

REDESCRIPTION, DESCRIPTION OF THE MALE, AND  
NEW DISTRIBUTION RECORDS FOR THE HOMOLID CRAB  
*PAROMOLA FAXONI* (SCHMITT) IN THE  
EASTERN PACIFIC OCEAN

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ABSTRACT

The homolid crab *Paromola faxoni* (Schmitt, 1921) is redescribed and compared to previous descriptions of the female holotype. The male is described and illustrated for the first time. New records of specimens from several museum collections on the west coast of the United States are presented. The range, formerly restricted to the type locality off Point Loma, California, is extended north to Tajiguas, California, and south to Isla Cedros, Baja California, Mexico.

The homolid crab genus *Paromola* Wood-Mason and Alcock, 1891, is represented by 12 species (Guinot and Richer de Forges, 1981) found in depths from 1-1,320 m (Gordon, 1956; Ingle, 1980; for *P. cuvieri*) in waters of the northeastern Atlantic Ocean, Norwegian Sea, North Sea, Mediterranean Sea, Indian Ocean, Indo-Pacific, and eastern Pacific Ocean (Schmitt, 1921; Rathbun, 1937; Gordon, 1956; Griffin, 1965; Serène and Lohavanijaya, 1973; Guinot and Richer de Forges, 1981; Manning and Holthuis, 1981; Miyake, 1983). The genus in the Pacific includes nine species from the Indo-Pacific region (Serène and Lohavanijaya, 1973; Guinot and Richer de Forges, 1981) and two species from the eastern Pacific (Rathbun, 1937). (In a world-wide revision of the Homolidae (Guinot and Richer de Forges, in press) several new genera and new species of the Homolidae are described. This publication was not available to us at the time that the current paper went to press.)

The two eastern Pacific species, *Paromola faxoni* (Schmitt, 1921) and *Paromola rathbuni* Porter, 1908 (as *P. rathbunae* in Guinot and Richer de Forges, 1981), were previously considered rare. For example, prior to Báez and Ruiz (1985) only two specimens of *P. rathbuni* had been recorded (both from the Juan Fernández Islands, Chile) as follows: the type female (destroyed in an earthquake and fire in 1906) and a male housed in the Museo Nacional de Historia Natural, Santiago, Chile (NMS; D-10915) (Rathbun, 1937, plate 19, fig. 2; Garth, 1957). The latter specimen was confirmed to be extant by P. Báez (NMS, personal communica-

tion). Three additional specimens of *P. rathbuni* (two males and an ovigerous female) were collected from the same area off Chile in 1945 and are housed at the National Museum of Natural History (USNM) in Washington, D.C. (R. B. Manning, personal communication). Báez and Ruiz (1985) recorded seven specimens of *P. rathbuni* (five males and two females) collected in 1960 and 1969 from off the oceanic islands of (1) the Juan Fernández Archipelago (Robinson Crusoe and Alejandro Selkirk Islands), and (2) the Desventuradas Archipelago (San Ambrosio and San Félix Islands), as well as from the offshore rocks, Islotes González (in 73-146 m).

Although Wicksten (1989) omitted *P. faxoni* from her treatment of eastern Pacific offshore benthic decapods, a review of the literature revealed that this species has been reported three times in the eastern Pacific. Schmitt (1921), in describing the species (as *Homola faxoni*), listed five specimens collected from off Point Loma, California. Rathbun (1937) commented on the same five specimens. The third report was by Crane (1937) who recorded a female collected off Punta San José, Baja California, Mexico. The only subsequent references to this species are in a key to the genus *Paromola* (see Griffin, 1965), a collection catalog (Luke, 1977), and three behavioral notes by Wicksten (1983, 1985, 1986).

While studying decapod crustaceans collected by the research submersible DSRV *Diaphus* in Californian waters of the Santa Maria Basin and Santa Barbara Channel under the auspices of the Minerals Manage-

ment Service (MMS), we encountered a male specimen of the homolid crab *Paromola faxoni* collected from off Tajiguas, California (approximately 27 miles east of Point Conception, directly inshore of deepest part of Santa Barbara Basin; MMS Station 1 C/D; 28 July 1984; Table 2). A search of the Crustacea collections of the Natural History Museum of Los Angeles County (LACM; much of which was formerly housed at the Allan Hancock Foundation (AHF), University of Southern California, Los Angeles, California), and queries to several southern California museums and the U.S. National Museum of Natural History located a total of 34 specimens (18 male, 11 female, 3 juvenile, and 2 indeterminate; 1 male specimen missing [LACM]) of *Paromola faxoni* distributed north to Tajiguas, California, and south to Isla Cedros, Baja California, Mexico (Tables 1, 2). An additional female specimen was recorded by Crane (1937) from Punta San José, Baja California, Mexico (Table 2; not verified extant by the authors). These records indicate that the species is neither as rare nor as narrowly distributed as published accounts would suggest. Below, we add to Schmitt's (1921) species description, describe and illustrate the male for the first time, and document the increased range of the species to the north and south of the type locality.

#### Family Homolidae de Haan, 1839

##### *Paromola faxoni* (Schmitt, 1921)

Figs. 1–4

*Homola faxoni* Schmitt, 1921: 184–185, pl. 31, fig. 7.

*Paromola faxoni*.—Rathbun, 1937: 68–69, pl. 18; pl. 19, fig. 1; table 19.—Crane, 1937: 107.—Church, 1971: 113 (color photograph, presumably this species).—Luke, 1977: 32.—Wicksten, 1983: 187, fig. 1b (drawing based on Church's (1971: 113) photograph); 1985: 476; 1986: 364.—Correa-Sandoval, 1991: 3 (as cited by Guinot and Richer de Forges, in press).

*Type Locality*.—Off Point Loma, California, 67–73 fathoms (123–134 m), *Albatross* station 4309, 3 March 1904.

*Type Specimen*.—USNM 53331, female (Figs. 1, 3d).

*Material Examined*.—See Tables 1, 2. Size range of material examined (in mm): males: 6.2–83.3 rostral carapace length (RCL), 4.8–72.7 carapace width between dorsal anterolateral spines of greatest width (CW); fe-

males: 44.7–59.3 RCL, 39.6–55.7 CW. The largest individual examined was a male (Cabrillo Marine Museum, San Pedro, California, CMM 87.18.1) collected at 73-m depth off White's Point, Palos Verdes, California, on 8 January 1985. See Table 1 for definition of measurements.

#### Species Description

(Additional to Rathbun (1937), who followed Schmitt (1921).) Description refers to both male and female specimens unless otherwise noted.

*Carapace* (Figs. 1a, 2a, 4a).—Very short covering of setae over entire carapace, but not obscuring surface (i.e., not with "entire surface more or less obscured by a rather thick, short pubescence" (Schmitt, 1921)). Supraorbital spines directed outward, with two (sometimes 1; e.g., MMS 1 C/D) small, hooked spines. Branchial and hepatic regions distinctly inflated; body subrectangular in cross section, becoming more inflated with increased size of crab. Lateral margins with row of 4–6 spines. Linea homolica (see Martin and Abele (1986: 587; 1988: 32) for discussion of lineae of decapods; see McLaughlin (1980: 167) for definitions of types of lineae found in decapods) visible along dorsolateral margins. Small tubercles of varying number and size covering carapace both dorsally and laterally, largest concentration on dorsal branchial region.

*Chelipeds* (Figs. 1, 2, 4).—Long, slender, equal in length; covered with dense, short setation; merus with row of 5–8 spines dorsally in females. Fingers with nonserrate, acute inner margins; dactyl crossing propodus inwardly at tip (except one chela of specimen from MMS 1 C/D); with patches of long, thick setae in most specimens.

*Pereiopods* (Figs. 1, 2, 3d, 4).—P2–4 with row of 15–22 corneous spines on inner (ventral) margin of dactyl; merus with 6–9 dorsal, and 3–12 ventral, spines along margins; P5 dactyl with 5–8, and propodus with 7–10 (proximal 5 or 6 in circular pattern) corneous spines on inner margin (Fig. 3d). Dorsal and lateral surfaces of propodus densely covered with short setae; ventral surfaces of dactyl and propodus mostly devoid of setae.

*Abdomen* (Figs. 1b, 2b, 4b).—Seven-segmented; large tubercle at posterior margin of first, and in center of second, segments;

Table 1. Collection and morphometric data for specimens of *Paromola faxoni* (Schmitt, 1921) housed in the Natural History Museum of Los Angeles County. Numbers in parentheses under LACM catalog numbers are *Velero III* and *Velero IV* station numbers (see Fraser (1943) for additional *Velero III* station data). Most coordinates are approximate. Depth in m. Body measurements in mm. M = male, F = female, \* = ovigerous, \*\* = missing from collection. CW = carapace width between dorsal anterolateral spines of greatest width; RCL = rostral carapace length, from tip of rostrum to midposterior margin of carapace; OCL = ocular carapace length, from right supraocular margin to midposterior margin of carapace; CD = carapace depth at highest middorsal prominence to sternum. Cheliped measurements: DL = dactyl length, left/right; DH = dactyl height at toothed base of dactyl, left/right; PL = propodus length, left/right; PH = propodus height at base of chelipeds, left/right.

Catalog number	Locality	Latitude/ longitude	Depth	Date	Sex	CW	RCL	OCL	CD	DL	DH	PL	PH
LACM 62-205.1	Pts. Mugu and Dume, California	34°00.0'N 118°51.0'W	91	24 Mar 62	F*	55.7	59.2	56.9	33.6	17.8 18.3	2.4 2.4	41.2 40.8	6.2 6.1
LACM 41-56.6 (1276-41)	Pt. Dume, California	34°00.2'N 119°01.3'W	86-88	23 Mar 41	M	17.4	—	16.3	— 10.5	6.4 6.1	1.0 1.2	13.9 13.6	2.5 2.6
LACM 40-148.1 (1174-40)	San Pedro Channel, California	33°24.3'N 118°00.6'W	123-201	20 Aug 40	M	4.8	6.3	5.4	3.8	2.0 2.0	0.3 0.4	4.4 4.9	0.8 1.0
LACM 40-148.1 (1174-40)	San Pedro Channel, California	33°24.3'N 118°00.6'W	123-201	20 Aug 40	M**	—	—	—	—	—	—	—	—
LACM 80-150.1	Santa Barbara Id., California	33°29.0'N 119°01.0'W	119	Jul 80	M	40.0	45.2	40.1	23.3	17.4 17.4	3.0 2.9	40.3 41.6	7.7 7.7
LACM 84-282.1	Dana Pt., California	33°26.0'N 117°36.0'W	50-200	13 Feb 84	M	62.6	71.6	64.4	36.7	29.2 29.2	5.8 5.9	78.8 78.3	16.0 15.9
LACM 66-371.1 (10987-66)	Pta. Banda, Baja California, Mexico	31°43.0'N 116°48.0'W	200-302	19 Feb 66	M	44.0	51.3	45.6	26.9	19.4 19.2	3.1 2.9	45.4 45.2	7.8 7.9
LACM 62-204.1	Cabo Colonet, Baja California, Mexico	30°55.0'N 116°22.0'W	119	10 Feb 62	M	50.8	59.1	53.0	32.0	23.7	4.2	52.3	10.2
LACM 60-269.1	Pta. San Rosarito, Baja California, Mexico	28°29.0'N 114°25.0'W	82-86	21 Sep 60	M	41.9	47.0	41.5	25.0	16.1 16.2	3.0 2.9	37.7 37.9	7.4 7.4
LACM 41-33.9 (1253-41)	Isla Cedros, Baja California, Mexico	28°05.8'N 115°31.3'W	117-119	26 Feb 41	F	11.0	12.1	10.1	6.6	3.6 3.0	0.7 0.7	7.9 8.3	1.3 1.4

Table 2. Collection locality (north to south), coordinates, depths, depository, and number per sex of all known specimens of *Paromola faxonii* from the eastern Pacific Ocean. AHF-LACM = Natural History Museum of Los Angeles County specimens that were formerly housed at the Allan Hancock Foundation, Los Angeles, California; CMM = Cabrillo Marine Museum, San Pedro, California; NYZS = Department of Tropical Research, New York Zoological Society; OMP = Ocean Monitoring Program, San Diego, California; SIO = Scripps Institution of Oceanography, La Jolla, California; USNM = National Museum of Natural History, Washington, D.C.; M = male, F = female, J = juvenile, ? = sex indeterminate (i.e., specimen either dry or not extant), (O) = ovigerous; \*\* = collected but not retained. Coordinates are approximate in most cases. Specimens not examined = NYZS, OMP, SIO, and those denoted with \*.

Locality	Latitude/ longitude	Depth (m)	Depository/ number of specimens
Tajiguas, California	34°24.12'N 120°00.62'W	76	USNM/1M (MMS 1 C/D)
Points Mugu and Dume, California	34°00.00'N 119°00.00'W	91	AHF-LACM/1F(O)
Point Dume, California	34°00.20'N 119°01.30'W	86-88	AHF-LACM/1M
Palos Verdes, California	33°40.00'N 118°19.00'W	70-90	*CMM/3F, 1? 2M (86.26.001; 87.18.001)
Santa Barbara Id., California	33°29.00'N 119°01.00'W	119	AHF-LACM/1M
Dana Point, California	33°26.00'N 117°36.00'W	50-200	AHF-LACM/1M
San Pedro Channel, California	33°24.30'N 118°00.60'W	123-201	AHF-LACM/1M *1M
San Diego, California	32°52.43'N 117°16.60'W	18-30	SIO/1M
La Jolla, California	32°52.00'N 117°16.50'W	150	SIO/1M
Coronado Bank, California	32°40.50'N 117°27.30'W	230	SIO/1M, 1F
San Diego, California	32°39.04'N 117°19.44'W	97.5	**OMP/1F(O)
La Jolla and Point Loma, California	32°45.00'N 117°30.00'W	460	SIO/1M, 1F
Point Loma, California	32°39.00'N 117°19.45'W	123-247	*USNM/1M, 1F, 2J 1F (Holotype)
Point Loma, California	32°34.20'N 117°24.00'W	220	*CMM/1?
Punta Banda, Baja California, Mexico	31°43.00'N 116°48.00'W	200-302	AHF-LACM/1M
Punta San José, Baja California, Mexico	31°23.00'N 116°41.00'W	82	NYZS/1F
Cabo Colonet, Baja California, Mexico	31°07.00'N 116°36.00'W	91-141	SIO/2M, 1F, 1J
Cabo Colonet, Baja California, Mexico	30°55.00'N 116°22.00'W	119	AHF-LACM/1M
Punta San Rosarito, Baja California, Mexico	28°29.00'N 114°25.00'W	82-86	AHF-LACM/1M
Isla Cedros, Baja California, Mexico	28°05.80'N 115°31.30'W	117-119	AHF-LACM/1F

occasionally, small tubercle at anterior margin of first, large or small tubercle in center of third, and small tubercle on anterior margin of fourth, segments.

*Male* (Figs. 2, 3a-c, 4a).—Chelipeds more

robust; larger specimens with propodus and carpus covered with prominent tubercles, fewer and sometimes absent in smaller males and in females. Merus with 9-19 dorsal spines; occasionally, additional parallel row of up to 11 spines in larger specimens. Ab-

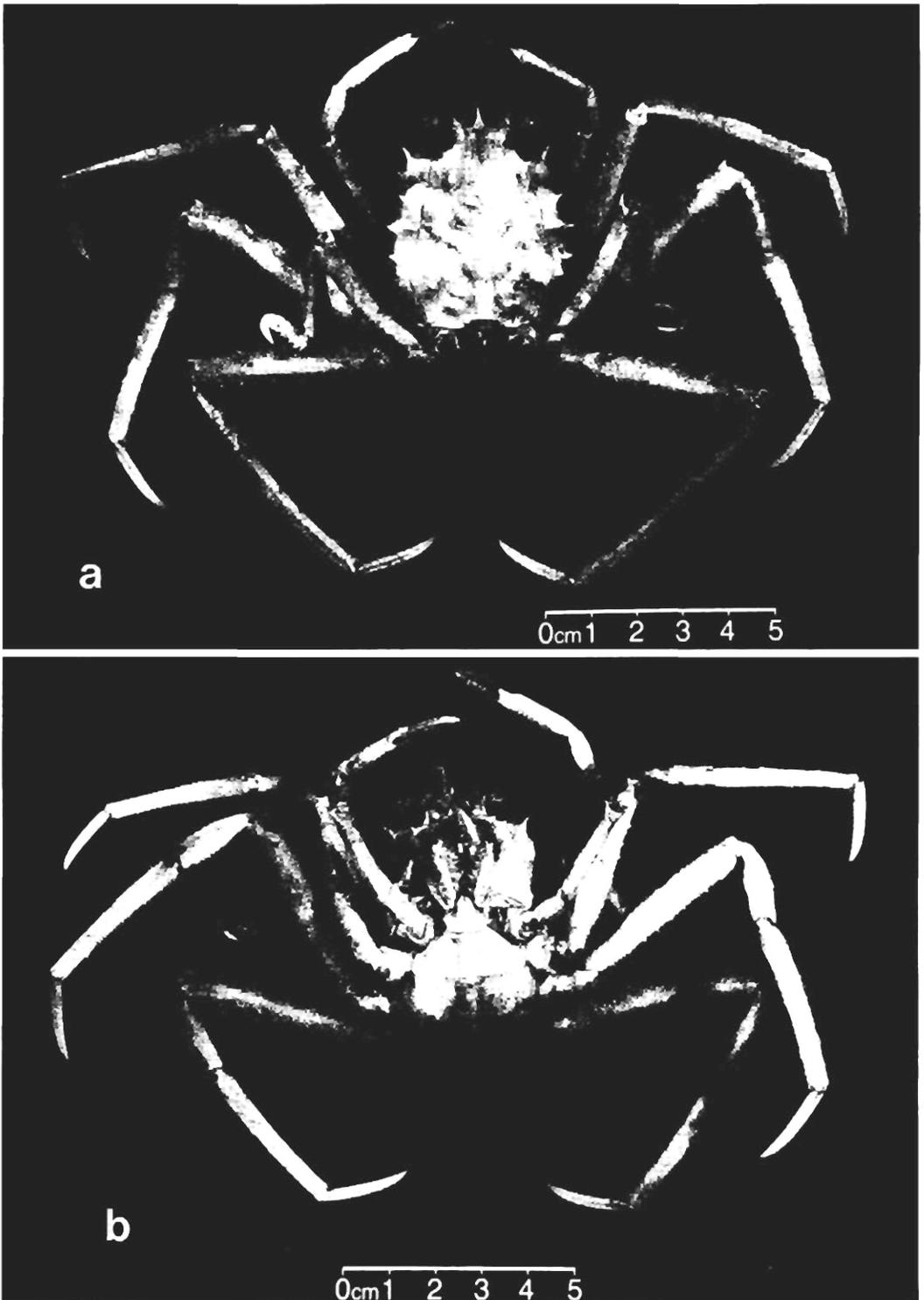


Fig. 1. *Paromola faxoni* (Schmitt), holotype, female (CW = 39.60 mm), USNM 53331, a, dorsal view; b, ventral view.

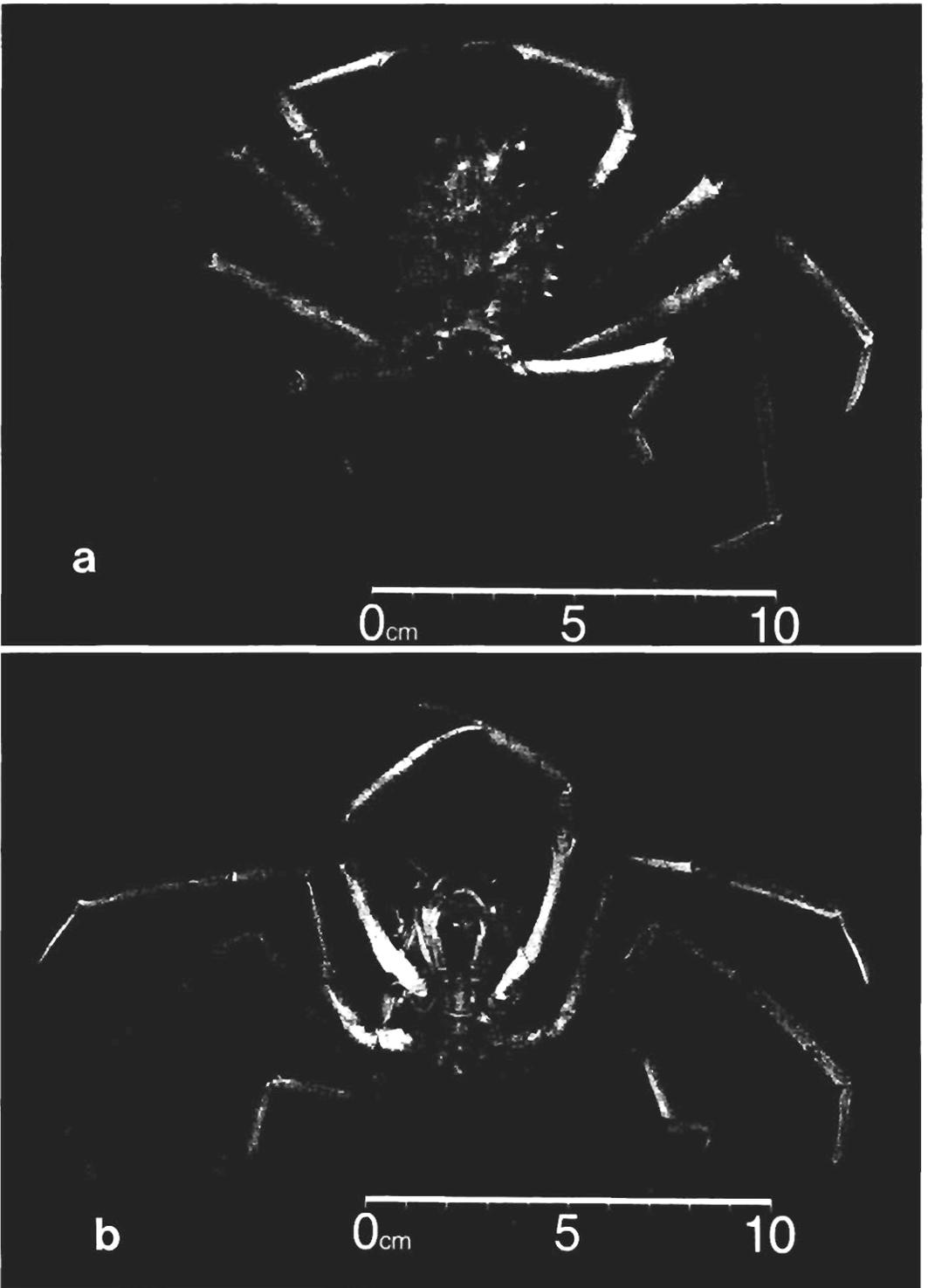


Fig. 2. *Paromola faxoni* (Schmitt), male (CW = 43.95 mm), LACM 66-371.1, a, dorsal view; b, ventral view.

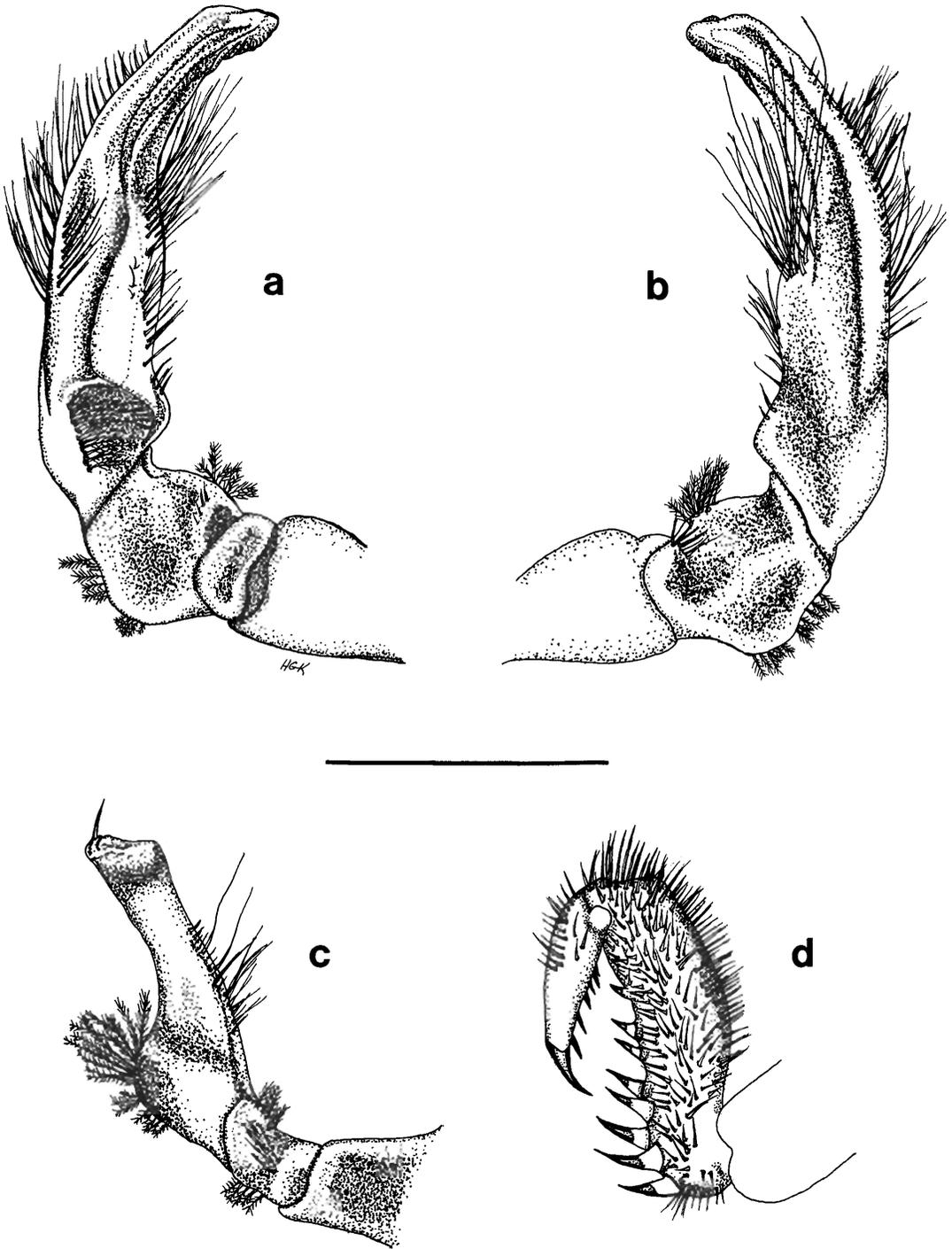


Fig. 3. *Paromola faxoni* (Schmitt), male, a-c (CW = 31.92 mm), MMS station 1 C/D; 28 July 1984; a, right first pleopod, posterior (ventral) view; b, same, anterior (dorsal) view; c, right second pleopod, posterior (ventral) view; d, female, holotype, USNM 53331, left fifth pereiopod (dactyl, propodus, carpus [setae omitted]), dorsal view. Scale bar = 5 mm for a-c; 2.5 mm for d.

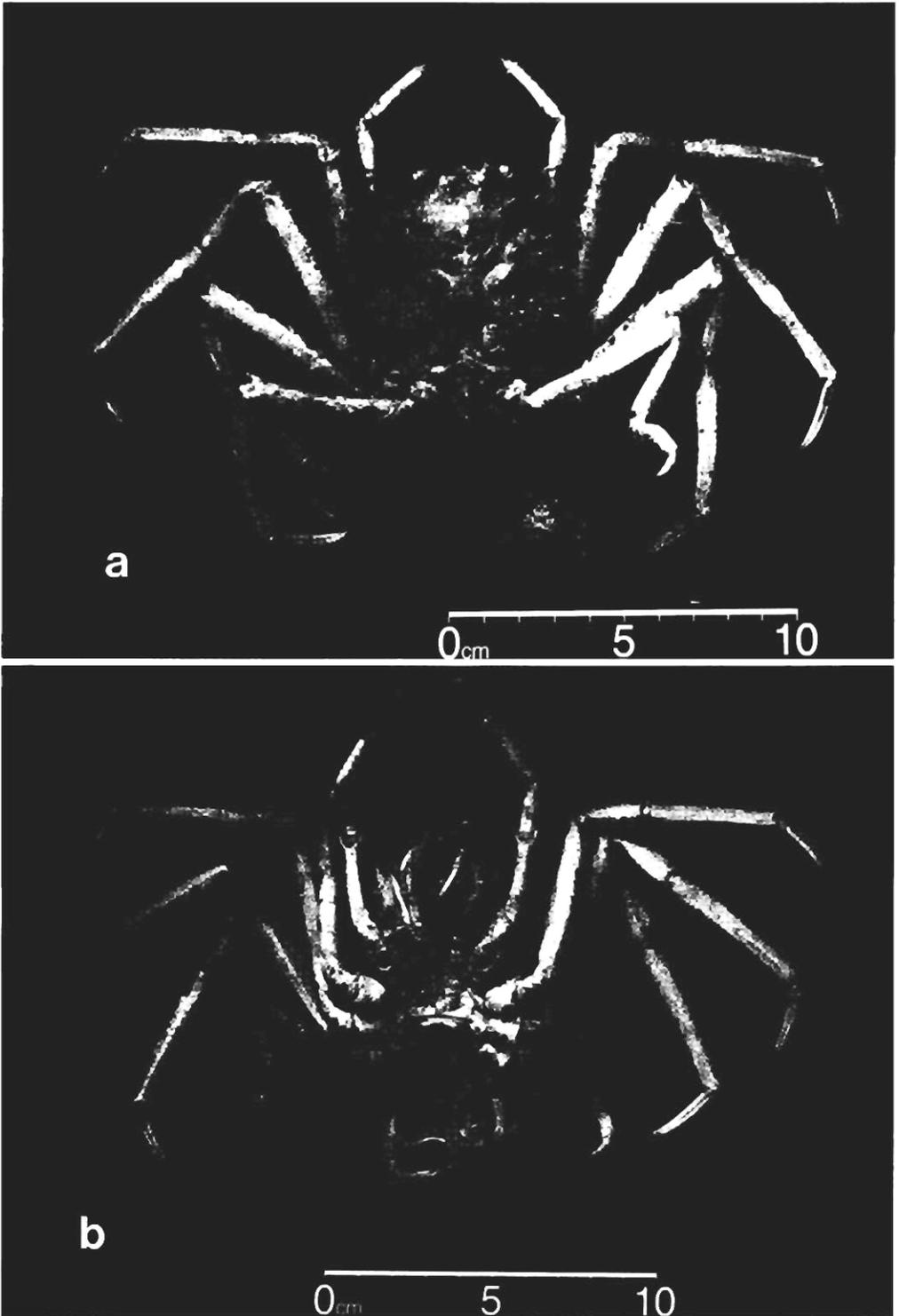


Fig. 4. *Paromola faxoni* (Schmitt), a, large female (ovigerous; CW = 55.69 mm), LACM 62-205.1, dorsal view; small female (CW = 10.97 mm), LACM 41-33.9, dorsal view; b, female (ovigerous), LACM 62-205.1, ventral view with abdomen extended to show eggs (approximately 0.43-0.52 mm in diameter) attached to pleopods.

domen with tubercle along horizontally raised posterior border of sixth segment (also found in small female from LACM 41-33.9, Fig. 4a); anterior half to two-thirds of seventh segment generally narrower at base (Fig. 2b) than in females (Fig. 1b). Pleopod 1 (Fig. 3a, b) large, robust, minutely crenulate at distolateral tip; overlapping ventral folds with long setae covering posterior opening (Fig. 3a). Pleopod 2 as in Fig. 3c. Pleopods 1 and 2 becoming more robust and better defined with increased size of specimen.

*Juveniles* (e.g., LACM 41-33.9; Fig. 4a).—Carapace with spines longer and sharper than in adults; virtually no setae dorsally, except at tips of largest lateral, gastric, and hepatic spines; short hooked setae along some margins; rostrum, supraocular spines, pereopods, antennae, and eyestalks with long, slender, irregularly spaced setae; very few well-spaced setae covering chelipeds. Supraocular spines directed forward with small, hooked dorsal spines sometimes lacking (e.g., LACM 40-148.1). Chelipeds with 5 dorsal spines on merus; fingers without pigmentation. Pereopods 2-4 proportionately longer and more slender, and with fewer and less prominent spines along dorsal and ventral margins of merus, than in adults. P5 dactyl with 6, propodus with 8, spines.

*Color*.—All specimens examined (Tables 1, 2) appeared uniformly light to dark cream (preservation in 70% ethanol) except for LACM 66-371.1 (Fig. 2) which has a whitish carapace. Crane (1937) described "color in life" as "entirely buff, except anterior part of carapace which is suffused with scarlet." Cheliped finger pigmentation ranges from white (Fig. 2a) to brown (Fig. 1a) to black (Fig. 4a). Six specimens have a variously sized, darkly pigmented, subcircular spot distally on both sides of the propodus (LACM 62-204.1 has spots only on inner side of propodus; CMM 86.26.001 has spot on inner side of right propodus only). The nature of this spot, and why it appears in only some specimens of both sexes, is unknown.

Although Crane (1937) mentioned scarlet coloration of live crabs, living crabs held in aquaria exhibited only a uniform cream or beige color (Steve Vogel and Ron McConnaughey, personal communication). In

respect to the dark, subcircular spot on the chelipeds of some *P. faxoni*, several papers concerning these spots on other decapods have come to our attention (Williams, 1974, 1976; Williams and Van Dover, 1983).

## DISCUSSION

### Biology and Behavior

Very little is known concerning the basic biology of *P. faxoni*, as is the case with many deep-sea brachyurans. The reduced and subchelate fifth pereopods suggest a carrying behavior, with these legs holding some object(s) over the back of the carapace for protection or camouflage. In other members of the genus this behavior has been observed (e.g., see Wicksten, 1985, for *P. japonica*). Wicksten (1983, fig. 1b) showed what is probably a *P. faxoni* "from southern California" carrying a sponge; her drawing was based on a color photograph in Church (1971) of a "10-inch-long [specimen] at a depth of 1,200 feet [366 m] off San Diego." Based on pereopod morphology, Guinot and Richer de Forges (1981) and Wicksten (1985, 1986) inferred carrying behavior in all species of the family Homolidae. Similar behavior has been documented or inferred for other crabs with chelate or subchelate posterior pereopods (i.e., Dromiidae, Latreilliidae, Tymolidae, and Dorippidae; Wicksten, 1986).

Only one ovigerous female exists in collections examined (LACM 62-205.1, Fig. 4, Tables 1 and 2). A second ovigerous specimen was collected live off San Diego, California, on 28 January 1992 by the Pt. Loma Biology Laboratory, Ocean Monitoring Program (OMP) (Table 2), but was returned to the sea.

We know of only four *P. faxoni* that have been held successfully in aquaria (three females at the Cabrillo Marine Museum, and one male at the Scripps Institution of Oceanography). The only behavioral notes available are from observations by Steve Vogel (CMM, personal communication) of crabs in aquaria carrying gorgonians with the fifth pereopods, and by Ron McConnaughey (SIO, personal communication) of a crab that lived in an aquarium (5-10°C) from 5 May to October 1992. McConnaughey noted that the crab maintained the fifth pereopods in an elevated position,

but no obvious carrying behaviors were observed (although shells and other items were introduced).

### Taxonomic Remarks

Although the holotype (USNM 53331; Figs. 1, 3d) is a female, and is the only specimen mentioned by Schmitt (1921), his figure (plate 31, fig. 7) was erroneously referred to as a male in the accompanying figure legend. Rathbun (1937) used the same photograph, but correctly referred to it as a female (holotype), and also included a photograph of the holotype in ventral view (clearly showing it to be female). Rathbun (1937: 72, table 18) listed the five previously known specimens which are presently housed at the National Museum of Natural History (USNM) (R. B. Manning, personal communication).

The male first and second pleopods have been illustrated for relatively few species of *Paromola*. Griffin (1965, figs. 1–4) provided figures for *P. spinimana* Griffin as did Serène and Lohavanijaya (1973, figs. 36, 37) for *P. alcocki faughni* Serène and Lohavanijaya, and Guinot and Richer de Forges (1981, figs. 5A, A1 and 5C, C1) for *P. profundorum* (Alcock and Anderson, 1899) and ?*P. japonica* Parisi, 1915. The general shapes of the pleopods of these species and those of *P. faxoni* are quite similar, including the distinctive overlapping ventral folds of the first pleopod (Fig. 3a; ventral view not shown in Serène and Lohavanijaya, 1973). The apex of the first pleopod is distinctive in these species, as in many brachyurans, and likely provides a good distinguishing characteristic among males of species of *Paromola*.

### Distribution

All five specimens of *P. faxoni* listed by Schmitt (1921) and again by Rathbun (1937) were taken off Point Loma, California, in depths from 123–247 m. Wicksten (1985) examined another specimen housed at the Allan Hancock Foundation where we found nine additional unreported specimens (Tables 1, 2) distributed from Point Mugu, California, to Isla Cedros, Baja California, Mexico. The only other published records for this species are Crane's (1937) record of a female specimen from Punta San José, Baja California, Mexico, and a collection

catalog by Luke (1977) documenting 10 specimens (six males, three females, and one juvenile) housed at the Scripps Institution of Oceanography and distributed from La Jolla, California, to Cabo Colonet, Baja California, Mexico. According to the staff of the Monterey Bay Aquarium Research Institute (MBARI), Monterey, California, there have been no sightings of *P. faxoni* in that area during the past four years either by personnel or in extensive video footage (J. Berry, J. Connor, L. Lewis, personal communications). Queries to the California Academy of Sciences (CAS; R. Van Syoc, personal communication), San Francisco, California, and to the Universidad Nacional Autónoma de México (UNAM; M. Hendrickx, personal communication), Mazatlán, Mexico, did not result in further specimens. Additionally, Hendrickx (1992) did not list *P. faxoni* as occurring in the Gulf of California, Mexico. Therefore, it is likely that the geographic distribution of *P. faxoni* does not greatly exceed the boundaries defined by present specimen collections, although distribution of the species west to Point Conception, California (northernmost border of the Californian Province; e.g., Brusca and Wallerstein, 1979: 73), is highly probable.

This report extends the range of *P. faxoni* northward to Tajiguas, California, and southward to Isla Cedros, Baja California, Mexico, and extends the depth range to 18–460 m.

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