bed; 9 July 1973; Mary K. Wicksten; 1 ♂ 11.5 mm — Farnsworth Bank, off Santa Catalina I.; 20-34 m; 12 Dec. 1970; Nat. Hist. Mus. of Los Angeles Co. Calif. Fish and Game; 4 ♂ 7.2-11.2 mm, 1 ♀ 6.5 mm.

Family CALAPPIDAE

Mursia gaudichaudii (H. Milne-Edwards, 1837)

Mursia gaudichaudii—Schmitt, 1921:190, fig. 118. Rathbun, 1937:220, pls. 66, 67.

Recorded distribution: Gulf of the Farallones, Calif. (Rathbun) to Talcahuano, Chile (Garth, 1957).

Material examined: "Searcher" sta. 187, 5 mi SW of Point Delgada, Humboldt Co., 39°56'N, 124°07'W; 91 m; 6 Aug. 1971; 1 ♂ cl. 38.4 mm, cb. 54.0 mm (not including lateral spines).

Remarks: A specimen from still farther north was seen by one of us (M. K. Wicksten) in the collection of the California Academy of Sciences. Data are as follows: 18.7 mi WSW of the Klamath River, 41°27'N, 124°29'W; 210-218 m; 10 Sept. 1964; coll. Peter Isaacson.

Family MAJIDAE

Loxorhynchus crispatus Stimpson, 1857

Loxorhynchus crispatus—Schmitt, 1921:213, fig. 133. Rathbun, 1925:200, pls. 66, 67. Garth, 1958:260, pl. P fig. 3, pl. 27 fig. 2, pl. 28 fig. 1.

Recorded distribution: California, off Cordell Bank, Marin Co, and S to San Diego (Garth).

Material examined: "Searcher" sta. 156, Tolo Banks, 3 mi S of Shelter Cove, Mendocino Co; 21–30 m; 28 July 1971; 1 ♂ 29.7 mm — "Searcher" sta. 150, Arena Rock, 1½ mi N of Point Arena; 24–30 m; 26 July 1971; 2 ♂ 98.7 and 100.5 mm.

DISCUSSION

The occurrence of four of these species outside their recorded ranges may be due to localized regions of cold water. A mixture of fauna typical of both cold- and warm-temperate waters has been reported in the northern Channel Islands of California, where the cold California Current swings offshore from the mainland coast (Hewatt, 1946; Neushul, Clarke, and Brown, 1967). Three cold-temperate species, *Phyllolithodes papillosus*, *Pagurus hemphilli*, and *Cryptolithodes typicus*, were found in this region. Ekman (1953) called attention to the water mass around Cape Mendocino, which is lower in temperature than at any other point on the northeast Pacific coast up to southern Alaska. Within the 11 degree isotherm surrounding this water mass was found the southern extension of the range of the northern species *Pagurus aleuticus*. This mass of cold water may serve as the northern boundary of the ranges of the southern species *Loxorhynchus crispatus* and *Mursia gaudichaudii*.

Since this paper was submitted for publication, our attention has been called to two checklists in a 1972 work edited by A. T. Pruter and D. L. Alverson: The Columbia River estuary and adjacent ocean waters. Bio-environmental studies. Univ. Washington Press, 882 pp. The first of these (J. E. McCauley, A preliminary checklist of selected groups of invertebrates from otter-trawl and dredge collections off Oregon: 409–421) lists *Mursia gaudichaudii* from off Oregon in 100 m (p. 414). The second (W. T. Pereyra and M. S. Alton, Distribution and relative abundance of invertebrates off the northern Oregon coast: 444–474) lists *Munidopsis scabra* from northern Oregon in 1463 m (p. 450). No precise locality was given in either case.

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