

DESCRIPTIONS OF NEW DECAPOD CRUSTACEANS FROM THE WEST COAST OF NORTH AMERICA.

By MARY J. RATHBUN,

Second Assistant Curator, Division of Marine Invertebrates.

The species and subspecies here described are the result chiefly of a study of the vast collection of shrimps from the coast of Alaska southward to San Diego, California, which have been accumulating for many years in the United States National Museum, and have been obtained largely by the United States Fish Commission steamer *Albatross*. Besides the shrimps, one new crab, an *Oregonia*, was dredged by the *Albatross* during her cruise in Bering Sea in 1900.

In connection with the publication of the Decapod Crustacea of the Harriman Expedition, it is proposed to give a list of the forms known to inhabit the coast of western America (north of Mexico) and to more fully describe and figure the new and little-known species.

Family MAIIDÆ.

OREGONIA BIFURCA.

Surface tuberculate and hairy. Postorbital width two-thirds of branchial width. Rostral horns divergent from their base. Basal joint of antenna armed on its outer edge with a stout blunt subterminal spine and three small spines, one of which is at the anterior angle. Inner surface of merus of chelipeds bordered by short blunt spines; propodus slightly longer than merus, fingers and palm subequal, margins of palm subparallel. Dactyli of ambulatory legs contained about one and a third times in their propodi.

Dimensions.—Length of carapace and rostrum 26.5 mm., width of carapace 19.6 mm., width between tips of postorbital spines 13 mm., length of horn measured along the inner edge 3.4 mm., distance between tips of horns 3.5 mm.

Type locality.—One specimen only, a female, was taken by the U. S. Fish Commission steamer *Albatross* at station 3785, north of Rat Islands, Aleutians, 270 fathoms (Cat. No. 25287).

Family CALLIANASSIDÆ.

CALLIANASSA GONIOPHTHALMA.

Closely allied to *C. cæcigena* Alcock and Anderson. Rostrum reaching barely one-third the length of the eyes. No median carina, but a slight blunt elevation near the posterior margin corresponding to the strong tooth in *C. cæcigena*. Eyes oblong, sides subparallel, reaching nearly to end of first antennular segment. Chelipeds of the first pair shaped as in *C. cæcigena*, but the carpus of the larger one is devoid of a spine, the palm is not serrated on its lower margin, its outer surface has a few tubercles irregularly disposed on the distal lower quarter; the pollex has on the cutting edge a stout tooth which is nearer the middle than in *C. cæcigena*. The second to fifth segments, inclusive, of the abdomen are without spines, the telson has subparallel side margins.

Dimensions.—Length of carapace of male 30.5 mm., of abdomen 67.5 mm.

Type locality.—Off Point Conception, California, 278 fathoms, station 3198, U. S. Fish Commission steamer *Albatross*, one male (Cat. No. 25238).

Distribution.—Also dredged in 322 fathoms in Clarence Strait, Alaska, station 3077.

Family AXIIDÆ.

AXIUS SPINULICAUDA.

Gastric region traversed by five carinae, all of which fade out before reaching the cervical groove; the median extends along basal third of rostrum and is armed with four spines; the outer carinae are a continuation of the side margins of the rostrum, and are unarmed, as are also the shorter intermediate carinae. Surface covered with rather distant scabrous granules. Rostrum reaches middle of second joint of antennular peduncle, is sharp-pointed, and has five spines on one side and six on the other. Second segment of antennular peduncle a little longer than the third, both together shorter than the first. The scaphocerite projects as far as the middle of the second segment of the antennula, the stylocerite to end of penult joint of antennal peduncle. First pair of chelipeds missing. Abdomen smooth above; pleura sculptured and pubescent; telson elongate, subquadrilateral, lateral margins spinulose, dorsal surface with a few spines; swimmerets spinulose.

Dimensions.—Female, length of carapace and rostrum 19.6 mm., rostrum 3.5 mm., abdomen 31.5 mm.

Type locality.—One specimen only, from off Bodega Head, California, 62 fathoms, station 3172, U. S. Fish Commission steamer *Albatross* (Cat. No. 25239).

CALASTACUS QUINQUESERIATUS.

Allied to *C. felix* Alcock and Anderson.

Carapace and rostrum as long as first five abdominal somites; surface pitted and setose. Rostrum reaches end of second antennular segment, is tipped with a spine, side margins armed with three to seven spines, and prolonged two-thirds the length of gastric region, where they bear five or six spines; these prolongations form a horseshoe. Median carina with from two to six spines. Intermediate carina with from three to five spines. Eyes colorless, globular. Stylocerite reaching to distal third of penult joint of peduncle; scaphocerite not reaching middle of stylocerite. Chelipeds unequal, the longer one in the male nearly as long as the body. Outer surface of carpus and hand covered with sharp granules or short spines; upper margin spinous, also lower inner margin of merus; lower outer margin of merus spinous; lower margin of propodus granulous. Margins of propodus subparallel, fingers shorter than palm in adult males, usually slightly gaping at base.

Abdomen almost smooth, sides setose. Anterior margin of pleura of third, fourth, and fifth somites, and lower margin of sixth, armed with a small spine. Telson subquadrangular, broadly rounded behind, having a few lateral and one median marginal spine, and two larger dorsal spines.

Dimensions.—Male, length of carapace and rostrum 28 mm., of abdomen 41 mm.

Type locality.—San Luis Obispo Bay, California, 200 fathoms, station 3196, U. S. Fish Commission steamer *Albatross* (Cat. No. 25240).

Distribution.—Also taken at six other stations on the coast of southern California, in 160 to 388 fathoms.

Family PENÆIDÆ.

GENNADAS BOREALIS.

Allied to *G. parvus* Bate. Rostrum longer, reaching at least half way along the eyestalk, sometimes to the cornea; armed with one tooth. Median carina very distinct nearly to posterior border of carapace. A sharp marginal spine at angle of antero-lateral sinus. The antennal scale projects beyond the antennular peduncle by about the length of the last segment of the peduncle. Chelæ of first pair of feet narrow and elongate as in the succeeding pairs. Sixth abdominal somite more than twice as long as fifth, carinate. A small lateral spine at the posterior fourth of the telson. The thelycum differs from that of *G. parvus* in having the transverse plate between the feet of the fourth pair subquadrilateral, narrow in front, and that between the fifth pair fan-shaped, narrow behind, anteriorly rounded, and with

a blunt median point. The leaves of the andrium are small and not in contact.

Dimensions.—Male, length of carapace and rostrum, 13.6 mm.; of abdomen, 29 mm.

Type locality.—Off Copper Island, Kamchatka, 1,567 fathoms, station 3783, U. S. Fish Commission steamer *Albatross* (Cat. No. 25241).

Distribution.—Also taken in Bering Sea, north of Rat Islands, Aleutians, 850 fathoms, station 3784.

Family CRANGONIDÆ.

Genus CRANGON.

a. Group of *C. nigricauda*, in which the carapace has only one median spine, and the gastric region is not depressed below the general level.

CRANGON ALASKENSIS ELONGATA.

Dr. S. J. Holmes, in his very useful Synopsis of California Stalk-Eyed Crustacea,¹ has given the synonymy and diagnoses of seven species of *Crangon* known to occur on the west coast of the United States. I would exclude *Crangon alaskensis* Lockington from the synonymy of *C. nigricauda* Stimpson, and raise it to specific rank, as in a large series of specimens it differs from *C. nigricauda* in the antennal scale being a little longer and much narrower distally, the extremity of the blade not produced at the antero-internal angle, the spine longer; the first pair of trunk feet shorter; hands more slender, their distal margin more oblique. *C. nigricauda* ranges from British Columbia to Lower California, *C. alaskensis* from Bering Sea to Straits of Fuca.

Typical *C. alaskensis* passes by insensible gradations into a form occurring off the coast of California and Oregon in 9 to 53 fathoms, which differs in its longer and narrower rostrum, in the outer antennular flagellum falling considerably short of the antennal scale, in the much longer scale, equal to the length of the carapace exclusive of the rostrum, in the fourth segment of the abdomen showing signs of carination, in the telson flattened above, though scarcely grooved, while its tip is more acute than in typical *C. alaskensis*.

Dimensions.—Length of ovigerous female from tip of rostrum to tip of telson, 55.7 mm.; length of carapace, 13.5 mm.; of antennal scale, 11.6 mm.

Type locality.—Off Santa Barbara, California, 29 fathoms, U. S. Fish Commission steamer *Albatross* stations 2970 and 2971 (Cat. No. 25242).

CRANGON HOLMESI.

Allied to *C. alba* Holmes in not having a groove on the under side of the sixth abdominal somite. Carapace a third as long as abdomen; rostrum short, narrow, triangular, tip rounded. Antennal scale as

¹ Occasional Papers of the California Academy of Sciences, VII, 1900.

long or nearly as long as the carapace, exclusive of rostrum. Maxillipeds exceeding scale, antepenult segment not dilated. Hand elongate, about three times as long as wide.

Dimensions.—Ovigerous female, length, 23 mm.; of carapace, 5.3 mm.; of antennal scale, 4.2 mm.

Type locality.—Off Wilmington, California, 27 fathoms, U. S. Fish Commission steamer *Albatross* station 2939 (Cat. No. 25243).

CRANGON DALLI.

Rostrum long and narrow. Acicle about seven-tenths as long as carapace, obliquely subtruncate, inner angle of extremity rounded, receding, spine extending beyond the blade to no greater extent than anterior width of blade. Hands widening from proximal to distal end, distal margin transversely oblique, length of palm about two and two-thirds its width. Sixth abdominal somite with two blunt prominent carinae, which are the most distinguishing feature of the species.

Dimensions.—Length of ovigerous female, 61.5 mm.; of carapace, 16.2 mm.; of scale, 11.5 mm.

Type locality.—Bering Sea, off Cape Seniavin, Alaska, 30 fathoms, U. S. Fish Commission steamer *Albatross* station 3287 (Cat. No. 25244).

Distribution.—One of the most abundant of Alaskan shrimps. Ranges from Bering Sea to Washington and to Kurile Islands, in 4½ to 61 fathoms.

CRANGON FRANCISCORUM ANGUSTIMANA.

Differs from typical *C. franciscorum* chiefly in the shape of the hands, which are narrower, the difference being greater in the male than in the female (in the male the length is five and a half times the width), the dactylus is more longitudinally placed, the pollex is more transverse and nearer the proximal end of the hand.

Dimensions.—Length of female 70.6 mm., of carapace 18.9 mm., of scale 13 mm.

Type locality.—Off Chuckanuts Island, Bellingham Bay, Washington, 11 fathoms, station 3612, U. S. Fish Commission steamer *Albatross* (Cat. No. 25245).

Distribution.—Ranges from British Columbia to Oregon, in 23 to 67 fathoms.

b. Group of C. communis, in which the carapace has two median spines and the gastric region is not depressed below the general level.

CRANGON RESIMA.

Anterior of median spines much the smaller. Rostrum advanced beyond eyes, ascending, and having, in full-grown individuals, an inferior plate, thin, compressed, spatulate. Second segment of antennular peduncle three times as long as third. Hands shorter than in

C. communis, three times as long as broad; their anterior margin and also the dactylus, when flexed, are more longitudinal than in *C. communis*.

Dimensions.—Length of ovigerous female 48.3 mm., length of carapace 12.2 mm., of scale 8.2 mm.

Type locality.—Off San Diego, California, 124 fathoms, U. S. Fish Commission steamer *Albatross* station 2935 (Cat. No. 25246).

Distribution.—Ranges from Monterey Bay, California, to San Domingo Point, Lower California, 44 to 266 fathoms.

CRANGON ABYSSORUM.

Integument very thin. Anterior of median spines minute. Rostrum linear, flattened above, acute, ascending at an angle of 30 degrees, below compressed. Eyes very large, hemispherical, inner faces flat and contiguous. Second segment of antennulæ about one and a half times as long as third. Maxillipeds exceeding scale by half length of terminal segment. Manus widening distally, length three times width, dactylus more longitudinal than transverse. Sixth abdominal somite having two prominent dorsal carinæ and a short, low, lateral carina.

Dimensions.—Length of female 61 mm., of carapace and rostrum 17 mm., of scale 10.3 mm.

Type locality.—Bering Sea, southwest of Pribilof Islands, 1,771 fathoms, station 3603, U. S. Fish Commission steamer *Albatross* (Cat. No. 25247).

Distribution.—Extends from Bering Sea to southern end of California, in 685 to 1,771 fathoms.

c. Group of C. munita, in which the gastric region is depressed below the general level of the carapace.

CRANGON ACCLIVIS.

Compared to *C. munita* Dana, the lower lateral spine of carapace is further back, the anterior median spine is much larger and farther forward, projecting well in front of the posterior line of the orbits; the rostrum is narrower, ascending at an angle of about 45 degrees, and the anterior margin of the hand is more longitudinal.

Dimensions.—Length of male 24.8 mm., length of carapace 7.4 mm., of scale 3 mm.

Type locality.—Off Santa Cruz Island, California, 266 fathoms, station 2948, U. S. Fish Commission steamer *Albatross* (Cat. No. 25248).

Distribution.—Dredged from off the Trinity Islands, Alaska, to southern California, 80 to 266 fathoms; scarce.

CRANGON VARIABILIS.

Like *C. munita*, but carapace nearly half as long as abdomen, rostrum convex from behind forward, tip rounded and thickened. Outer

margin of antennal scale concave. Second to fifth, inclusive, and sometimes the first, somites of abdomen carinated, and except on the first and second the carina is usually high, laterally compressed, and blunt.

Dimensions.—Female, length of body 32.2 mm., of carapace 9.2 mm.

Type locality.—Off North Head, Akutan Island, Alaska, 72 fathoms, station 2842, U. S. Fish Commission steamer *Albatross* (Cat. No. 25249).

Distribution.—Ranges from Bering Sea to southern California, 72 to 184 fathoms.

CRANGON SPINOSISSIMA.

Compared to *C. variabilis*, the lower lateral spine of the carapace is more nearly in line with the superior lateral spine; the anterior median spine is larger and farther forward, advancing to a line in front of the posterior line of the orbits; rostrum narrower, longer, acute, and more ascending; hand longer and narrower. Differs from all allied species in having the somites of the abdomen armed laterally with spines.

Dimensions.—Female, length of body 36 mm., of carapace 10.5 mm.

Type locality.—Off Point Arena, California, 51 fathoms, station 3351, U. S. Fish Commission steamer *Albatross* (Cat. No. 25250).

Distribution.—Off Oregon and California, 51 to 96 fathoms.

CRANGON SPINIROSTRIS.

Differs from all others of the *munita* group in having a long sub-erect spiniform rostrum. Anterior median gastric spine similar to the rostrum. Orbital spine slender and ascending, antero-lateral spine directed upward and outward. Third, fourth, and fifth abdominal somites carinated.

Dimensions.—Female, length of body 35.4 mm., of carapace 10.5 mm.

Type locality.—North of Unalaska, 399 fathoms, station 3329, U. S. Fish Commission steamer *Albatross* (Cat. No. 25251).

SCLEROCRANGON ALATA.

A small species allied to *S. boreas*. Carapace only slightly broader than long, surface sculptured and pitted, two spines and a tubercle on median carina. Antero-lateral angles broadly alate. Spine of antennal scale advanced as far as or farther than the blade. Hand less than twice as long as broad. Abdominal pleura without spines.

Dimensions.—Male, length 38 mm., length of carapace 11 mm., width at branchial spine 10.7 mm.

Type locality.—Admiralty Inlet, Puget Sound, 40 fathoms, station 2865, U. S. Fish Commission steamer *Albatross* (Cat. No. 25252).

Distribution.—From Bering Sea to Puget Sound, 6 to 91 fathoms.

NECTOCRANGON DENTATA.

Differs from *N. lar* (Owen), with which it has been confused, in the carinae of the sixth abdominal somite ending in a small sharp tooth or spine, and the more elongate hand, which is about five or more than five times as long as its width across the palm.

Dimensions.—Female, length of body 73 mm., of carapace 19 mm., of hand 10 mm., width of palm 2.1 mm.

Type locality.—Off Sitkalidak Island, Alaska, 69 fathoms, station 2855, U. S. Fish Commission steamer *Albatross* (Cat. No. 25253).

Distribution.—From Bering Sea eastward to Sitka and westward to Kamchatka, 6 to 96 fathoms.

NECTOCRANGON OVIFER.

A deep-water species, also closely related to *N. lar*. Median crest of carapace higher, spines more ascending, anterior marginal spines above the eyes longer and more deeply separated, eyes larger, abdomen shorter, median carina higher. Carinae of sixth somite terminating in a small spine or tooth. Eggs larger than in *N. lar* or *N. dentata*.

Dimensions.—Female with eggs, length 60 mm., length of carapace 17.4 mm.

Type locality.—Off the Trinity Islands, Alaska, 159 fathoms, station 2853, U. S. Fish Commission steamer *Albatross* (Cat. No. 25254).

Distribution.—Found in Bering Sea and along the Alaska Peninsula, 56 to 368 fathoms.

NECTOCRANGON CALIFORNIENSIS.

Allied to *N. ovifer*. Eyes smaller, spine of antennal scale projecting not so far beyond the blade, hands having the digital spine situated nearer the wrist, and the distal margin in consequence more longitudinal; above all, the first and second abdominal somites are noncarinate, and the carina of the third and fourth somites is rather feebly developed.

Dimensions.—Male, length of body 31 mm., of carapace 8.6 mm.

Type locality.—Off Santa Catalina Island, California, 80 fathoms, station 3664, U. S. Fish Commission steamer *Albatross* (Cat. No. 25255).

NECTOCRANGON LEVIOR.

Allied to *N. crassa* Rathbun, but has the first four abdominal somites noncarinate, except for a tubercle on the first, and the carinae of the fifth and sixth somites less clearly marked than in that species. The pleura of all the somites have shallow depressions.

Dimensions.—Female, length 47.7 mm., length of carapace 13.1 mm.

Type locality.—Admiralty Inlet, Puget Sound, 40 fathoms; station 2865, U. S. Fish Commission steamer *Albatross* (Cat. No. 25256).

Distribution.—Occurs sparingly from Aleutian Islands to Puget Sound, in 10 to 68 fathoms.

Family HIPPOLYTIDÆ.

Genus SPIRONTOCARIS.

a. *Species having one or more supraorbital spines.*

SPIRONTOCARIS ARCUATA.

Very closely allied to, and in part associated with, *S. spina* (Sowerby). In the adult female, the upper line of carapace and rostrum in profile forms a single curve, without the sinus shown in *S. spina*; posterior lobe of third abdominal somite shorter and broader than in that species, sixth segment considerably shorter, less than one and a half times as long as wide; dactyli of third to fifth pairs of feet shorter than in *S. spina*, that of last pair being contained at least three times in propodus.

Dimensions.—Female, length 53.8 mm., length of carapace and rostrum 20 mm., of rostrum 8 mm.

Type locality.—Washington Sound, Straits of Fuca, 48 fathoms; station 2864, U. S. Fish Commission steamer *Albatross* (Cat. No. 25257).

Distribution.—From Bering Sea to Straits of Fuca, in 3 to 350 fathoms.

SPIRONTOCARIS MURDOCHI.

Hippolyte spinus MURDOCH, Report Internat. Polar Exped. to Point Barrow, Alaska, 1885, p. 140 (not *Cancer spinus* Sowerby).

Allied to *S. spina* (Sowerby) and *S. liljeborgii* (Danielssen). Description of female: Rostrum three-fourths as long as remainder of carapace, not reaching tip of antennal scale; midrib nearly horizontal; upper limb convex, 20 to 22 small irregular teeth; lower limb deeper, convex, 1 to 4 small teeth near end. Eyes as wide as the antennular peduncle and half its scale. Spine of antennal scale advanced about as far as blade. Dactyli of last three pairs of feet long and slender, that of last pair half as long as propodus. Abdomen not carinate; sixth segment three-fourths as broad as long.

Dimensions.—Female, length 46.6 mm., length of carapace and rostrum 17 mm., of rostrum 7.5 mm.

Type locality.—Off Robben Island, east coast of Saghalin, Okhotsk Sea, station 3650, U. S. Fish Commission steamer *Albatross* (Cat. No. 25258).

Distribution.—Also taken on the east coast of Kamchatka and Arctic coast of Alaska.

SPIRONTOCARIS TRUNCATA.

Allied to *S. spina*. Carapace armed with 4 median spines; rostrum subtriangular, widest at the extremity, about three-fifths as long as carapace, midrib curving upward, upper margin with 1 spine at its middle, extremity with 7 spines, 2 above and 4 below the midrib. Supraorbital spines 2, equal, large, 1 behind, not above the other, distant.

Dimensions.—Length of male 14 mm.

Type locality.—Heceta Bank, Oregon, 50 fathoms, station 2886, U. S. Fish Commission steamer *Albatross* (Cat. No. 25259).

SPIRONTOCARIS SNYDERI.

Near *S. bispinosa* Holmes. Median spines of carapace 3 or 4, separated from the rostral teeth, which are 5 or 6 on the upper margin and 3 or 4 on the lower. Rostrum shorter than carapace, much the shape of that of *S. bispinosa*, excepting that the midrib is more rapidly ascending and ends in a short point, the upper lamina is shallower and of rather even depth. Antennal peduncle reaches only about one-third length of scale. Dactyli of third, fourth, and fifth pairs of feet a third or less than a third as long as their propodi.

Dimensions.—Ovigerous female, approximate length, 28 mm.; length of carapace and rostrum, 9.4 mm.; of rostrum, 4.4 mm.

Type locality.—Monterey Bay, California, J. O. Snyder, collector (Cat. No. 25260).

Distribution.—From Puget Sound to Lower California.

SPIRONTOCARIS SICA.

Near *S. bispinosa* Holmes. The posterior tooth of the carapace is considerably in front of the middle. Rostrum shorter than in *S. bispinosa*, both upper and lower laminae narrower and extending nearer the tip. Second segment of antennular peduncle three times as long as third segment. Outer maxillipeds reach beyond antennal scale. Thoracic feet longer and slenderer than in *S. bispinosa*, the first pair overreaching the antennular peduncle. The maxilliped and the first foot only are provided with an epipod.

Dimensions.—Female, length 58 mm., length of carapace and rostrum 24.8 mm., of rostrum 12.8 mm.

Type locality.—Santa Barbara Channel, 265 fathoms, station 3200, U. S. Fish Commission steamer *Albatross* (Cat. No. 25261).

Distribution.—Found only on the coast of California, 211 to 464 fathoms.

SPIRONTOCARIS DALLI.

Allied to *S. ochotensis* (Brandt). Rostrum longer, reaching nearly to end of antennal scale, midrib straighter, less sinuous, terminating

in a single sharp spine; teeth 6 to 8 above, 3 to 4 below. Last three pairs of thoracic feet longer and more slender than in *S. ochotensis*; sixth abdominal segment longer, being more than one and a half times as long as the fifth segment.

Dimensions.—Female, approximate length 38 mm., length of carapace and rostrum 13.6 mm., of rostrum 6 mm.

Type locality.—Coal Harbor, Unga Island, Alaska, 8 to 9 fathoms, W. H. Dall, collector (Cat. No. 25262).

Distribution.—Alaska, 6 to 20 fathoms.

SPIRONTOCARIS UNALASKENSIS.

Agrees with *S. polaris* (Sabine) and differs from all other species which possess a supraorbital spine, in the maxilliped being without an exognath, while it and the first two pairs of feet are provided with an epipod. Female: Posterior median spine of carapace situated at the anterior third (rostrum excluded). Rostrum longer than aciele, dorsal spines 4 or 5, 2 on carapace and 2 or 3 at base of rostrum; no upper limb on distal portion, lower limb shallow, convex, 3-spined in front of middle. Eyes large, pyriform. Third segment of antennules less than half as long as second. Antennal peduncle extending nearly to end of second segment of antennular peduncle. Hinder portion of third abdominal segment very prominent; sixth segment about one and two-thirds times as long as fifth.

Dimensions.—Female, length 60 mm., carapace and rostrum 26.5 mm., rostrum 14.5 mm.

Type locality.—North of Unalaska, 350 fathoms, station 3331, U. S. Fish Commission steamer *Albatross* (Cat. No. 25263).

SPIRONTOCARIS VICINA.

Allied to the preceding; second foot without an epipod.

Female.—Dorsal spines 7 or 8 (2 on carapace), the anterior not very near tip of rostrum; inferior spines 4. Second segment of antennular peduncle about three times as long as third; basal scale falls considerably short of second joint of peduncle. Antennal peduncle does not reach middle of second segment of antennular peduncle.

Dimensions.—A female with rostrum and telson incomplete measures 39 mm. from the orbit to the end of the sixth abdominal somite.

Type locality.—North of Unalaska, 309 fathoms, station 3316, U. S. Fish Commission steamer *Albatross* (Cat. No. 25264).

SPIRONTOCARIS WASHINGTONIANA.

Female.—Posterior median spine at anterior fourth of carapace (rostrum excluded). Rostrum slender, half as long as carapace, nearly horizontal, slightly sinuous, dorsal spines 4 (2 on carapace), 3 teeth below on anterior third. Second segment of antennular peduncle

three times as long as third; basal scale two-thirds as long as first segment. Acicle two-thirds as long as carapace, oblong-lanceolate; peduncle reaching middle of acicle. Outer maxilliped extends beyond antennal scale by half the length of its last segment; without exopod, but with an epipod; first three pairs of feet with epipods.

Dimensions.—Female, length 39 mm., of carapace and rostrum 14 mm., of rostrum 5 mm.

Type locality.—Off Sea Lion Rock, Washington, 685 fathoms, station 3071, U. S. Fish Commission steamer *Albatross* (Cat. No. 25265).

b. Species having no supraorbital spine.

SPIRONTOCARIS FLEXA.

Very near *S. gracilis* (Stimpson); differs chiefly in longer basal scale of antennula, reaching a little beyond first segment, in lower position of pterygostomial spine, in the presence of epipods on the maxilliped and first two pairs of feet.

Dimensions.—Female, length 54 mm., of carapace and rostrum 20 mm., of rostrum 11.5 mm.

Type locality.—North of Bird Island, Shumagins, Alaska, 21 fathoms, station 2850, U. S. Fish Commission steamer *Albatross* (Cat. No. 25266).

Distribution.—From Bering Sea to Drakes Bay, California, 10 to 93 fathoms.

SPIRONTOCARIS DECORA.

Rostrum longer than carapace, 4 to 5 superior teeth (1 to 2 on carapace), anterior tooth in front of middle of rostrum; rostrum less slender than in *S. gracilis* or *S. flexa*, a little concave above, nearly horizontal; 6 to 8 teeth below. Maxilliped without exognath, but with an epipod; no epipods on feet. Posterior margin of third abdominal segment strongly produced at the middle, but the segment is not laterally pinched or carinated; sixth segment longer than seventh.

Dimensions.—Female, approximate length 47 mm., length of carapace and rostrum 16.4 mm., of rostrum 9 mm.

Type locality.—Off Santa Cruz Island, California, 150 fathoms, station 2946, U. S. Fish Commission steamer *Albatross* (Cat. No. 25267).

Distribution.—From Straits of Fuca to San Diego, California, 50 to 171 fathoms.

SPIRONTOCARIS TRIDENS.

Allied to *S. gracilis*, *S. flexa*, and *S. decora*, but stouter. Superior teeth 3, 1 on carapace and 2 at base of rostrum; inferior 3 to 6. Basal scale of antennules with a spine which extends nearly to end of second segment. Acicle, measured along its outer margin, a little shorter than carapace. Third abdominal somite well produced backward and

its posterior portion carinated, the carina defined on either side by a deep groove like the imprint of a nail.

Dimensions.—Female, approximate length 61 mm.; length of carapace and rostrum 22 mm., of rostrum 12.5 mm.

Type locality.—Admiralty Inlet, Puget Sound, 40 fathoms, station 2865, U. S. Fish Commission steamer *Albatross* (Cat. No. 25268).

Distribution.—From Aleutian Islands to Washington, to a depth of 48 fathoms.

SPIRONTOCARIS TOWNSENDI.

Closely allied to *S. gaimardii*, and may be compared with *S. gaimardii belcheri* (Bell), which is the only form of *S. gaimardii* known to occur on the Pacific coast, and which ranges from the Arctic shores of Alaska and Siberia southward to Sitka.

In the female of *S. townsendi*, the rostrum reaches almost or quite to the end of the acicle and is armed above with 5 to 7 spines (2 on carapace), below with 3 to 6 spines; lower limb deeper than in *S. gaimardii belcheri*; rostrum nearly straight. Pterygostomial spine very small. Scale at base of antennula reaches end or nearly to end of second segment; second segment scarcely longer than third. Antennal scale almost as long as carapace. The maxillipeds reach to distal fourth of antennal scale; the fifth pair of feet do not attain end of maxilliped.

Third abdominal segment smoothly rounded, without lobe or angle in a profile view; posterior margin produced moderately backward at the middle. Fourth segment devoid of a lateral spine; telson provided with 3 or 4 lateral spinules on each side.

Dimensions.—Female, approximate length 60.5 mm.; length of carapace and rostrum 20 mm., of rostrum 10.6 mm.

Type locality.—Washington Sound, Straits of Fuca, 48 fathoms, station 2864, U. S. Fish Commission steamer *Albatross* (Cat. No. 25269).

Distribution.—From Bering Sea to Puget Sound, 21 to 114 fathoms.

SPIRONTOCARIS MOSERI.

Of the *gaimardii* group, but the maxilliped is without exognath, and the maxilliped and the first foot only are provided with an epipod. Rostrum about as long as or longer than carapace; teeth 6 to 8 above (2 on carapace), 4 to 7 below. Antennal spine strong; pterygostomial small. Eyes large, pyriform. The antennular peduncle reaches to the middle or the distal third of antennal scale; second segment a little longer than third; spine of basal scale reaches to middle of second segment. Antennal peduncle very stout and nearly as long as antennular; scale narrow-ovate, its outer margin about five-sevenths as long as carapace. The maxillipeds exceed the scale by one-fourth or more of the length of the last segment. The first pair of feet overreach the

antennular peduncle, the second pair reach tip of maxillipeds, the fifth pair extend to or beyond end of antennal scale. Dactyli of third, fourth, and fifth pairs short, very stout, and armed with strong spines. Upper margin of third abdominal segment in profile smoothly rounded; posteriorly the segment is strongly produced over the fourth, which has a spine on either side; sixth twice as long as fifth; seventh longer than sixth; 4 or 5 lateral spines.

Dimensions.—Female, length 57 mm.; length of carapace and rostrum 22.7 mm., of rostrum 11.5 mm.

Type locality.—Off Segouam, Aleutians, 283 fathoms, station 3480, U. S. Fish Commission steamer *Albatross* (Cat. No. 25270).

Distribution.—Bering Sea, southward and eastward to Washington, 60 to 516 fathoms.

SPIRONTOCARIS MAXILLIPES.

Very near *S. moseri*, but distinguished as follows: Rostrum shorter, about four-fifths as long as carapace, teeth 5 to 8 above, 2 to 6 below. The antennular peduncle reaches two-thirds or more of the length of the antennal scale; second segment a little longer than in *S. moseri*; spine of basal scale scarcely reaches middle of second segment, or may not extend beyond first. The antennal peduncle does not reach beyond second segment of the antennular; scale about two-thirds length of carapace. More than one-half of the last segment of outer maxilliped extends beyond scale. No epipods on feet. Minute spinule on fourth abdominal somite; sixth somite one and a half times fifth; spinules of telson commonly three on each side.

Dimensions.—Female, length 48.9 mm.; length of carapace and rostrum 18.4 mm., of rostrum 8.6 mm.

Type locality.—Off Segouam, Aleutians, 283 fathoms, station 3480, U. S. Fish Commission steamer *Albatross* (Cat. No. 25271).

Distribution.—Also taken at stations 3330, 3331, and 3338; depth, 350 to 625 fathoms.

SPIRONTOCARIS BRACHYDACTYLA.

Closely allied to the three immediately preceding, but distinguished from them by the short fingers of the first chelipeds, which are not more than a third as long as the palm. Rostrum distinctly shorter than carapace, 6 teeth above (1 on carapace), 3 below. No pterygostomian spine. Like *S. maxillipes*, the feet are devoid of epipods.

Dimensions.—Length of ovigerous female, exclusive of rostrum and telson, 24.8 mm.; length of carapace (rostrum excluded) 7.7 mm.

Distribution.—Southern California, 266 to 417 fathoms; type locality, off Santa Cruz Island, 266 fathoms, station 2948, U. S. Fish Commission steamer *Albatross* (Cat. No. 25272).

SPIRONTOCARIS KINCAIDI.

Near *S. camtschatica* (Stimpson). Rostrum one-third longer than carapace, horizontal, slightly concave above, 5 teeth above (2 on carapace), 5 teeth below. Antennular peduncle reaching about two-fifths length of antennal scale, second and third segments very short and subequal, basal scale reaching end of second segment. Antennal peduncle almost as long as antennular, scale tapering, exceeding the carapace. No exognath, but an epignath on maxilliped. No epipods on feet. Abdomen strongly bent at third somite, which is produced backward in a strong lobe; fourth somite spineless.

Dimensions.—Ovigerous female, approximate length 36.5 mm.; length of carapace and rostrum 13.6 mm., of rostrum 7.7 mm.

Type locality.—Off Santa Cruz, California, 21 fathoms, station 3124, U. S. Fish Commission steamer *Albatross* (Cat. No. 25273).

Distribution.—Also taken on coast of Washington in 37 to 40 fathoms.

SPIRONTOCARIS BIUNGUIS.

Also of the *gaimardii* type, but easily distinguished by the very large, pyriform eyes, the cornea covering the greater part of the peduncle, by the longer rostrum, which is from one and a fourth to one and two-thirds times as long as the remainder of the carapace, by the maxilliped possessing an exopod and an epipod, while the feet are destitute of epipods, and by the dactyli of the last three pairs of feet armed with a long subterminal spinule, which, folding against the slender tip of the dactylus, gives the appearance of a minute chela.

Dimensions.—Length of egg-laden female 83 mm., length of carapace and rostrum 37.6 mm., length of rostrum 23.2 mm.

Type locality.—Off Cape St. James, Queen Charlotte Islands, British Columbia, 876 fathoms, station 2860, U. S. Fish Commission steamer *Albatross* (Cat. No. 25274).

Distribution.—From Bering Sea to Oregon, 109 to 987 fathoms.

SPIRONTOCARIS STONEYI.

A small species near *S. cristata* (Stimpson). Rostrum about half as long as carapace, upper margin convex, armed with 7 to 9 teeth (1 to 2 on carapace), unarmed and straight near tip; tip pointed; one tooth near tip below. A strong antennal, a slender pterygostomial spine. Antennular peduncle reaching to middle of antennal scale; second segment one and a half times as long as third; outer scale not reaching end of first segment. Antennal scale as long as carapace, spine reaching as far as blade; peduncle reaching to a little beyond first segment of antennular peduncle. Fourth abdominal somite

unarmed; sixth somite more than one and a half times as long as fifth and equal to the telson, which has three pairs of lateral spines.

Dimensions.—Female, length 20 mm., length of carapace and rostrum 5.5 mm., of rostrum 1.8 mm.

Type locality.—Bering Sea, latitude $62^{\circ} 15'$ north, longitude $167^{\circ} 48'$ west, $20\frac{1}{2}$ fathoms, Lieut. George M. Stoney, U. S. N., collector, June, 1884 (Cat. No. 25275).

SPIRONTOCARIS MACROPHTHALMA.

Allied to *S. macilentu* (Krøyer) and *S. bispinosa* Holmes. Rostrum about three-fourths or five-sixths as long as carapace, upper and lower limbs with convex margins and widest at about the middle of their length; 10 to 14 teeth above (2 or 3 on carapace), 1 to 3 spines below; tip acute. No supraorbital nor pterygostomial spine. Eyes large, pyriform, corneæ extending almost to base of eyestalk on inner side, eye reaching two-thirds length of first antennular segment; this segment twice as long as second, and second three times as long as third. The blade of the antennal scale exceeds the spine considerably, and is most advanced toward its inner margin. Outer maxillipeds slender, reaching midway between end of antennal peduncle and end of scale. Last three pairs of feet long, fragile, unarmed.

Differs from *S. macilentu* in the much larger eyes, longer rostrum, of which the upper limb is narrowed at its base; from *S. bispinosa* in the absence of a supraorbital spine and of the long slender process of the rostrum.

Dimensions.—Female, length 62.6 mm., length of carapace and rostrum 24 mm., of rostrum 11 mm.

Type locality.—Off Tawhit Head, Washington, 178 fathoms, station 3076, U. S. Fish Commission steamer *Albatross* (Cat. No. 25276).

Distribution.—Ranges from Unalaska to California, 178 to 636 fathoms.

Family PANDALIDÆ.

PANDALUS JORDANI.

Near *P. borealis* Krøyer. Rostrum similar to that of *P. borealis*, 14 to 17 spines above (4 on carapace), 7 to 10 below. Blade and spine of acicle equally advanced. Carpus of right cheliped of second pair divided into 19 to 22 segments; of left cheliped, into 58 to 63 segments. Dactyli of last three pairs of feet contained from $2\frac{1}{2}$ to $2\frac{3}{4}$ times in their propodi. Third abdominal somite carinated in its posterior half, and with a slight lobe at the posterior third, which may almost disappear in large specimens.

Dimensions.—Ovigerous female, length 124.5 mm., length of carapace and rostrum 59.5 mm., of rostrum 38 mm.

Type locality.—Off Santa Cruz Island, California, 155 fathoms, station 2949 (Cat. No. 25277).

Distribution.—From Unalaska to southern California, 35 to 178 fathoms.

PANDALUS MONTAGUI TRIDENS.

Differs from *P. montagui* Leach of the North Atlantic in its somewhat longer rostrum, which varies from $1\frac{1}{2}$ to $1\frac{2}{3}$ times length of carapace, the dorsal spines terminate behind the middle of the rostrum and the tip is usually trifid, while in typical *P. montagui* the rostrum is from $1\frac{2}{3}$ to $1\frac{1}{2}$ times the carapace, its dorsal spines reach to or in front of the middle, and the tip is bifid.

Dimensions.—Female, length 104 mm., length of carapace and rostrum 48.5 mm., of rostrum 30.2 mm.

Type locality.—Off North Head, Akutan Island, Alaska, 72 fathoms, station 2842, U. S. Fish Commission steamer *Albatross* (Cat. No. 25278).

Distribution.—From Bering Sea to Point Arena, California, 3 to 351 fathoms, abundant.

PANDALUS STENOLEPIS.

Near *P. danæ* Stimpson. Differs in the stouter eyes, the transverse diameter as great as axial diameter; in the more slender acicle, which has a concave outer margin, and distal half of blade very narrow and filiform, narrower than adjacent thickened portion; in the longer feet of first pair, reaching almost to extremity of maxillipeds; in the third, fourth, and fifth pairs of feet of the male, which, while shorter than those of the female, as in *P. danæ*, do not, as in that species, differ in shape from those of the female; in the tip of the rostrum, usually two-spined instead of three-spined.

Dimensions.—Adult female, length 80 mm., length of carapace and rostrum 37.2 mm., of rostrum 21 mm.

Type locality.—Straits of Fuca, 40 fathoms, station 3464, U. S. Fish Commission steamer *Albatross* (Cat. No. 25279).

Distribution.—From Aleutian Islands to Oregon, 27 to 125 fathoms.

PANDALOPSIS ALEUTICA.

Allied to *P. ampla* Bate and *P. lamelligera* (Brandt). Surface pubescent. A curved, longitudinal branchial ridge present. Superior spines 8 to 13. 4 to 6 behind orbits, the insertion of the posterior spine at middle of carapace, anterior spine (exclusive of a subterminal spine) behind middle of rostrum; inferior spines 8 to 12. Peduncle of antennula extends a little past middle of antennal scale; second segment $1\frac{1}{2}$ times as long as third. Peduncle of antenna reaching to end of second segment of antennula; scale three-fourths to four-fifths as long as carapace, broader behind than in *P. ampla*. The outer

maxillipeds extend either to the tip or nearly to the tip of antennal scale. Feet of second pair subequal, carpal segments 18 to 21. Third, fourth, and fifth pairs of feet subequal, dactyli subequal.

Dimensions.—Adult female, length 132 mm., length of carapace and rostrum 61.5 mm., of rostrum 33 mm.

Type locality.—Off Segouam, Aleutians, 283 fathoms, station 3480, U. S. Fish Commission steamer *Albatross* (Cat. No. 25280).

PANDALOPSIS LONGIROSTRIS.

Near *P. aleutica*. Rostrum more than twice the length of remainder of carapace, strongly upturned. Antennal scale as long as carapace. Chelæ of second pereopods with fingers almost as long as palm.

Dimensions.—Male, length 112 mm., length of carapace and rostrum 59 mm., of rostrum 41 mm.

Type locality.—Off Iliuliuk Harbor, Unalaska, 309 fathoms, station 3316, U. S. Fish Commission steamer *Albatross* (Cat. No. 25690).

PANDALOPSIS DISPAR.

Rostrum from 2 to $2\frac{1}{2}$ times as long as the rest of the carapace; superior spines 16 to 21, 3 or 4 on carapace, posterior spine at anterior third of carapace, spines extending along whole length of rostrum; inferior spines 9 to 15, tip bifid. Carpal segments of second pair of feet, 26 to 33. Third, fourth, and fifth pairs of feet nearly equal, their propodi increasing in length in the order named, while the dactyli increase in reverse order. Outer branch of swimming fan about as long as telson; inner branch much shorter.

Dimensions.—Length of female 181 mm., length of carapace and rostrum 100.5 mm., of rostrum 73.5 mm.

Type locality.—Chernoffski Harbor, Unalaska, 109 fathoms, station 3324, U. S. Fish Commission steamer *Albatross* (Cat. No. 25281).

Distribution.—From Bering Sea to Washington, 53 to 351 fathoms.

Family PONTONIIDÆ.

PONTONIA CALIFORNIENSIS.

Rostrum more than one-third the length of remainder of carapace, very narrow, deflexed, reaching middle of second antennular segment; this is one and a half times as long as third, both together half as long as first. Antennal scale scarcely exceeding antennular peduncle; antennal peduncle reaching end of scale. Of the first pair of feet the merus and carpus are subequal, the propodus a little shorter than the carpus, palm and fingers subequal. Right foot of second pair missing, merus of left foot short and stout, carpus cup-shaped, palm and fingers subequal in length, palm two-thirds as broad as long, fingers

gaping, prehensile edges denticulate, fringed with long hair. Dactyli of last three pairs of feet provided with a subterminal and a terminal spine. Telson twice as long as sixth somite, two pairs of long lateral appressed spines inserted on anterior half.

Dimensions.—Length of carapace and rostrum 6.7 mm., of rostrum 1.8 mm., of abdomen 9 mm.

Type locality.—Off Santa Cruz Island, California, 30 fathoms, station 2945, U. S. Fish Commission steamer *Albatross* (Cat. No. 25282).

Family PALÆMONIDÆ.

PALÆMONETES KADIAKENSIS.

Rostrum about as long as carapace, 6 or 7 teeth above (1 behind orbit), 2 or 3 below. Antennular peduncle reaching about four-fifths the length of antennal scale. Scale as long, or nearly as long, as carapace, oblong, blade projecting considerably beyond scale. Outer maxillipeds very slender, reaching when extended only a small bit beyond antennal peduncle. Feet of first pair nearly to end of scale, carpus longer than merus, and more than twice as long as propodus, fingers and palm subequal. Feet of second pair reaching beyond scale by half length of propodus, carpus $1\frac{1}{2}$ times merus, propodus three-fourths of carpus and no wider than in the first pair, fingers shorter than palm. Sixth abdominal somite twice as long as fifth and as long as telson.

Dimensions.—Length of female, 39 mm., of carapace and rostrum 15 mm., of rostrum 7 mm.

Type locality.—Kadiak Island, Alaska, under stones at low water; William J. Fisher, collector (Cat. No. 6246).

UROCARIS INFRASPINIS.

General appearance of *U. longicaudata* Stimpson. Differs in having an antennal spine on the carapace, a distinct ocellus outside the cornea, in having the palm and fingers of the first pair of feet subequal, the carpus of the second pair subequal to the merus, the palm a little shorter and the fingers still shorter, and in having the sixth abdominal somite shorter than the carapace (rostrum excluded) and less than twice as long as fifth somite.

Dimensions.—Female with eggs, length of carapace and rostrum 6 mm., of rostrum 2.5 mm., of abdomen 15 mm.

Type locality.—Gulf of California in Concepcion Bay, Lower California, U. S. Fish Commission steamer *Albatross* (Cat. No. 25283).

Distribution.—San Diego Bay, California, and Gulf of California.

Family OPLOPHORIDÆ.

HYMENODORA FRONTALIS.

Surface covered with very fine wrinkles or rugose lines. Rostrum from two-fifths to one-half as long as remainder of carapace, reaching end of antennular peduncle; it is a slender sharp-pointed spine, distal half slightly curved upward, basal half armed above with from 3 to 6 small spines (2 or 3 on carapace). Antennular spine minute; antennal spine strong; from it a sharp carina runs back subparallel to the side margin and quite to the posterior margin. A blunt ridge on the branchial region. A deep groove extends obliquely downward and backward from the orbital sinus nearly to the lateral carina. Eyes without pigment, with a slender blunt spine on inner margin. Antennal scale lanceolate; peduncle reaching end of first antennular segment. Abdomen devoid of a median carina or median spines; sixth somite $2\frac{1}{2}$ times as long as fifth and between three-fourths and four-fifths as long as telson.

The unusually long rostrum distinguishes this from other species of *Hymenodora*.

Dimensions.—Male, length of carapace and rostrum 19 mm., of rostrum 6.5 mm., of abdomen 32.5 mm.

Type locality.—West of Unalaska, 322 fathoms, station 3327, U. S. Fish Commission steamer *Albatross* (Cat. No. 25284).

Distribution.—From Bering Sea and Kamchatka to off Monterey Bay, California, 322 to 1,771 fathoms.

Family PASIPHLEIDÆ.

PARAPASIPHÆ SERRATA.

Allied to *P. gilesii* Wood-Mason. Carapace and rostrum as long as first five abdominal somites. The median carina extends backward to the posterior fifth of the carapace and forward along the high thin rostrum, which extends to middle of eyestalks; carina a little concave at middle of carapace, anteriorly sloping downward and armed with 16 small teeth or spines, two of which are on the rostrum and one is terminal; below this spine the rostrum is a compressed finely crenulate lobe. Antennular scale as long as basal joint of peduncle. Antennal scale nearly half as long as carapace proper. Fingers of first pair of feet equal to palm in length; third pair (tip broken off) equal to carapace exclusive of rostrum; fourth and fifth pairs have the terminal joint narrow-oval, fifth pair the longer and two-thirds the length of carapace. First three abdominal somites noncarinate, fourth terminating in a thin compressed spine.

Dimensions.—Egg-laden female, length of carapace and rostrum 23.6 mm., rostrum 1.8 mm., abdomen 42 mm.

Type locality.—Off Cortez Bank, California, 984 fathoms, station 2919, U. S. Fish Commission steamer *Albatross* (Cat. No. 25285).

PASIPHÆA PACIFICA.

Carapace distinctly carinated, carina anteriorly sharp and terminating in a rather slender sharp-pointed tooth or spine, which falls far short of the anterior margin. The branchiostegal sinus is an obtuse angle; the branchiostegal spine is situated over the angle of the sinus. Eyes dark brown. The merus of the first pair of feet is either unarmed or may have one to three spines. First abdominal somite noncarinate; second to sixth, inclusive, carinate; telson fourth-fifths as long as sixth somite; its extremity has a deep notch.

Dimensions.—Female, length 64.8 mm., carapace 20.3 mm.

Type locality.—Off Point Sur, California, 328 fathoms, station 3186, U. S. Fish Commission steamer *Albatross* (Cat. No. 25286).

Distribution.—From Unalaska to Gulf of California in 53 to 399 fathoms.

PASIPHÆA EMARGINATA.

Near *P. faxonii* (new name = *P. acutifrons* Faxon, not Bate). Differs in longer carapace, which is equal to the first five segments and one-half of the sixth segment of the abdomen; more sinuous branchial ridge; less prominent median carina; smaller gastric tooth; longer telson, which has a very shallow notch, scarcely forked.

Dimensions.—Length of female 81 mm., length of carapace 33.3 mm.

Type locality.—Gulf of California, 857 fathoms, station 3009, U. S. Fish Commission steamer *Albatross* (Cat. No. 25552).

PASIPHÆA CORTEZIANA.

Carapace very bluntly carinated behind gastric tooth, which is dentiform and does not overreach margin of front; branchiostegal spine near antero-lateral angle, just behind anterior margin; antero-lateral sinus forming an obtuse angle; eye-stalks slightly enlarged distally, eyes reddish brown; abdomen not carinated; telson with a deep notch.

Dimensions of male.—Length 64 mm., length of carapace 23.8 mm.

Type locality.—Near Cortez Bank, California, 776 fathoms, station 3627, U. S. Fish Commission steamer *Albatross* (Cat. No. 25553).

PASIPHÆA AFFINIS.

Differs from *P. corteziana* in its shorter carapace (equal to the first four and half the fifth segment of the abdomen), without median carina, and in the abdomen being carinated.

Dimensions.—Length of male 67 mm., length of carapace 22 mm.

Type locality.—Near Cortez Bank, California, 984 fathoms, station 2919, U. S. Fish Commission steamer *Albatross* (Cat. No. 25691).