

ART. XXVII.—On the CRUSTACEA and ECHINODERMATA of the Pacific Shores of North America. By WM. STIMPSON. Part I. CRUSTACEA.

THERE is no part of the world in which so large accessions to our knowledge of Zoölogy and Botany have been made within the past five years, as in that part of our continent which lies west of the Rocky Mountains. The results of the numerous government surveys, as elaborated by BAIRD and GIRARD, and the investigations of CASSIN, AYRES, and the Californian naturalists, have brought to light hundreds of new and interesting Vertebrates, while the Insects have been extensively studied by LE CONTE and the Testacea by GOULD. The Marine Invertebrata have however as yet excited but little attention among our naturalists. With the exception of the descriptions of Crustacea by DANA and RANDALL, nothing has been done here in this department, while in Europe several articles having more or less relation to the subject have recently appeared in various scientific periodicals.

It is with the view of calling attention to this interesting division of our western fauna, and of opening a rich field, that I have been led here to give something more than a description of the novelties collected by Mr. Samuels;—in fact, to present a view of the present state of our knowledge of the Crustacea and Echinodermata of the West Coast.*

* The following works have been consulted in the preparation of this article :
For the Crustacea :—

- AR. FR. WIEGMANN. *Beschreibung einiger neuen Crustaceen des Berliner Museums aus Mexico*, etc. Archiv für Natargeschichte, 1836, i. 145–151.
- J. W. RANDALL. *Catalogue of the Crustacea brought by Thomas Nuttall and J. K. Townsend from the West Coast of North America, with descriptions and figures of new species*. Journal of the Academy of Natural Sciences of Philadelphia, vol. viii. 1839, pp. 106–147. Pl. III—VII.
- R. OWEN. *The Zoölogy of Captain Beechey's Voyage, Crustacea*. (1839.)
- M. M. MILNE-EDWARDS et H. LUCAS. *Description des Crustacés nouveaux ou peu connus*. Archives du Muséum d'Histoire Naturelle, 1841, ii. 461.

APRIL, 1857.

The Smithsonian Institution has with its usual liberality allowed me the use of the very numerous specimens in its

- W. F. ERICHSON. *Übersicht der Arten der Gattung Astacus*. Archiv für Naturgeschichte, 1846, i. 86–103, 375–377.
- A. WHITE. *On a new genus of Crustacea*. Annals and Magazine of Natural History, 1846, xvii. 497.
- . *List of the specimens of Crustacea in the British Museum*. London, 1847.
- . *Description of Echinocerus cibarius, a new species and subgenus of Crustacea*. Proceedings of the Zoölogical Society of London, 1848, p. 47; Annulosa, Pl. II. and III.
- . *Some remarks on Crustacea of the genus Lithodes, with a brief description of a species apparently hitherto unrecorded*. Proceedings of the Zoölogical Society of London, 1856, p. 132. Annulosa, Pl. XLII.
- G. NEWPORT. *Note on the genus Atya of Leach, with descriptions of new species*, etc. Annals and Magazine of Natural History, 1847, xix. 158–160.
- F. BRANDT. *Die Gattung Lithodes, Latreille, nebst vier neuen ihr Verwandten von Wosnessenski entdeckten als Typen einer besondern Unterabtheilung (Tribus Lithodea) der Edwards'schen Anomuren*. Bulletin physico-mathématique de l'Académie de Saint-Petersbourg, 1849, vii. 171–175.
- . *Vorläufige Bemerkungen über eine neue, eigentümliche, der Fauna Russlands angehörige Gattung oder Untergattung von Krabben (Crustacea Brachyura) aus der Edwards'schen Abtheilung der Corysten*. Bulletin physico-mathématique de l'Académie de Saint-Petersbourg, 1849, vii. 178, 179.
- . *Beiträge zur Kenntniss der Amphipoden*. Loc. cit., 1851, ix. 132, 310, etc.
- . *Middendorff's Reise in den Sibiriens, Zoölogie; Theil I. Krebse*, pp. 79–162, (1851.)
- L. R. GIBBES. *On the Carcinological Collections of the United States, and an enumeration of the species contained in them, with notes, etc.* Proceedings of the American Association for the Advancement of Science; Third Meeting, Charleston, S. C., 1850, pp. 167–201.
- C. GIRARD. *A Revision of the North American Astaci*, etc. Proceedings of the Academy of Natural Sciences of Philadelphia, 1852, vii. 87–91.
- J. D. DANA. *Crustacea of the United States Exploring Expedition, 1852*.
- . *Catalogue and Descriptions of Crustacea collected in California by Dr. John L. Leconte*. Proceedings of the Academy of Natural Sciences of Philadelphia, 1854, vii. 175–177.
- . *Description of a new species of Cryptopodia from California*. American Journal of Science, 2d Series, vol. xviii. p. 430, (1854.)
- M. MILNE-EDWARDS. *Mélanges Carcinologiques*. Annales des Sciences Naturelles, 1852–1853.
- H. DE SAUSSURE. *Description de quelques Crustacés nouveaux de la côte occidentale du Mexique*. Revue et Magasin de Zoölogie, 1853, v. 354–368.

museum, obtained mostly through the researches of Lieut. TROWBRIDGE, Drs. SUCKLEY and NEWBERRY, and Mr. A. S. TAYLOR. These specimens, together with those found by myself while on the North Pacific Exploring Expedition, form a large addition to Mr. Samuel's collection, and have enabled me to make more extended and satisfactory observations upon these divisions of our Western Fauna.

It will be seen that more than one hundred and thirty species of the class Crustacea have been determined to exist in the region now under consideration, a number which seems quite large when we consider that so recently as in the year 1838 not a single species was known to science as forming part of its fauna.* But we cannot suppose even this number to be more than a fourth part of that which will be reached when a thorough search shall be instituted. Many families which are undoubtedly represented here by one or more species, have not yet been noticed; and that part of the coast which is included within the

W. P. GIBBONS. *On a new genus of Crabs*. Proceedings of the California Academy of Natural Sciences, 1855, vol. i. pp. 48, 49.

T. BELL. *Horæ Carcinologicae, or Notices of Crustacea*. I. *A monograph of the Leucosiadae*. Transactions of the Linnæan Society of London, 1855, xxi. 277. Pl. XXX—XXXIV.

W. STIMPSON. *On some Californian Crustacea*. Proceedings of the California Academy of Natural Sciences, 1856, vol. i. pp. 87—90.

———. *Descriptions of new species of Crustacea from the Western Shores of North America*. Proceedings of the Boston Society of Natural History, 1857, vol. vi. pp. 84—89.

For the Echinodermata:—

ESCHSCHOLTZ. *Zoologischer Atlas*.

F. BRANDT. *Prodromus descriptionis animalium ab H. Mertensio in orbis terrarum circumnavigatione observatorum*. Fascic. I. Petropoli, MDCCCXXXV.

J. E. GRAY. *On the class Elypostoma*. Annals and Magazine of Natural History, vi. 176, etc.

VALENCIENNES. *Voyage de la Venus*.

W. O. AYRES. *On Californian Echinodermata*. Proceedings of the California Academy of Natural Sciences, 1855, i. 68.

* "Nous ne savons rien sur les Crustacés de la côte occidentale de l'Amérique du Nord." MILNE-EDWARDS, *Hist. Nat. des Crust.* iii. 564, (1840.)

tropics must swarm with Crustacea of the higher orders, the species of which are as yet entirely undetermined. Without, therefore, attempting to generalize upon so imperfect data, we may notice a few facts with regard to the character of the Crustacean fauna, which are so prominently marked that they will be but little affected by future discoveries.

The tribe *Oxyrhyncha* is very numerous represented in the rocky fiords of the upper coast, and a predominance of deep-water forms may be observed, the genera of which are mostly peculiar to this region. The restricted genus *Cancer* (*Platycarcinus*, M. Edw.) is remarkably well represented here, by four species, very abundant in individuals, and which are in fact the most common crabs known. On the other hand, with the exception of a single species of *Ozius*, no other examples of the *Canacrinea*, elsewhere so numerous, have yet occurred; and it is indeed singular that the sandy shores of California, so well adapted to *Lupa* and its allies, should have as yet furnished no species of the *Portunidae*. In this point a striking difference is shown between the marine fauna of this and the eastern coast, where such forms are abundantly distributed.

The chief and most noticeable feature, however, which at once gives a peculiar character to the Decapoda of the Northwestern coast, is the remarkable development of the *Lithodina*. But few species of the rare and curious crabs of this family, all denizens of deep water, were until recently known, one of which (the only one described in the "Histoire Naturelle des Crustacés,") is found in the North Atlantic, one in the Antarctic Ocean, and two in the seas of Japan and Kamtschatka. Within the past ten years, however, no less than nine additional species have come to light, nearly all of which were found on the shores of California, Oregon, and Russian America. Among these are some gigantic and representative forms which tend greatly to enlarge our views of the extent, importance, and relations of the group. For our knowledge of these interesting Crustaceans, we are chiefly indebted to BRANDT of St. Petersburg.

Among the fresh-water Crustacea we may notice the fact, first observed by DANA* in *Astacus leniusculus*, that the Cray-fish of the rivers running into the Pacific have branchiæ on the fifth pair of legs, and, like those of Europe, are classed among the true *Astaci*. AGASSIZ † saw the same thing in *A. Gambelii*, and I have found it to be invariably the case in the species of this region, among which there are several not hitherto described in the Museum of the Smithsonian Institution. Our eastern Cray-fish, on the contrary, all belong to the genus *Cambarus*, having no branchiæ on the legs of the fifth pair,—a singular instance of the coincidence of peculiarities of structure with those of geographical distribution. ERICHSON ‡ does indeed describe two species of *Cambarus* from Southern Mexico, but we have reason to suppose that these belong rather to the eastern slope of the Rocky Mountains.

In the preparation of the following paper I have used every means in my power to identify the species described by previous authors, and have done this by actual comparison of specimens wherever it was possible. Through the kindness of Dr. BRIDGES I was enabled, during a short visit to Philadelphia for that purpose, to examine the typical specimens of RANDALL'S species, and those of DE SAUSSURE. To PROFESSOR DANA I am indebted for much assistance, and for the use of the few specimens of his types which were particularly desired for comparison,—the admirable exactness of his figures and descriptions rendering any further means of identification in most cases unnecessary.

Full descriptions will be here given of the new species only, but notes are appended to several already known, including remarks on characters which have been overlooked by previous authors. Enough is given in most instances to enable the reader to determine any known California or Oregon species.

* U. S. Exploring Expedition, Crust. i. 524.

† Proc. Acad. Nat. Sci., Philad. vi. 375.

‡ Archiv für Naturgeschichte, 1846, i. 99.

DECAPODA BRACHYURA.

TRIBE OXYRHYNCHA.

CHIONOCETES BEHRINGIANUS. Stimpson.

Chionocetes Behringianus, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 84.

Carapax with numerous scattered unequal rugose prominences which are blunt and wart-like about the middle, but become more acute anteriorly and at the sides. Superior surface covered with a short pubescence. The broad channels above the postero-lateral margins are nearly smooth, but their double margins are granulated. The inferior antero-lateral margin is armed with about fourteen small bifid teeth which diminish in size forwards. The feet are everywhere slightly pubescent, with the third articles scabrous or echinulate above; those of the first pair are mucronated along the angles, and everywhere somewhat scabrous on their upper surfaces. The abdomen in the male is one third the width of the sternal plastron at its penultimate article, the infero-lateral angles of which are somewhat produced and tumid. Length of the carapax, 2.5; width, 2.52 inch.

This species may be distinguished from *C. opilio*, KROYER, judging from the descriptions of that naturalist, by the shorter feet of the male;—those of the second pair, in the species here described, being not more than twice the length of the carapax, while those of the first pair are not much more than half as long as those of the second. The abdomen consists in both male and female of seven articles, the three nearest the base being strongly granulated. KROYER, in his diagnosis of the genus, states the number of articles to be six, although O. FABRICIUS* gives seven as the number in his *Cancer phalangium*.

It inhabits deep water, the specimens described being

* Fauna Grönlandica, p. 234; n. 214.

dredged on a muddy bottom at the depth of thirty fathoms, off Cape Romanzoff. It was also found in Behring's Straits, by Commodore RODGERS, of the North Pacific Expedition.

It is in the Museums of the Boston Society of Natural History, of the Smithsonian Institution, and of the Jardin des Plantes.*

HYAS COARCTATUS. Leach.

Hyas coarctatus, LEACH; *Malac. Pod. Brit.*, Pl. XXI. b. MILNE-EDWARDS; *Hist. Nat. des Crust.*, i. 312. BRANDT; *Sibirische Reise*, i. 79.

Dredged off Cape Romanzoff by the North Pacific Expedition.

This is an arctic species, found on both boreal shores of the Atlantic. It is also the most common crab found in Behring's Straits, and is reported to exist on the shores of Kamtschatka and in the Sea of Ochotsk.

Mus. Smithsonian.

HYAS LYRATUS. Dana.

Hyas lyratus, DANA; *U. S. Exploring Expedition, Crust.*, i. 86, Pl. I. f. 1.

Distinguished from the preceding species by the broad, wing-like, antero-lateral expansions of the carapax. It in-

* As it is always desirable to know where typical specimens may be found for comparison, I shall indicate in every case the different museums in which examples of the species herein catalogued are deposited. For convenience, the following abbreviations will be used:—

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|---|-----------------|
| Museum of the Boston Society of Natural History | Mus. Bost. Soc. |
| “ “ “ Smithsonian Institution | “ Smithsonian. |
| “ “ “ Philadelphia Academy of Natural Sciences | “ Phil. Acad. |
| “ “ “ U. S. Exploring Expedition | “ Expl. Exped. |
| “ “ “ California Academy of Natural Sciences | “ Cal. Acad. |
| “ “ “ Yale College | “ Yale. |
| “ “ “ Imperial Academy of St. Petersburg | “ Acad. Petrop. |
| “ “ “ Berlin | “ Berlin. |
| “ “ “ the Garden of Plants at Paris | “ Paris. |
| “ “ “ Royal College of Surgeons, London | “ R. C. S. |
| “ “ “ Zoological Society of London | “ Zool. Soc. |
| British Museum | “ Brit. |

habits deep water on the coast of Oregon, where it was found by the U. S. Exploring Expedition.

Mus. Expl. Expedition.

HERBSTIA PARVIFRONS. Randall.

Herbstia parvifrons, RANDALL; *Journal of the Academy of Natural Sciences of Philadelphia*, viii. 107. GIBBES; *Proceedings of the American Association for the Advancement of Science*, 1850, p. 170.

“Western America.” (Nuttall.) This species I have not seen.

LOXORHYNCHUS. nov. gen.

Carapax pyriformis, plus minusve spinosus et pubescens; regione stomachali amplâ, convexâ; regionibus hepaticis parvis, prominentibus, spinâ unâ saltem validâ in medio armatis. Rostrum bifidum, plus minusve deflexum; cornibus divaricatis. Orbita imperfecta, supra infraque sinu profundo longitudinali interrupta; cavo pediculi subtubulato. Oculi sat breves, retractiles, non sese latentes. Dens præorbitalis validus; spina postorbitalis acuta, fere longitudinalis, sub quâ spina parva juxta basim externam articuli primi antennæ externæ sita. Pars mobilis antennarum externarum rostro vix celata, flagellis longis; articulus immobilis latus, fere quadratus, apice externo spinâ acutâ lateraliter porrectâ armato. Epistoma magna, subtrapezoidalis. Maxillipedes externi fere ut in *Pisâ*; apice interno articuli secundi valdè productâ et rotundatâ. Pedes subcylindrici, secundi paris longiores; tarsi breves non spinulosi; digiti primi paris maris fæminæque margine interno toto denticulato. Abdomen 7-articulatum.

This genus is proposed for the reception of two new species of Maioid crabs, which, though differing from each other considerably in the characters of the surface of the carapax, and some other points, yet are so closely allied in the structure of the orbits and antennæ that they cannot be generically separated. They unite the characters of several generic groups, so that their position is somewhat doubtful, although probably among the *Pisinae*. The deflection of the rostrum is quite characteristic, but this feature is much less developed in one species than in the other. The eyes are short, and do not reach the tip of the post-orbital spine.

The genus will be perhaps best characterized by a comparison with others. From *Pisa*, which it resembles in the shape of the carapax, it differs in the less excavated orbits, and single supra-orbital fissure, the want of spinules on the tarsi, and the much broader basal article of the external antennæ. This latter character also separates it from *Herbstia* and *Halimus*. From the *Chorininae* it may be distinguished by the non-concealment of the external antennæ, and the shorter and broader rostrum. It is allied to *Paramicippa* in the deflection of the rostrum, but differs in the longer epistome, and the inferior position of the external antennæ. The cavities of the eye-peduncles are less tubular than in *Pericera*, the eyes being retractile. *Perinea* has a shorter carapax and a much shorter rostrum, leaving the external antennæ considerably exposed.

This genus, like several others of the tribe, seems to be peculiar to this coast. The species are crabs of large size.

LOXORHYNCHUS GRANDIS. Stimpson.

Plate XIX. f. 1, and XXII. f. 1.

Loxorhynchus grandis, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 85.

Carapax pyriform, subglobose; branchial regions broadly expanded somewhat as in *Libinia*. Surface covered with small warts of nearly uniform size, which are blunt and rounded about the middle portion of the carapax, but become sharp and spine-like anteriorly and on the sides, where they are also more crowded. There are seven spines on the hepatic protuberances, two of which are larger. Pubescence very short and mostly obsolete above, leaving the surface punctate with minute pit-like depressions. Rostrum a little longer than wide, slit for somewhat more than half its length, and greatly deflexed, pointing downward in a direction almost at right angles with the horizontal axis of the body. The præorbital spine is emarginate at its extremity. The feet are rather short and stout, covered with a short,

thick villosity. Those of the first pair shorter than those of the second, with fingers touching each other along the whole length of their denticulated inner edges; wrist somewhat tuberculous above; third article with four small distant spines on the superior margin, the largest being at the summit of the abrupt expansion at the articulation of the fourth article. A single subterminal spine on the third article of the second pair of feet; this spine becomes almost obsolete in the posterior pairs, which are elsewhere smooth. Tarsi short and thick, somewhat curved, with corneous tips easily separable in dry specimens. The color of exposed parts is reddish inclining to roseate, becoming yellowish-white on the sides. Fingers white. The following are the dimensions of a female:—

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|---|------------|
| Length of carapax | 5.55 inch. |
| Width " " | 4.54 " |
| Length of rostrum from base of præorbital spine | 0.96 " |
| Distance between rostral tips | 0.39 " |
| " " tips of præorbital spines | 1.30 " |
| Length of 1st pair of feet | 4.90 " |
| " " 2d " " | 6.45 " |
| " " 5th " " | 4.75 " |

Taken on the coast of California, near San Francisco, by Lieut. TROWBRIDGE.

Mus. Smithsonian.

LOXORHYNCHUS CRISPATUS. Stimpson, n. s.

Plate XXII. f. 2, 3, and 4.

Carapax very much elongated, somewhat triangular; regions separated by deep depressions. There are nine large tubercles above, with sharp apices, between which smaller ones are interspersed. These tubercles are as follows: one at the posterior summit of the stomachal region, one at each hepatic region, (projecting laterally,) two on each side at the branchial regions, and one at either extremity of the abruptly convex intestinal region. The sides of

the carapax are nearly perpendicular, and provided with tubercles. The whole surface of the body and feet (excepting the pincers and tips of the tarsi) above and below, is covered with short, thick hair, which, on the front and sides of the carapax and along the angles of the legs, becomes longer, stiff, and curled. The rostrum is but slightly deflexed, and not curved; it is slit two thirds of its length, the horns diverging, but slightly turned inwards at their sharp extremities. Præorbital spines slender, sharply pointed. External antennæ long, the flagella reaching much beyond the tips of the rostrum. The feet are somewhat triangularly prismatic; a character best seen in the third joints. The fourth articles in the posterior four pairs have a longitudinal groove on the upper surface. In the first pair the fingers are rather slender, and the posterior tooth of the movable one is much larger than the others; in this pair of feet there are two small spines on the third joint. The sternal plastron and abdomen in the male are transversely grooved with deep channels corresponding in number to the articulations. The color beneath the pubescence is bluish-white, the rostrum, spines, and feet being of a bright carmine hue.

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| Length of carapax, ♂ | 3.45 |
| Greatest width | 2.30 |
| Length of rostrum | 0.67 |
| Distance between tips of præorbital spines | 0.82 |
| “ “ “ anterior spines of branchial region | 1.40 |
| Length of 1st pair of legs | 3.50 |
| “ “ 2d “ “ | 4.40 |

Found at the island of San Miguel, off the coast of California, near San Pedro. This is another of the novelties for which we are indebted to that indefatigable observer, Lieut. TROWBRIDGE, who, though devoting his chief attention to the Vertebrata, has succeeded in making collections of the lower forms of animal life, of greater extent and interest than has any other student of Californian Zoölogy.

Mus. Smithsonian.

LIBINIA AFFINIS. Randall.

Libinia affinis, RANDALL; *Jour. Acad. Nat. Sci., Philad.* viii. 107. GIBBES, *Proc. Am. Assoc.* 1850, p. 170.

This species is rare, Nuttall's specimen being the only one yet found. It is very closely allied to *L. canaliculata* of the eastern coast, but differs in its less convex carapax and smoother hand.

Upper California, (Nuttall.)

Mus. Phil. Acad.

CHORILIA LONGIPES. Dana.

Chorilia longipes, DANA; *U. S. Expl. Expedition, Crust.* i. 91; Pl. I. f. 5.

This species may be distinguished from the other Oxyrynchs of this coast by its long, bifid, pubescent rostrum, the forks of which are nearly parallel. The carapax is without pubescence, with a few distant tubercles and a sharp spine on each side at the branchial region. The legs are long, and, with the exception of the first pair, very slender. It is about 1½ inches in length.

Oregon, (Expl. Exped.)

Mus. Expl. Exped.

SCYRA ACUTIFRONS. Dana.

Scyra acutifrons, DANA; *U. S. Exploring Expedition, Crust.* i. 95; Pl. II. f. 2.

This little crab may be recognized by its ovate spineless carapax, the regions of which are strongly prominent; and by its short, bifid, lamellar rostrum.

Puget Sound, (Pickering.)

Mus. Expl. Exped.

OTHONIA PICTETI De Saussure.

Othonia picteti, DE SAUSSURE; *Revue et Magasin de Zoologie*, v. 357, Pl. XIII. f. 2.

Mazatlan, (Verreaux.)

Mus. Phil. Acad.

Dr. JOHNSTON used the name *Othonia* for a genus of Annelides in 1835,—prior to its application to the crustacean group by BELL. But JOHNSTON'S genus seems to be the same as *Fabricia*, BLAINV. 1828.

MITHRAX ARMATUS. De Saussure.

Mithrax armatus, DE SAUSSURE; *Rev. et Mag. Zool.* v. 355, PL. XIII. f. 1.

Mazatlan, (Verreaux.)

Mus. Phil. Acad.

OREGONIA GRACILIS. Dana.

Oregonia gracilis, DANA; *U. S. Exploring Expedition, Crust.* i. 106, PL. III. f. 2.

The *Oregonia* may be distinguished by the great length of their legs, the penultimate joint of which is not expanded; and by the long, slender, post-orbital spine. The rostrum is slender, and forked nearly from its base; in this species the horns are long, and diverge toward their extremities.

Puget Sound, (Pickering.)

Mus. Expl. Exped.

OREGONIA HIRTA. Dana.

Oregonia hirta, DANA; *U. S. Expl. Exped., Crust.* i. 107, PL. III. f. 3.

This is more hairy than the preceding species, and has a proportionally longer rostrum. Both are inhabitants of deep water.

Puget Sound, (Pickering.)

Mus. Expl. Exped.

PUGETTIA GRACILIS. Dana.

Pugettia gracilis, DANA; *U. S. Exploring Expedition, Crust.* i. 117, PL. IV. f. 3.

The genus *Pugettia* is characterized by the large post-orbital expansions of the depressed, unarmed carapax. Ros-

trum bifurcate, horns diverging. The deep constriction between the hepatic and branchial regions renders it easily distinguishable from all other crabs of this coast, except perhaps *Hyas lyratus*, which has a simply cleft rostrum. In the present species the post-orbital expansions are triangular.

Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

PUGETTIA RICHII. Dana.

Pugettia Richii, DANA; *U. S. Exploring Expedition, Crust.* i. 117, PL. IV. f. 3.

In this the post-orbital expansions are bilobate, with the lobes acute. Larger than the preceding; anterior feet of great size.

San Diego, (W. Rich.)

Mus. Expl. Exped.

EPIALTUS PRODUCTUS. Randall.

Epialtus productus, RANDALL; *J. A. N. S. Phil.* viii. 110. GIBBES; *Proc. Am. Assoc.* 1850, p. 173. DANA; *U. S. Exploring Expedition, Crust.* i. 133, PL. VI. f. 2.

Easily recognized by its smooth quadrate carapax, with two distant teeth on either side. It is the most common maioid crab on the coast of California and Oregon, and is usually found among sea-weeds on rocks just below low-water mark. Its color is olivaceous when alive.

Puget Sound, (Suckley); Mouth of the Columbia, (Trowbridge); Farallone Is. (Trowbridge); Tomales Bay, (Samuels); entrance of San Francisco Bay, (Stimpson); Monterey, (Trowbridge.)

Mus. Smithsonian; Bost. Soc.; Phil. Acad.; Paris; Acad. Petrop.

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EPIALTUS NUTTALLII. Randall.

Epialtus Nuttallii, RANDALL; *loc. cit.* viii. 109, PL. III. GIBBES; *loc. cit.* p. 173.

Differs from the preceding by its more rounded outline and larger rostrum.

Upper California, (Nuttall.)

Mus. Phil. Acad.

PARTHENOPE PUNCTATISSIMA. Owen.

Parthenope punctatissima, OWEN; *Zoölogy of Beechey's Voyage, Crust.* 81, PL. XXXIV. f. 4.

This is almost certainly a *Lambrus*, but having been unable to procure a specimen and examine the characters of the antennæ, I refrain from adding to the synonymy.

Coast of California, (Belcher.)

Mus. Zoöl. Soc.; R. C. S.

CRYPTOPODIA OCCIDENTALIS. Dana.

Cryptopodia occidentalis, DANA; *Am. Jour. Sci.*, 2d Ser. xviii. 430, (wood-cut.) GIBBES, *Proc. Elliott Soc. Nat. Hist. Charleston, S. C.* i. 36.

This curious crab is distinguished from all others found on this coast, by the smallness of its posterior four pairs of feet, which are entirely concealed beneath the carapax; those of the first pair on the contrary are very large, angular, and much longer than the shell.

Monterey, (W. Rich.)

Mus. Expl. Exped.

TRIBE CYCLOMETOPA.

CANCER MAGISTER. Dana.

Cancer magister, DANA; *U. S. Exploring Expedition, Crust.* i. 151, PL. VII. f. 1. STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88. *Cancer irroratus*, RANDALL, l. c. (non Say.)

The largest of the numerous species found on the Cali-

fornian coast. Antero-lateral margin ten-toothed; teeth but little prominent, with the exception of the posterior one, which is separated from the next by a considerable space; they gradually diminish in size toward the orbits. Terminal segment of abdomen in the male short, with a rounded extremity. Third article of outer maxillipeds somewhat granulated, with the exterior apex broadly truncated. Feet of the second pair longest, and equal in length to the width of the carapax. In adult specimens the tarsi of the fifth pair of feet are very much compressed, and not conspicuously ciliated below. In a specimen from Sitka, the granulation on the upper side of the feet of the posterior pairs is much stronger, and the teeth on the crest of the hand less numerous and higher, than in Californian specimens. The following are the measurements of several specimens in the Museum of the Smithsonian Institution:—

| Locality. | Sex. | Length of Carapax. | Width of Carapax. | Proportions of Carapax. |
|----------------|------|--------------------|-------------------|-------------------------|
| Puget Sound, | ♂ | 0.875 inch. | 1.27 inch. | 1:1.45 inch. |
| San Francisco, | " | 1.23 | 1.80 | 1:1.46 |
| Monterey, | " | 2.51 | 3.77 | 1:1.50 |
| San Francisco, | " | 4.42 | 7.00 | 1:1.58 |
| Sitka, | " | 4.90 | 8.85 | 1:1.80 |
| San Francisco, | ♀ | 2.55 | 3.90 | 1:1.53 |

By these measurements and proportions it will be seen that this species increases in width with age, and that the female is slightly broader than the male. I have seen no specimen according in dimensions with the variety figured by Dana.

This species was erroneously referred by RANDALL to *C. irroratus*, SAY. The succeeding species, however, approaches much more closely to the eastern crab.

C. magister has been found at Sitka, (Trowbridge;) Puget Sound, (Suckley;) San Francisco Bay, (Pickering, Kennerly, etc.;) and at Monterey, (Taylor.) It is the common crab of the San Francisco market, and is caught very abundantly about the wharves of the city. It is of a light

reddish-brown color, darkest anteriorly, often light orange below; inner sides of the anterior feet and hands crimson.

Mus. Smithsonian; Expl. Exped.; Phil. Acad.

CANCER GRACILIS. Dana.

Cancer gracilis, DANA; *U. S. Exploring Expedition, Crust.* i. 153, Pl. VII. f. 2. STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88.

This is the smallest species of the genus known, although found of a much larger size than that figured by DANA. It may be distinguished from the young of *C. magister* by the emargination or slight tooth on the postero-lateral margin near its outer extremity, as well as by its proportions. It differs from *C. irroratus*, (*C. Sayi*, GOULD,) which also possesses the postero-lateral emargination, by its smoother and more slender tarsi, and by the granulation of the central portions of the carapax. The antero-lateral margins are nine-toothed. Lateral teeth of inter-antennary front deeply separated from, and much larger than, the middle one, although not projecting so far forward. Third article of outer maxillipeds smooth, with the exterior apex rounded. Terminal segment of abdomen in the male elongate-triangular, with a slender, pointed extremity. The following are the dimensions of several specimens now before me:—

| Locality. | Sex. | Length of Carapax. | Breadth of Carapax. | Proportion. |
|--------------|------|--------------------|---------------------|--------------|
| Tomales Bay, | ♂ | 1.51 inch. | 2.30 inch. | 1:1.52 inch. |
| " " | " | 1.60 | 2.40 | 1:1.50 |
| " " | " | 1.70 | 2.55 | 1:1.50 |
| Puget Sound, | ♀ | 1.90 | 2.80 | 1:1.47 |
| Tomales Bay, | " | 1.45 | 2.13 | 1:1.47 |

We may thus notice that in this species the males are wider than the females.

Puget Sound, (Suckley;) Tomales Bay, (Samuels;) San Francisco Bay, (Expl. Exped.)

Mus. Expl. Exped.; Smithsonian; Bost. Soc.; Phil. Acad.; Acad. Petrop.; Paris; etc.

CANCER PRODUCTUS. Randall.

Cancer productus, RANDALL; *loc. cit.* viii. 116. DANA; *U. S. Exploring Expedition, Crust.* i. 156, Pl. VII. f. 3. STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88. *Platycarcinus productus*, GIBBES; *Proc. Am. Assoc.* 1850, p. 177.

This species was described by RANDALL from young specimens, which differ much from the adult, both in proportions and markings. Having seen only large individuals at the time my paper in the Proceedings of the California Academy was written, I there proposed for them the name *C. perlatus*, in case they should prove different from RANDALL's species. But the possession of a full series of all ages, and the examination of the original specimen at Philadelphia, has now convinced me of their identity. DANA's specimens appear also to have been young, and his description will scarce apply to the adults, in which the teeth on the front and antero-lateral margin are sufficiently projecting and well separated.

The produced and elevated front is the most prominent character of this species. The female is rather more convex than the male. The greatest width is at the penultimate lateral tooth. The postero-lateral margin is emarginated, as in the preceding species. Surface of the carapax unequally granulose, most so toward the margins and on the teeth. Hand tuberculous above, scarcely cristate, the projections being few and blunt; the exterior surface 4-carinate. Posterior feet rather compressed; third articles in all ciliate along the superior edge; tarsi with three longitudinal brushes of short, thick hair along the angles, the superior one in the fifth pair and the posterior one in the other pairs being often obsolete. The terminal article of abdomen in the male is triangular, elongated, with an acuminate extremity, the sides being concave.

This species is of a dark red or madder color above; feet mottled; below dirty white. The following are the dimensions of several specimens:—

| Locality. | Sex. | Length of Carapax. | Width of Carapax. | Proportion. |
|----------------|------|--------------------|-------------------|--------------|
| San Francisco, | ♂ | 2.95 inch. | 4.90 inch. | 1:1.63 inch. |
| " " | " | 2.56 | 4.18 | 1:1.63 |
| " " | " | 2.47 | 4.01 | 1:1.62 |
| " " | " | 2.46 | 4.00 | 1:1.62 |
| Tomales Bay, | " | 2.35 | 3.78 | 1:1.60 |
| San Francisco, | " | 2.27 | 3.66 | 1:1.60 |
| " " | " | 2.10 | 3.36 | 1:1.60 |
| " " | " | 1.97 | 3.05 | 1:1.55 |
| " " | " | 0.99 | 1.29 | 1:1.30 |
| " " | ♀ | 2.84 | 4.30 | 1:1.52 |
| Tomales Bay, | " | 2.73 | 4.20 | 1:1.54 |
| San Francisco, | " | 2.15 | 3.34 | 1:1.55 |
| Tomales Bay, | " | 2.16 | 3.32 | 1:1.54 |
| " " | " | 2.00 | 3.07 | 1:1.54 |

Here it will be perceived that the male is wider than the female; and also that the males steadily increase in width with age, while the females show some variation. The great breadth in this species renders it easily distinguishable from its congeners.

Distortions of the antero-lateral teeth often occur, rendering the sides somewhat unsymmetrical.

This *Cancer* is common at San Francisco, and is sold in the markets with *C. magister*. It was also found at Tomales Bay by Mr. Samuels, and in Puget Sound by the Exploring Expedition.

Mus. Bost. Soc.; Smithsonian; Phil. Acad.; Paris; Acad. Petrop.

CANCER ANTENNARIUS. Stimpson.

Plate XVIII.

Cancer antennarius, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88.

Carapax convex; greatest breadth at the penultimate antero-lateral tooth. Superior surface much undulated, very smooth in appearance, but minutely granulated; the granulation being almost obsolete about the middle, but sufficiently well marked towards and at the margin. Antero-

lateral margin convex and well rounded, with nine teeth, the inner one forming the outer angle of the orbit; teeth deeply separated, their edges denticulated, their apices curving forward and very sharp, almost uncinatè. Postero-lateral margin with a deep emargination near the extremity, forming a sharp tooth, and another, rather slight, a short distance within the first. These emarginations are much deeper in the young than in the adult. Front sufficiently broad, but not projecting farther forward than the exterior angle of the orbit; inter-antennary portion with three well-separated teeth, the middle one being smaller and rather below the lateral ones; præorbital tooth rather prominent. External antennæ very large and hairy, in length equalling two fifths that of the carapax; apex of basal article projecting considerably beyond the præorbital tooth. Third article of external maxillipeds subquadrate, a little longer than broad; anterior margin nearly transverse, ciliate with long hairs; angles rounded; notch for insertion of fourth article deep, abrupt below, continuous with the margin above. The slight ridge on the palate parallel with its inner margin is more sharply prominent in this than in any other species. Feet of the first pair large, particularly in the male. Carpus and hand rather short and thick, in the adult smoothly rounded above and microscopically granulated, in the young ornamented with small spiniform tubercles; outer surface of hand costate; costæ well marked and granulated in the young, almost obsolete in the adult. Fingers in the female with linear grooves on the sides. Ambulatory feet hairy; third articles overreaching the margin of the carapax; tarsi with thick brushes of short hair along the angles. Margins of abdomen and other parts on the inferior surface generally, very hairy. Terminal article of abdomen in the male slender, with somewhat concave sides and bluntly pointed extremity.

Color above dark purplish-brown; below yellowish-white, spotted with red; finger and thumb black.

The dimensions of two specimens from San Francisco Bay are as follows:—

| | | | | | | | |
|---|--------------------|------|-------|----------|-------|-------------|---------|
| ♂ | Length of carapax, | 2.43 | inch; | breadth, | 3.70; | proportion, | 1:1.52. |
| ♀ | " | 2.13 | " | " | 3.08; | " | 1:1.45. |

The male is therefore broader than the female.

Its hairiness and the great length of the outer antennæ distinguish it from all other species. In a variety found in Tomales Bay, the upper surface of the carapax is hairy as well as the sides. The middle tooth of the inter-antennary front is sometimes wanting in this, as in other species.

It is not uncommon about the mouth of San Francisco Bay, inhabiting rocky bottoms at the depth of two or three fathoms. It was also found at Monterey by Mr. Taylor, and at Tomales Bay by Mr. Samuels.

Mus. Bost. Soc.; Smithsonian; Phil. Acad.; Paris; Acad. Petrop.

OZIUS VERREAUXII. De Saussure.

Ozius Verreauxii, DE SAUSSURE; *Revue et Magasin de Zoologie*, v. 359, PL. XII. f. 1.

Mazatlan, (Verreaux.)

Mus. Phil. Acad.

TRIBE CORYSTOIDEA.

TRICHOCERA OREGONENSIS. Dana.

Trichocera Oregonensis, DANA; *U. S. Exploring Expedition, Crust.* i. 299, Pl. XVIII. f. 5.

This little crab has much the aspect of a small *Cancer*, and may be recognized by its rounded carapax, hairy legs, and long antennæ. The whole margin (including the postero-lateral) is dentate with about thirteen teeth on each side.

Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

CHEIROGONUS HIPPOCARCINOIDES. Latreille.

Cancer adperso-setosus hippocarcinoides, STELLER, *MS.* (fide TILESII.)

Cancer cheiragonus, TILESII; *Mem. de l'Acad. Imp. des Sciences de St. Petersb.* 1815, v. 347, Pl. VII. f. 1.

Cheiragonus hippocarcinoides, LATREILLE; *Fam. Nat.* 1825, p. 270. (fide BRANDTIL.)

Platycorystes ambiguus, BRANDT; *Bulletin physico-mathém. de l'Acad. de St. Petersb.* 1849, vii. 179.

Platycorystes cheiragonus, BRANDT; in *Middendorff's Sibirische Reise, Zool.* i. 85.

Cheiragonus hippocarcinoides, BRANDT; in *Midd. Sibirische Reise, Zool.* i. 147.

Telmessus serratus, DANA; *U. S. Exploring Expedition, Crust.* i. 303, Pl. XVIII. f. 8, (viz WHITE.)

This crab may be distinguished among those of this coast by its scabrous and setose surface, and the large triangular lateral teeth, of which there are four on the antero-lateral and two on the postero-lateral margin. These teeth have serrated margins, and the outer one on each side is much the largest. The inter-antennary front, which is separated from the præorbital tooth on either side by a broad sinus, has four small equal teeth. Length about two inches. It was found on the coast of Upper California by Dr. Le Conte; in Puget Sound by the Exploring Expedition; and at Sitka by Wosnessenski.

Mus. Acad. Petrop.; Expl. Exped.; Phil. Acad.

CHEIROGONUS ISENBECKII. Brandt.

Platycorystes Isenbeckii, BRANDT; *Bulletin physico-mathém. de l'Acad. de St. Petersb.* 1849, vii. 179.

Cheiragonus Isenbeckii, BRANDT; in *Middendorff's Sibirische Reise, Zool.* i. 147.

Unalashka, (Wosnessenski.)

Mus. Acad. Petrop.

This very distinct genus, to which so many names have recently been applied, is now known to include at least four species. That found on the west coast of North America, which occurs also along the shores of the Aleutian Islands, of Kamtschatka, and the Sea of Ochotsk, is dis-

tinct from the *Telmessus serratus* of WHITE. *Platycorystes* (*Podocanthus*) *Isenbeckii* of BRANDT is also properly placed in this genus, and I have recently discovered a new species in the seas of Northern Japan.

The reference to LATREILLE's work, (*Les Crustacés, les Arachnides, et les Insectes distribués en familles naturelles*, Paris, 1825,) for *Cheiragonus* is given on the authority of BRANDT. This book I have never seen, but it is said to have been republished in CUVIER's "Regne Animal"—edition of 1829. In this latter publication the name *Cheiragonus* certainly does not occur, which is singular, and it is also remarkable that it should have been entirely overlooked by MILNE-EDWARDS. The name occurs, however, in the "Index Universalis" of AGASSIZ, and must undoubtedly have been published somewhere by LATREILLE in 1826. Whether this author gives a generic character, or a simple reference to TILESUS's description; and whether he designates the species as *C. hippocarcinoides*, I am of course unable to say. If this specific name were not given we must call the species *C. ambiguus*, for TILESUS's reference to STELLER's MS. name *hippocarcinoides* is not sufficient to give it priority.

TRIBE CATOMETOPA.

GRAPSUS STRIGOSUS. Latreille.

Grapsus strigosus, LATREILLE. *Goniopsis strigosus*, DE HAAN; WHITE, *Brit. Mus. Catalogue, Crust.* 40.

Specimens in the British Museum, from Lower California, are referred to this species by WHITE.

GRAPSUS PICTUS. De Saussure.

Grapsus pictus, DE SAUSSURE; *Rev. et Mag. de Zoologie*, v. 362.

This is in all probability not the *Grapsus pictus* of LATREILLE. It may be either *G. ornatus*, M. ED., or a new species; and is not improbably the same as the preceding.

Mazatlan, (M. Verreaux.)

PACHYGRAPSUS CRASSIPES. Randall.

Pachygrapsus crassipes, RANDALL; *Jour. Acad. Nat. Sci. Philad.* viii. 127.

Distinguished by the square form of the carapax, which has a single tooth on each side posterior to that forming the outer angle of the orbit;—the broad depressed front, and spiny tarsi. It is very common on the coast of California, south of San Francisco, and was found at the Farallone Is., (Trowbridge;) at Monterey, (Taylor;) and at San Diego, (Schott.) RANDALL states that his specimens were found at the Sandwich Is., by Nuttall. But the species has never been found there by other observers, although the Islands have been frequently and well searched for Crustacea. On the other hand, RANDALL states that his *P. parallelus** is found on the coast of Oregon, where, however, it has not been since observed; while it is common at the Sandwich Is. It is therefore probable, that in the case of Nuttall's specimens the labels of the two species were accidentally exchanged.

Mus. Bost. Soc.; *Phil. Acad.*; *Smithsonian*; *Acad. Petrop.*; *Paris.*

There seems to be no good reason why RANDALL's name *Pachygrapsus* should not be retained for the group called *Leptograpsus* by MILNE-EDWARDS. The thick, square, and evidently allied forms with a square third article of maxillipeds, for which Dr. R. instituted the genus, are quite distinct from the true *Grapsi*, though forming a group to which DE HAAN proposed to restrict the ancient name of the family. When it was found necessary to divide this group into genera, based upon the characters of the orbits and external antennæ, the name *Pachygrapsus* should certainly have been retained for one of them. That RANDALL did not describe the structure of those parts in his two species,

* *Grapsus thukuhar*, Owen; *Goniograpsus thukuhar*, Dana; *Metopograpsus thukuhar*, Milne-Edwards, *Mélanges Carcinologiques*, p. 131.

is no reason for rejecting it,—this was not necessary in the definition of the group. As well might we reject the name *Grapsus* itself, because we cannot determine from LAMARCK's descriptions many characters now considered important. RANDALL's first-mentioned species, *P. crassipes*, which we may consider as typical, is closely allied to the Mediterranean *Grapsus varius*; having the internal suborbital lobe widely separated from the front, admitting the external antennæ within the orbit. It therefore belongs to M. EDWARDS's division *Leptograpsus*. *P. parallelus* will come under *Metopograpsus*, which genus seems to be the nearest ally of *Leptograpsus*, although M. EDWARDS places *Grapsus* between them. In fact, *M. thalukhar* might well be considered an intermediate species, for the suborbital lobe is here not quite joined to the front, although approximating closely to it.

PSEUDOGRAPSUS OREGONENSIS. Dana.

Pseudograpsus Oregonensis, DANA; *U. S. Exploring Expedition, Crust.* i. 334, Pl. XX. f. 6. MILNE-EDWARDS; *Mélanges Carcinologiques*, 157. STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88.

The *Pseudograpsi* are easily distinguished from the other *Grapsi* of this coast by the approximation of the inner margins of the outer maxillipeds, which, in the other forms, are widely separated by a rhomboidal space. The present species differs from the next in the hairiness of its feet. It is bluish-gray above, clouded anteriorly with patches of dark red dots; the feet, with the exception of the light-colored anterior pair, are sparsely dotted with red. The carapax is usually about an inch in length. The lanose spot on the hand is found in the male only.

This species occurs very abundantly on the muddy shores of sheltered bays, generally among pebbles and under stones about half-tide mark. It was found in Puget Sound, (Suckley;) Tomales Bay, (Samuels;) and in San Francisco Bay, (Ayres.)

Mus. Expl. Exped.; *Bost. Soc.*; *Phil. Acad.*; *Smithsonian*; *Acad. Petrop.*; *Paris.*

PSEUDOGRAPSUS NUDUS. Dana.

Pseudograpsus nudus, DANA; *U. S. Exploring Expedition, Crust.* i. 335, Pl. XX. f. 7. MILNE-EDWARDS; *Mélanges Carcinologiques*, 158. STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88.

This beautiful species may be at once recognized by the glossy smoothness of its feet. The posterior pair of feet are very short. It is of a dark purplish-red color above; the carpus and hand much lighter, and spotted. It grows to a large size;—the carapax of one specimen from Monterey measuring two inches in length, by two and two fifths in breadth. It has some resemblance to *Pachygrapsus crassipes*, which is found with it, but may be distinguished by the character of the maxillipeds and the nearly smooth tarsi. It is found among rocks at the mouths of bays, or on the open sea-coast, where the water is clear. Like the preceding it is a littoral species, and is often found near high-water mark. It was found in Puget Sound, (Expl. Exped.) Tomales Bay, (Samuels;) San Francisco Bay, (Stimpson;) and at Monterey, (Trowbridge and Taylor.)

Mus. Bost. Soc.; *Smithsonian*; *Acad. Petrop.*

Heterograpsus marmoratus, M. EDW. (*Cyclograpsus marmoratus*, WHITE,) is perhaps identical with *P. nudus*. If so, DANA's name has priority, as no description accompanies WHITE's name in the British Museum catalogue. It is said to be found at Sitka.

GECARCINUS QUADRATUS. De Saussure.

Gecarcinus quadratus, DE SAUSSURE; *Rev. et Mag. de Zool.* v. 360, Pl. XII. f. 2.

Mazatlan, (Verreaux.)

Mus. Phil. Acad.

PINNIXA FABÆ. Stimpson.

Pinnothera faba, DANA; *U. S. Exploring Expedition, Crust.* i. 381, Pl. XXIV. f. 4.

The large palpi of the external maxillipeds in this species indicate its affinity with the *Pinnixæ*. The male resembles *P. cylindrica*, (*Pinnotheres cylindricum*, SAY,) and is much smaller than the female, while the carapax is shorter and broader; its length bearing to its breadth the proportion, 1:1.8. The hands are very large, and of nearly the same shape as in the female, the finger being, however, considerably more curved.

♂ Length of carapax, 0.36 inch; breadth, 0.65.
♀ " " 0.69 " " 1.05.

Found in the large *Lutreria* of the Oregon coast. Puget Sound, (Expl. Exped.;) Shoalwater Bay, (Cooper.)

Mus. Smithsonian; Expl. Exped.

FABIA SUBQUADRATA. Dana.

Fabia subquadrata, DANA; *U. S. Exploring Expedition, Crust.* i. 382, Pl. XXIV. f. 5.

Distinguished from the preceding by its greater proportional length.

Puget Sound, (Expl. Exped.;) Farallone Is. (Trowbridge.)

Mus. Expl. Exped.; Smithsonian; Phil. Acad.

TRIBE OXYSTOMATA.

CALAPPA CONVEXA. De Saussure.

Calappa convexa, DE SAUSSURE; *Rev. et Mag. de Zool.* v. 362, Pl. XIII. f. 3.

Mazatlan, (Verreaux.)

LEUCOSILIA JURINII. Bell.

Guaia Jurinii, DE SAUSSURE; *Rev. et Mag. de Zool.* 1853, v. 365, Pl. XIII. f. 4.
Leucosilia Jurinii, BELL; *Trans. Linn. Soc.* xxi. 295, Pl. XXXII. f. 1.

Mazatlan, (Verreaux.)

Mus. Brit.

RANDALLIA. nov. gen.

Carapax ovalis, subglobosus, ferè lævis, politus, dentibus duobus posticè armatus. Regiones pterygostomiani angulati. Frons angustata sed crassa, in medio concava. Orbita trifissa. Fossæ antennariæ parvæ, obliquæ, altissimæ. Antennarum internarum articulus basalis operculiformis, fossam claudens et partem super-mobilem retractam antennæ celans. Epistoma ex comparatione ampla. Maxillipedes et pedes ut in *Persephonâ*.

The species upon which this genus is founded was placed in *Iliæ* by RANDALL, and in *Guaia* (*Persephona*) by GIBBES. Its characters will, however, exclude it from both of these genera, although it approaches closely to the latter in its general appearance. The following are its distinctive features. The carapax is not depressed, and is armed with but two teeth posteriorly; the surface is mostly smooth and ungranulated. Anterior extremity thick. Antennary fossæ small, oblique, and very deep. Basal article of internal antennæ somewhat expanded, operculiform, almost completely closing the aperture of the fossa when the antenna is retracted within it. The fossæ do not immediately border on the buccal margin as in *Persephona*, but are separated from it by a considerable space, so that the epistoma presents a greater surface than is usual in the family.

RANDALLIA ORNATA. Stimpson.

Plate XIX. f. 3.

Iliæ ornata, RANDALL; *Jour. Acad. Nat. Sci. Philad.* viii. 129.
Guaia ornata, GIBBES; *Proc. Am. Assoc.* 1850, p. 186.
Randallia ornata, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 85.

In this species there are generally a few granules on the stomachal region anteriorly, and on the intestinal poste-

riorly. There may be either several small granules or one large one only, on the margin between the posterior teeth.

Upper California, (Nuttall.)

Mus. Phil. Acad.; Smithsonian.

DECAPODA ANOMOURA.

TRIBE LITHODEA.

CRYPTOLITHODES TYPICUS. Brandt.

Plate XX.

Cryptolithodes typicus, BRANDT; *Bulletin physico-mathém. de l'Académie de St. Petersb.* 1849, vii. 175.

As BRANDT's description of this remarkable crab is unaccompanied by a figure, and very short,—the general characters of the clypeus, rostrum, and antennary appendix only being given,—I take the present opportunity of presenting figures, and a detailed description, drawn up from a specimen (a female) sent in a dried state to the Smithsonian Institution by Mr. Taylor of Monterey. As the dismemberment of this most rare and unique example would be by no means desirable, the details of the inner maxillipeds, and of some other less conspicuous appendages, cannot be here given.

The most striking characteristic in this species is the great development of the carapax, which forms a broad, thin shield, of very uneven surface, completely hiding the legs, antennæ, abdomen, and all the inferior parts of the body. These parts, therefore, which form a great portion of the bulk in most crabs, seem here, when viewed from below, to be placed in the bottom of a cup-like cavity. This arrangement would lead one to refer the species to the *Cryptopodiaceæ*, to which family however it has no resemblance in its other characters; the structure of the antennæ, the position of the eyes, and the concealment of the posterior pair of feet at once distinguishing it.

The superior surface of the carapax is raised into a high ridge along the median line, deeply sinuated between the stomachal and cardiac regions, the former of which is a little shorter and less prominent than the latter. The branchial regions are rather small, and much less prominent than the cardiac. The intestinal is continuous with the cardiac posteriorly. The wings or lateral portions of the shield are broadly expanded, subtriangular; their extremities covering the terminal joints of the third pair of feet extended. The surface is rugose at the prominent parts, but generally smoothish and ungranulated, although discolored and having a somewhat eroded appearance. The rostrum is lamelliform, rectangular, pointing downwards at an angle of about 60° with the horizontal axis;—its truncate extremity is still more deflected and slightly emarginate at the middle.

The arrangement of the eyes, antennæ, and other parts in the vicinity of the mouth, is generally similar to what we see in *Echidnocerus* and other genera of the family. The ocular peduncles are closely approximated at their base, and are rather long, allowing the eyes at their tips to be seen from above in the angle between the base of the rostrum and the anterior margin of the carapax, which constitutes the only vestige of an orbit. The internal antennæ are slender, inserted behind the base of the ocular peduncles, and much within the margin of the carapax; they are directed forward between the eyes, and terminate in a slender, hairy, multiarticulate flagellum, longer than the penultimate article, and not reaching the extremity of the rostrum. The external antennæ occupy the hiatus between the anterior margin of the almost vertical pterygostomial plates, and the exterior bases of the internal antennæ. Their second article is broadly expanded, and bears a lamelliform appendix which equals it in size, projecting much beyond it exteriorly, and reaching the margin of the carapax; both are of large size, and bear short, blunt hairs on their lower

or exposed surface, their upper sides being pressed against the carapax. The terminal flagellum is very long and slender, compressed, of nearly the same width throughout, and consists of about twenty-two articles, each bearing two clavate setæ.

The external maxillipeds are rather broad, and have their outer surfaces flattened, with sharp, projecting, lamellar edges. They resemble those of the *Brachyoura* much more closely than do those of other members of the tribe. The last two articles are, however, well developed. The basal article is of great width, expanded exteriorly, and bearing at its antero-internal angle the second, small, with bilobate inner margin; the third is elongated, and presents a triangular face. The surfaces of all these points are covered with the short, clavate hairs so peculiar in this species.

The feet of the first or anterior pair are very unequal in size, the right hand being much the larger. Their second and third joints bear a sharp longitudinal crest inferiorly, against which the margin of the hand rests when retracted; the second joint also bears a sharp compressed tooth above, near its articulation with the third, which also bears a still larger and more prominent tooth almost continuous with that on the second. The larger hand is broad, convex, with about six tuberculous ridges on the outer surface, and a strong projection above at the articulation of the short, stout finger, which is also ridged, and bears a crest above. The surface of contact between the thumb and finger is broad, with its margin scarcely dentate. The feet of the second, third, and fourth pairs, about equal in size, are strongly compressed, almost lamelliform, and sharply crested above for most of their length. Those of the fifth pair are concealed beneath the carapax, (or rather beneath the abdomen,) and are nearly the same in size and structure as in the other genera of the tribe. We may remark, however, that the three articles forming the terminal portion of these feet are of greater length and more slender than is usual;—

when drawn out they reach the fourth joint of the preceding pair.

The abdomen is flattened, and without spines or tubercles. In the female it is symmetrical externally, although provided with ovigerous legs on the left side only. The basal (second) article is undivided, arched, broad and concave. The three following each consist of a convex, quadrilateral, tergal piece, transversely ridged across the middle, and the lateral or epimeral pieces, which are placed obliquely, and are wider than long, with their margins raised, and their surface depressed. The sixth article is unprovided with epimeral pieces; it is longer than the preceding ones, of a trapezoidal shape, its sides joining the posterior edges of the epimera of the article next preceding; its broader terminal side is deeply sinuated for the reception of the seventh article. This latter is very small, triangular, and fits between the basal joints of the anterior pair of feet when the abdomen is in place.

The color was reddish beneath; above indistinct. The dimensions of the specimen above described are: length, 1.16; breadth, 1.85 inch. Proportion, 1:1.60. The dimensions of Brandt's specimen were: length, 1.33; breadth, 1.91 inch. Proportion, 1:1.43.

The Smithsonian specimen was found by Mr. Taylor on surf-washed rocks near low-water mark, on the beach of Monterey. It is desirable that other specimens should be secured and well preserved in spirits, in order that the anatomy, and particularly the arrangement of the branchiæ, and the structure of the lateral apodemes can be observed. It is obvious that this genus most strongly represents the *Brachyoura* in the section to which it belongs. The carapax, usually of moderate or small size in the *Anomoura*, is here developed to a degree unequalled in any of the higher Decapods, not excepting even *Cryptopodia* and *Ethra*. It is indeed the only instance in which the cephalo-thorax entirely conceals the feet; in all other genera the anterior pair at least being seen from above.

The specimen described by Brandt was taken by Wosnessenski on the coast of Upper California, and is in the Museum of the Academy of St. Petersburg.

CRYPTOLITHODES SITCHENSIS. Brandt.

Cryptolithodes Sitchensis, BRANDT; *Mélanges Biologiques*, i. 654.

Differs from the preceding in its smooth hands, and tridentate frontal margin of the rostrum.

Hab. Sitka.

PHYLLOLITHODES PAPILLOSUS. Brandt.

Phyllolithodes papillosus, BRANDT; *Bulletin phys.-mathém. de l'Académie de St. Pétersbourg*, 1849, vii. 175.
Petalocerus Bellianus, WHITE; *Proc. Zool. Soc.* 1856, 134.

I have with some doubt referred the curious *Lithodes* recently described by Mr. WHITE, to the *Phyllolithodes papillosus* of BRANDT. The descriptions, as far as they go, are in no respect inconsistent; but unfortunately for comparative investigation, the authors have for the most part described different parts of the crab. WHITE's figure is not yet published.

This species I have not met with.

Hab. Is. of Kadjak, (Wosnessenski;) Coast of California, (Lobb.)

Mus. of Prof. Bell; Acad. Petrop.

RHINOLITHODES WOSNESSENSKII. Brandt.

Rhinolithodes Wosnessenskii, BRANDT; *Bulletin phys.-mathém. de l'Académie de St. Pétersbourg*, 1849, vii. 174.

This may perhaps be the young of some other species.

Hab. Sitka, Kadjak, (Wosnessenski.)

Mus. Acad. Petrop.

ECHIDNOCERUS CIBARIUS. White.

Echidnocerus cibarius, WHITE; *Proc. Zool. Soc.* 1848, 47. Annulosa, Pl. II. III. *Brit. Mus. Cat. Crust.* 56.
Lopholithodes Mandtii, BRANDT; *Bulletin phys.-mathém. de l'Académie de St. Pétersbourg*, 1849, vii. 174.

The dimensions of the carapax in a specimen from Sitka are: length, 6.90; breadth, 8.35 inch.

The members of this remarkable genus are among the largest crabs known. They do not indeed cover so much space as do many of the *Maiaceæ* with their legs extended; but their carapax is nearly as large, and their weight greater than even in the *Macrocheira* of Japan. Specimens have been taken the weight of which exceeded seven pounds; the diameter of the carapax being over ten inches.

The species *E. cibarius* was found at the mouth of the Columbia by Sir George Simpson; and at Sitka by Wosnessenski, Trowbridge, and the North Pacific Expedition.

Mus. Brit.; Acad. Petrop.; Smithsonian.

ECHIDNOCERUS SETIMANUS. Stimpson.

Ctenorhinus setimanus, GIBBONS; *Proc. Cal. Acad. Nat. Sci.* i. 48, (1855.)
Echidnocerus setimanus, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88.

This species most closely resembles the preceding, and will perhaps prove the same when direct comparisons of specimens of the same age and sex can be instituted. I have before me a considerable number of specimens both of the Sitka and the California species, but those from the former locality are all males, and those from the latter, as it unfortunately happens, are all females. There are, however, some differences which may prove constant. In the Californian (female) specimens, the spines of the carapax, rostrum, feet, etc., are everywhere blunt, being rather tubercles than spines; the carapax is proportionally broader, and the greatest transverse diameter is at the large postero-lateral

tubercles, instead of at the first pair of antero-lateral teeth, (S of Dana.) In these females the characters of the abdomen usual in female *Lithodinae* are prominently shown, the terminal apex being turned considerably to the right of the median line of the body; there are no marginal plates on the left side, where the greater mass of the ova are placed, the ovigerous feet being wanting on the right side with the exception of that of the first pair.

The dimensions of three specimens are as follows:—

| Loc. | | Length of Carapax. | Width. | Proportion. |
|----------------|---|--------------------|------------|--------------|
| San Francisco, | ♀ | 4.72 inch. | 5.31 inch. | 1:1.13 inch. |
| " " | ♀ | 5.58 | 6.30 | 1:1.13 |
| ? (Gibbons) | ? | 10.00 | 10.25 | 1:1.03 |

All the specimens yet found were taken off the mouth of San Francisco Bay, and near the Farallone Rocks. They have been brought to the market of the city by fishermen, who are encouraged to preserve them when caught, by the high prices (from five to ten dollars) at which they are easily sold.

Mus. Cal. Acad.; North Pacific Expedition.

LITHODES SPINOSISSIMUS. Brandt.

Lithodes spinosissimus, BRANDT; *Bulletin phys.-mathém. de l'Académie de St. Pétersbourg*, 1849, vii. 173.

The members of the tribe *Lithodea* may easily be distinguished by the apparent want of the fifth pair of feet, which are very small, and always folded up over the back and concealed beneath the carapax. The present species may be recognized by the very numerous long sharp spines with which it is everywhere covered above.

Hab. Kadjak, (Wosnessenski.)

Mus. Acad. Petrop.

LITHODES BREVIPIES. Edwards et Lucas.

Lithodes brevipes, EDWARDS et LUCAS; *Archives du Museum*, ii. 463. Pl. XXIV-XXVII. BRANDT; *Bulletin phys.-mathém. de l'Acad. de St. Pétersb.* vii. 173. *Sibirische Reise, Zoologie*, i. 99.

In this species the feet are shorter than is usual in the genus, and there are few spines on the body, all of moderate length.

Hab. Unalashka, (Wosnessenski.)

Mus. Paris; Acad. Petrop.

LITHODES CAMTSCHATICUS. Latreille.

Lithodes Camtschaticus, LATREILLE; in *Cuvier's Regne Animal*, 2d ed. iv. 65. MILNE-EDWARDS; *Hist. Nat. des Crust.*, ii. 187. BRANDT; *Sibirische Reise, Zoologie*, i. 94.

Hab. Atcha, Unalashka, (Wosnessenski.)

Mus. Acad. Petrop.

TRIBE HAPALOGASTRINEA.

This remarkable tribe, although resembling much the *Porcellanidea* in general appearance, appears to be correctly placed between the *Lithodea* and the *Paguridea*. The distinguishing character consists in the structure of the abdomen, which, although broad and reflexed below the abdomen, is soft as in the hermit crabs; the basal and terminal articles only being provided with a hard coating. De Haan's *Lomis dentata* seems to belong to this tribe. The true *Lomis*, as described by Milne-Edwards, has a hard and crustaceous abdomen, as in *Lithodes* and *Porcellana*.

This tribe was first defined by BRANDT, the distinguished zoologist of St. Petersburg. He describes two species, both from the northwest coast of America. The most common crab found on the shores of Jesso, one of the Japanese

islands, belongs to this division. They live under flat stones, from half-tide to low-water mark, and represent the *Porcellanæ* of warmer latitudes.

DERMATURUS MANDTII. Brandt.

Dermaturus Mandtii, BRANDT; *Mélanges Biologiques*, i. 57.

Hab. Island of St. Paul.

Mus. Acad. Petrop.

HAPALOGASTER MERTENSII. Brandt.

Hapalogaster Mertensii, BRANDT; *Mélanges Biologiques*, i. 58.

Hab. Sitka, (Wosnessenski.)

Mus. Acad. Petrop.

TRIBE PORCELLANIDEA.

PORCELLANA EDWARDSII. De Saussure.

Porcellana Edwardsii. DE SAUSSURE; *Rev. et Mag. de Zool.* v. 366. Pl. XI. f. 3.

Carapax strigose; surface of hands scabrous; anterior margin of carpus in the first pair of feet, and of the third article in the remaining pairs, strongly toothed.

Hab. Mazatlan, (Verreaux.)

Mus. Paris.

PORCELLANA RUPICOLA. Stimpson.

Plate XIX. f. 2.

Porcellana rupicola, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 85.

Carapax moderately depressed; front triangular, considerably deflected, with a blunt extremity, and a notch or groove at the base separating it from the orbit. Surface of the feet and anterior half of the carapax scarcely rugose, with granules but slightly prominent. The portion of the

upper surface between the eyes is depressed, with a shallow median groove. Ocular peduncles broad; eyes small. Superior margin of orbit somewhat concave. External antennæ one and a half times as long as the carapax; flagella with few setæ, some of which are twice as long as the width of the flagellum. Anterior feet very large and broad; margins smooth; carpus scabrous on its infero-exterior surface, and conspicuously granulated above, along the slightly elevated ridge forming its outer margin, which terminates anteriorly in a tooth. The surface of the carpus near its somewhat projecting, rounded, postero-interior angle, is also granulated. Pincers smooth, with somewhat hooked extremities. Second, third, and fourth pairs of feet of moderate size; fourth joint with a slight ridge along the middle of the upper surface; fifth joint and tarsus provided with tufts of hair, which are most conspicuous in the fourth pair of feet, in which pair the fourth joint also has sometimes one or two small tufts near its extremity.

Color, dark purplish-red. Length of carapax in a male specimen, 0.85; breadth, 0.80; length of hand, 1.47; breadth, 0.64 inch.

Its affinities are with *P. valida*, *violacea*, and *granulosa*. It is easily distinguished from the preceding species by the smooth anterior margin of its carpus.

It is very common among the rocks of the Californian coast, preferring an open shore, with clear water. It is littoral in its habits, and is usually found at about half-tide mark. It was taken at the Farallones and at San Luis Obispo by Lieut. Trowbridge; at Monterey by Mr. Taylor.

Mus. Bost. Soc.; Phil. Acad.; Smithsonian.

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TRIBE PAGURIDEA.

EUPAGURUS MIDDENDORFFII. Brandt.

Pagurus (Eupagurus) Middendorffii, BRANDT; *Sibirische Reise, Zoologie*, i. 108.
Pl. V. f. 1.

Hab. Sitka, (Wosnessenski.)

Mus. Acad. Petrop.

EUPAGURUS SAMUELIS. Stimpson.

Eupagurus Samuelis, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 86.

Front acute at the middle. Outer antennæ articulated at the extreme antero-exterior corners of the carapax; extremity of terminal article of peduncle reaching much beyond the eyes; flagellum reaching the extremity of the larger hand. Anterior feet very unequal in size, the right being much the longer and stouter; carpus and hand granulated; larger hand nearly twice as long as broad; finger less than half as long as the hand, with a slight crest not conspicuously denticulated. Left hand narrower than its carpus, which has a slightly prominent double crest. Feet of the second and third pairs very slender, somewhat hairy; the right foot of the second pair longer than that of the first pair. Color yellowish. Length three fourths of an inch.

This is a very small species, found in shells of the genera *Nassa*, *Littorina*, etc. It most resembles *E. tenuimanus*, from which, however, it may be distinguished by its more oblong, non-cristate hand. From *E. Middendorffii* it differs in the more prominent granulation of its anterior feet, and the more numerous and smaller teeth on the inner margin of the thumb and finger.

It was taken in Tomales Bay, near low-water mark, by Mr. Samuels, to whom I have dedicated the species, as a memorial of his labors in this department of science. It is in the Museum of the Smithsonian Institution.

EUPAGURUS BERNHARDUS. Brandt.

Pagurus Bernhardus, FABR.; *Entom. Syst.* ii. 469.
Pagurus streblonyx, LEACH; *Mal. Pod. Brit.*, Pl. XXVI. f. 1.
Pagurus (Eupagurus) Bernhardus, BRANDT; *Sibirische Reise, Zoologie*, i. 106.
Bernhardus streblonyx, DANA; *Proc. Acad. Nat. Sci., Philad.* 1852, vi. 6.

This is an Arctic species, found on both shores of the continent.

Hab. Unalaschka, (Wosnessenski.)

Mus. Acad. Petrop.

Brandt's name *Eupagurus* has priority over *Bernhardus* of Dana by a few weeks only; the former appearing in a work the printing of which was finished (as appears from the reverse of title-page) Sept. 30, 1851; while Dana's name was presented at the Philadelphia Academy's meeting of the same date, and could not therefore have been printed until October.

EUPAGURUS MEERTENSII. Brandt.

Pagurus (Eupagurus) Mertensii, BRANDT; *Sibirische Reise, Zool.* i. 112.

Differs from *E. Bernhardus* in its longer and more slender chelæ.

Hab. Kadjak, Nootka Sound, and coast of Upper California, (Wosnessenski.)

Mus. Acad. Petrop.

EUPAGURUS TENUIMANUS. Stimpson.

Bernhardus tenuimanus, DANA; *U. S. Exploring Expedition, Crust.* i. 447.
Pl. XXVII. f. 7.

The hands in this species are very unequal; the larger one is short and broad, but thin, and granulose. Carapax and feet all without pubescence.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

EUPAGURUS ARMATUS. Stimpson.

Bernhardus armatus, DANA; *U. S. Exploring Expedition, Crust.*, i. 442.
Pl. XXVII. f. 2.

Distinguished by its spinulose feet, which, together with the carapax, are apparently destitute of hair.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

EUPAGURUS HIRSUTIUSCULUS. Stimpson.

Bernhardus hirsutiusculus, DANA; *U. S. Exploring Expedition, Crust.*, i. 443.
Pl. XXVII. f. 3.

Differs from *E. Mertensii* in its proportionably longer tarsi. Body everywhere hairy.

Hab. Dungeness, Puget Sound, (Expl. Exped.)

Mus. Expl. Expedition.

CLIBANARIUS TURGIDUS. Stimpson.

Plate XXI. f. 1.

Eupagurus turgidus, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 86.

Carapax rough, hairy, scabrous at the sides. Front broad, with an acute point at the middle, and one on either side, between the bases of the outer antenna and the peduncle of the eye. Antennæ very hairy; inner ones three fourths as long as the outer ones, which are shorter than the carapax. Eyes at the extremities of rather long, slender peduncles, reaching the extremity of the terminal joint of the peduncle of the outer antennæ. Chelopoda equal, rather short, covered above with short spines and tufts of long hair; hands short and very thick, strongly tumid below; finger about half as long as the hand; both finger and thumb with a few calcareous teeth near the base on the surface of contact, and a sharp, corneous, minutely denticulated

cutting edge near the extremity. Feet of the second and third pairs nearly equal; those on the right side sometimes slightly the longer; all spinulose and very hairy throughout their length. Tarsi much longer than the penult joint. Color yellowish, obscured by the hirsute covering; eye peduncles and internal antennæ with a longitudinal streak of crimson. Length about three inches.

It differs from *C. æquabilis* in its longer tarsi, greater size, and less variegated coloration. It may be distinguished from the other Oregon Paguri by its equal hands and hairy tarsi.

Found in large shells of the genera *Buccinum*, *Tritonium*, etc., in Puget Sound. The specimens described were collected by Dr. Suckley.

Mus. Smithsonian.

CLIBANARIUS ÆQUABILIS. Dana.

Clibanarius æquabilis, DANA; *U. S. Exploring Expedition, Crust.*, i. 464. Pl. XXIX. f. 4.
C. æqualis, DANA; *Proc. Acad. Nat. Sci. Philad.* 1854, vii. 175.

Hab. California, (Dr. Le Conte.)

Mus. of Prof. Dana.

TRIBE HIPPIDEA.

ALBUNEA LUCASII. De Saussure.

Albunea Lucasia, DE SAUSSURE; *Rev. et Mag. de Zool.* v. 367. Pl. XII. f. 4.

This species, according to M. DE SAUSSURE, differs from *A. symnista* in having the anterior margin of the carapax less sinuous, and in its long, styliform ocular peduncles, which are closely approximated at the base, leaving the angle between them very acute and narrow.

Hab. Mazatlan, (Verreaux.)

Mus. Phil. Acad.

BLEPHAROPODA OCCIDENTALIS. Randall.

Blepharopoda occidentalis, RANDALL; *Jour. Acad. Nat. Sci. Philad.* viii. 131. Pl. VI. GIBBES; *Proc. Am. Assoc.* 1850, p. 187.
Albumhippa occidentalis, DANA; *U. S. Exploring Expedition, Crust.* i. 404.

Blepharopoda is a well-marked genus first instituted by RANDALL in 1839; and subsequently named *Albumhippa* by MILNE-EDWARDS in the *Archives du Muséum d'Histoire Naturelle*, Vol. II. (1841.) The name *Blepharopus* occurs in Entomology; but this is scarce near enough to RANDALL's term to warrant its rejection.

Hab. San Diego, (Nuttall.)

Mus. Phil. Acad.

HIPPA ANALOGA. Stimpson.

Hippa emerita, DE SAUSSURE; *Rev. et Mag. de Zool.* v. 367.
Hippa talpoidea, DANA; *Proc. Acad. Nat. Sci. Philad.* 1854, vii. 175.
Hippa analoga, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 85.

In an examination of a great number of specimens of the common Californian *Hippa*, and a careful comparison of them with specimens from all parts of the eastern coast of the United States, I find differences which are so constant, that it is not difficult to determine at a glance, with regard to any specimen, whether it be from the eastern or western side of our continent. This being the case, I have been led to propose a new name for the western species.

It differs from *H. talpoidea* in the following characters. It is much broader,—the breadth of the carapax being to its length as 1 to 1.29; against 1:1.43 in *H. talpoidea*. It is more depressed, and the back is much less arched and convex, along the middle. In *H. talpoidea* the posterior margin of the carapax is concave on each side, and its postero-inferior corner forms a lobe-like projection; while in our species the margin is straight and forms no projection. In *H. talpoidea* the upper surface is rugose only toward the extremities,

chiefly the anterior one, while it is smooth in the middle;—in our species it is generally everywhere rugose, except at the postero-inferior wings, and much more so anteriorly than in the other species. In female individuals of equal length, the terminal segment of the abdomen is one sixth longer in *H. talpoidea* than in *H. analoga*. Finally there are slight differences in the details of the feet and antennæ, not as well marked, however, nor as constant as those of the carapax. One of the most prominent of these is in the spines of the acicle or appendicular scale of the outer antennæ, which in our species are somewhat longer, more slender, and more curved, than in the eastern one.

Compared with *H. emerita*, the teeth of the frontal margin of the carapax are found to be much less acute than in that species; the spines of the acicle are not as long, and are curved inward instead of outward.

It is of a bluish or cinereous color above, and yellowish-white below; the fringing hairs are mostly black. The dimensions of a female specimen from Tomales Bay are as follows: length of carapax, 1.19; breadth, 0.91.

It inhabits sandy beaches on the open coast.

Hab. Tomales Bay, (Samuels;) near San Francisco, (Trowbridge;) Monterey, (Taylor;) and Mazatlan, (Verreaux.)

Mus. Bost. Soc.; Phil. Acad.; Smithsonian; Paris; Acad. Petrop.

TRIBE GALATHEIDEA.

GRIMOTEA GREGARIA. Leach.

Galathea gregaria, FABR.
Grimotea gregaria, LEACH; *Dict. des Sci. Nat.* xviii. 50. OWEN; *Zool. of Beechey's Voy.* p. 87. See figure in DANA's Report on the Crustacea of the Exploring Expedition, Atlas, Pl. XXXI. f. 1.

A pelagic species, found swimming at the surface off the coast of California by the naturalists of the "Blossom."

Mus. Zool. Soc. of London.

DECAPODA MACROURA.

TRIBE THALASSINIDEA.

GEBIA PUGETTENSIS, Dana.

Plate XXI. f. 2.

Gebia Puggettensis, DANA; *U. S. Exploring Expedition, Crust.* i. 510, Pl. XXXII. f. 1.

Gebia Californica, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88.

The *Gebia* may be distinguished from the other fossorial Macrourea of this coast, by its rough, hairy rostrum, and equal anterior feet.

The thumb in this species (see the figure) is considerably curved, and bears on its inner side a strong tooth. This tooth is a prominent character in all the very numerous specimens in the Smithsonian Museum, but is obsolete in the specimen described by DANA, although actual comparison shows them to be the same. The species attains a large size, the dimensions of an Oregon specimen being as follows:—

| | |
|--------------------------------|-------------|
| Length of the animal | 4.00 inches |
| “ “ carapax | 1.38 “ |
| “ “ hand | 1.00 “ |
| Width “ carapax | .80 “ |
| “ “ abdomen | 1.05 “ |
| “ “ hand | .46 “ |

A curious parasitic bivalve, apparently new, both in genus and species, is frequently found adhering by its byssus to the inner surface of the abdomen of this crustacean. It approximates in character to the genus *Lepton*.

Gebia Pugettensis is found on the whole coast from Puget Sound to Monterey. It excavates its subterranean chambers in the sand and mud of beaches, near low-water mark, preferring that which is more or less indurated.

Mus. Bost. Soc.; *Phil. Acad.*; *Smithsonian*; *Expl. Exped.*; *Acad. Petrop.*

CALLIANASSA GIGAS. Dana.

Plate XXI. f. 3.

Callianassa gigas, DANA; *U. S. Exploring Expedition, Crust.* i. 512.

Pl. XXXII. f. 3.

The *Callianassa*, like the *Gebia*, lead a subterranean life, and by these are formed the numerous holes, half an inch or more in diameter, which may be observed on most sandy beaches. They may be distinguished by their thin, soft shell, and smooth, glossy carapace. One of the hands is invariably much larger than the other, and this may be either the right or left in the same species. In *C. gigas* the larger hand is remarkably short and stout. Length, often five inches.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

CALLIANASSA CALIFORNIENSIS. Dana.

Plate XXI. f. 4.

Callianassa Californiensis, DANA; *Proc. Acad. Nat. Sci. Philad.* 1854, vii. p. 175.

Callianassa occidentalis, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88.

Eye-peduncles subtriangular, closely approximated at their bases, but diverging and curving a little upward at their pointed tips. Length of the external antennæ two thirds that of the body. The larger of the anterior feet is smooth and glossy on the sides, and ciliate along the edges. Hand broadest at the base, but little longer than the carpus and much less in breadth. A considerable hiatus intervenes between the fingers when closed, and between their bases

arises a small but prominent blunt tooth, which curves upward. Movable finger half as long as the hand, with hooked extremity; inferior edge swelling out near the base, and minutely denticulated. Both fingers hirsute with scattered tufts of hair. Color of the body a delicate orange; anterior feet rose-colored. Length, three inches. The proportional dimensions as compared with the other species, will be given in the table under *C. longimana*. In this species, I have seen only one case in which the left hand is the larger.

Hab. San Francisco Bay, near its mouth, (Trask;) Fort Steilacoom, Puget Sound, (Suckley.)

Mus. Smithsonian; Cal. Acad.

CALLIANASSA LONGIMANA. Stimpson.

Plate XXI. f. 5.

Callianassa longimana, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 86.

A slender species, closely allied to the preceding, from which it may be distinguished by the following characters: It is more slender and elongated, and grows to a larger size, being often four inches in length. The outer maxillipeds are less broad. The larger foot of the anterior pair, (see figure,) which is most frequently on the left side, is more slender and less hairy than in the preceding species, with the hand much longer and of equal breadth with the carpus. In our species the carpus is shorter than the *body* of the hand, while in *C. Californiensis* it is longer. In the smaller chelopod, the fingers are of equal length in our species, while in *C. Californiensis* the finger exceeds the thumb in length. With *C. gigas* our species would never be confounded on account of the great difference in the length of the hand. The three species resemble each other very much, however, in general appearance and characters other than those derived from the chelopoda. The following table will show their relative proportions:—

| | <i>C. gigas.</i> | <i>C. Californiensis.</i> | <i>C. longimana.</i> |
|--|------------------|---------------------------|----------------------|
| Length of the body from anterior extremity of carapax to end of caudal segment | 1. | 1. | 1. |
| Length of carapax | .24 | .28 | .24 |
| Breadth of do. | .16 | .21 | .16 |
| Breadth of abdomen at 3d segment | .20 | .22 | .19 |
| Length of caudal segment | .10 | .13 | .11 |
| Length of larger chelopod | .55 | .81 | .70 |
| “ “ brachium | .12 | .18 | .12 |
| “ “ carpus | .11 | .24 | .15 |
| “ “ body of hand | .12 | .13 | .16 |
| “ “ finger | .06 | .14 | .12 |

C. longimana was found in considerable numbers at Fort Steilacoom, Puget Sound, by Dr. Suckley.

Mus. Bost. Soc.; Phil. Acad.; Smithsonian.

TRIBE ASTACIDEA.

PANULIRUS INTERRUPTUS. Stimpson.

Panulirus interruptus, RANDALL; *Jour. Acad. Nat. Sci. Philad.* viii. 137.
GIBBES; *loc. cit.* p. 194.
Panulirus interruptus, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 88.

This is the common “lobster” of the San Francisco market; and is the *langouste* of the French. It inhabits rocky ledges in rather deep water, and is taken in considerable numbers by the fishermen at Santa Barbara and other ports on the coast south of San Francisco. North of this point it is never found. The traps, or “pots” used in their capture are similar to those in which lobsters are taken on the New England coast, consisting of a strong wooden basket, with a funnel-shaped entrance projecting inwards. The bait used, however, is generally meat of some kind rather than fish.

Mus. Phil. Acad.; Smithsonian.

A species of *Panulirus* in the British Museum is said to have been brought from Sitka,—a very high latitude for this genus, if the locality is correct. It is catalogued as *P. sulcatus*, which is an East Indian species.

ASTACUS GAMBELII. Agassiz.

Cambarus Gambelii, GYRARD; *Proc. Acad. Nat. Sci. Philad.* 1852, vi. 90.
Astacus Gambelii, AGASSIZ; *Proc. Acad. Nat. Sci. Philad.* 1853, vi. 375.

This species may be distinguished by the partly pilose upper surface of its chelæ, and the convex serrated margins of its rostrum, which has no distinct antero-lateral teeth or angles.

Hab. California, (Gambel.)

Mus. Phil. Acad.; Smithsonian.

ASTACUS NIGRESCENS. Stimpson.

Astacus nigrescens, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 87.

Rostrum concave above; margins nearly parallel, denticulated with five or six small sharp spines on either side. Thoracic spines of the anterior pair rather long; a pair of minute spines between them and the posterior pair. Dorsal area between the branchial regions about as wide as in *A. Gambelii*. Hands smaller and less broad than in the preceding species; surface without pubescence. The sides of the abdominal segments (lateral projections of the dorsal arch) are sharply triangular. Color blackish. The following are the dimensions of a male specimen:—

| | |
|--|-------------|
| Length of body | 3.10 inches |
| “ carapax | 1.60 “ |
| Width of “ | .83 “ |
| Length of rostrum | .40 “ |
| “ terminal of spine of rostrum | .15 “ |
| “ hand | 1.25 “ |
| Width of “ | .45 “ |

Hab. California. My specimens were purchased in the market of San Francisco.

Mus. Smithsonian.

ASTACUS LENIUSCULUS. Dana.

Astacus leniusculus, DANA; *U. S. Exploring Expedition, Crust.* i. 524.
Pl. XXXIII. f. 1.

May be recognized by its well-developed thoracic spines, and light color.

Hab. Columbia River, (Expl. Exped.;) Puget Sound, (Expl. Exped., and Dr. Suckley.)

Mus. Expl. Exped.; Smithsonian.

ASTACUS TROWBRIDGII. Stimpson.

Astacus Trowbridgii, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 87.

This large species has a general resemblance to *A. leniusculus*. It differs from that species in having much less prominent thoracic spines, the posterior pair of which is here but little developed, even in adult specimens. The rostrum is also somewhat shorter and broader than in the preceding species, with smooth, nearly parallel sides; terminal tooth of moderate length; antero-lateral teeth sufficiently prominent. Dorsal area broader than in *A. Gambelii*, but narrower than in *A. leniusculus*. Hands large, robust, equal in size; surface rough; fingers spinulose. A prominent sharp spine on the superior edge of the brachium near its extremity.

This species is of a reddish-olive color in preserved specimens, probably much darker in life. The color of the chelæ is much darker than that of the body. The dimensions of a male specimen are as follows:—

| | |
|---------------------------------------|-------------|
| Length of body | 4.80 inches |
| Breadth “ | 1.30 “ |
| Length of rostrum | .50 “ |
| “ terminal tooth of rostrum | .18 “ |
| “ hand | 2.60 “ |
| Breadth of “ | 1.15 “ |

This species was found abundantly near Astoria by Lieut. Trowbridge. It occurs sometimes in brackish water, as I am informed by Dr. Cooper.

Mus. Bost. Soc.; Smithsonian; Paris; Acad. Petrop.

ASTACUS KLAMATHENSIS. Stimpson.

Astacus Klamathensis, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 87.

A small species with a smooth carapax; thorax somewhat contracted in front. Thoracic spines of the anterior pair very small; those of the posterior pair obsolete. Rostrum small; margins smooth, converging; antero-lateral teeth sufficiently distinct; terminal tooth short. Dorsal area broad. Anterior feet with rather small, smoothish hands; inferior edge of arm less strongly dentated than in the other species. Sides of the abdominal segments broadly rounded, scarcely at all angular at the middle. The minute lateral spines of the caudal segment are rather short and stout. Color, in preserved specimens, yellowish-white, clear and bright; hand slightly tinted with olive or bluish. The dimensions of a female specimen are as follows:—

| | |
|---------------------------------------|-------------|
| Length of body | 3.00 inches |
| “ carapax | 1.38 “ |
| “ rostrum | .29 “ |
| “ terminal tooth of rostrum | .10 “ |
| “ hand | .90 “ |
| Breadth of “ | .40 “ |

It may be distinguished from the preceding species by its lighter color, shorter and somewhat tapering rostrum, less developed spines, and smaller hands. It was found in Klamath Lake by Dr. Newberry.

Mus. Smithsonian

ASTACUS OREGANUS. Randall.

Astacus Oregonus, RANDALL; *Jour. Acad. Nat. Sci. Philad.* viii. 138, Pl. VII. ERICHSON; *Archiv für Naturgeschichte*, 1846, i. 375.
Cambarus Oregonus, GIRARD; *Proc. Acad. Nat. Sci. Philad.* 1852, vi. 87.

Dr. RANDALL's single specimen of this species was unfortunately lost by the artist employed in delineating it. No other example has since been found, although its locality has been since repeatedly searched. If the figure in the eighth volume of the Journal of the Philadelphia Academy is correct, this is a very remarkable species, differing from all others known, in possessing a median thoracic spine as well as in the length of the terminal rostral tooth; and above all in the singular lateral appendages of the abdominal segments.

Hab. Columbia River, (Nuttall.)

NEPHROPS OCCIDENTALIS. Randall.

Nephrops occidentalis, RANDALL; *Jour. Acad. Nat. Sci. Philad.* viii. 139. GIBBES; *Proc. Am. Assoc.* 1850, p. 195.

This curious lobster-like crustacean may be recognized by the three rows of spines on the dorsal surface of the carapax. It is a marine species, and grows to a length of six inches. It was found on the "West Coast of America," by NUTTALL. The fine specimen in the cabinet of the Philadelphia Academy is the only one yet known.

TRIBE CARIDEA.

CRANGON FRANCISCORUM. Stimpson.

Plate XXII. f. 5.

Crangon Franciscorum, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* 1856, i. 89.

This species is more slender and depressed than is usual in the genus. Rostrum small, subtriangular, rounded in front. Spines of the thorax nearly as in *C. vulgaris*. Hand

large, (see figure,) with an oblique palm, more nearly longitudinal than transverse, occupying nearly one third of the length of its inner side; thumb-like process long and spiniform. Sternal spine long, and followed by two or three sharp tubercles on the succeeding thoracic segments. A small sharp spine on each side of the abdomen at the supero-lateral angle of the antepenultimate segment. Caudal segment long, slender, and pointed, smoothly rounded above. Color light and dark yellowish-gray, mottled. Eyes salmon-colored in life. Length about three inches.

The peculiar character of the hand in this species will enable it to be readily distinguished from all others.

This is the common shrimp of the San Francisco market. It is found very abundantly in the sandy coves around the Bay, is perhaps the most valuable crustacean of this coast, for besides being used as food, it is the common, and almost the only bait with which fish of all kinds are taken.

Among other localities in which this species has been found, the following may be mentioned: Puget Sound, (Suckley;) Shoalwater Bay, (Cooper;) Tomales Bay, (Samuels;) and Monterey, (Taylor.)

Mus. Bost. Soc.; Phil. Acad.; Smithsonian; Paris; Acad. Petrop.

CRANGON NIGRICAUDA. Stimpson.

Plate XXII. f. 6.

Crangon vulgaris, OWEN, (non FABR.) *Zool. of Beechey's Voyage*, p. 87. DANA, *U. S. Exploring Expedition, Crust.* i. 536, ii. 561.
Crangon nigricauda, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 89.

This species resembles very closely the common shrimp of Europe and of the Northern United States. It differs, however, from that species in its broader carapax, its slightly smaller, and comparatively shorter hand, and more pointed caudal segment, which has also a shallow longitudinal furrow along the upper surface. The antepenultimate abdom-

inal segment exhibits a rather sharp ridge along the dorsal edge, which is not perceptible in *C. vulgaris*. These differences are indeed very slight, but they are nevertheless constant, and taken together with the remoteness of the geographical limits of the two forms, they seem to indicate with certainty a specific diversity.

The color of our species is a very dark gray, or blackish, becoming entirely black at the tail. Hands tinted with lilac. The hand (see figure) is very different from that of *C. Franciscorum*, but even without reference to this character, the black tail will enable any one readily to pick out specimens of this species from the heaps of the common kind which may be seen on every fish-stand in the market.

C. nigricauda is much less abundant in San Francisco Bay than the preceding species, and is found in deeper water. It occurs in Puget Sound, (Exploring Expedition;) at the mouth of the Columbia, (Trowbridge;) Tomales Bay, (Samuels;) and at Monterey, (Capt. Beechey.)

Mus. Bost. Soc.; Phil. Acad.; Smithsonian; Expl. Exped.; Paris; Acad. Petrop.; R. C. S.; Zool. Soc.

CRANGON MUNITUS. Dana.

Crangon munitus, DANA; *U. S. Exploring Expedition, Crust.* i. 536. Pl. XXXIII. f. 5.

Remarkable for the four strong spines with which its carapax is armed on the superior surface.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

PARACRANGON ECHINATUS. Dana.

Paracrangon echinatus, DANA; *U. S. Exploring Expedition, Crust.* i. 538. Pl. XXXIII. f. 6.

With the hands of a *Crangon* this species resembles

Hippolyte in its long elevated rostrum and inflexed abdomen. The carapax is everywhere spinous.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

ATYA SCABRA. Leach.

Atya scabra, LEACH; *Zool. Miscel.* v. iii. Pl. CXXXI. MILNE-EDWARDS; *Hist. Nat. des Crust.* ii. 348. Pl. XXIV. f. 15-19. NEWPORT; *An. and Mag. Nat. Hist.* 1847, nix. 159.

Atya Mexicana, WIEGMANN; *Archiv für Naturgeschichte*, 1836, i. 145.

The specimens in the Museum of the Smithsonian Institution from the fresh waters of Western Mexico agree in all their characters with the description given by WIEGMANN of his *A. Mexicana*, while they are exactly represented by the published figures of *A. scabra*. Under these circumstances, I have ventured to cite WIEGMANN'S name as a synonym. MILNE-EDWARDS considers *A. scabra* to be a marine form, but there is great doubt that any species of the genus is found in the sea.

Hab. Misantla, (Deppe;) Western Mexico, (Mus. Smithsonian.)

Mus. Phil. Acad.; Smithsonian; Paris; Berlin; Brit. Mus.

HIPPOLYTE AFFINIS. Owen.

Hippolyte affinis, OWEN; *Zool. of Beechey's Voyage*, 90, Pl. XXVII. f. 4.

Hab. Monterey, (Capt. Beechey.)

Mus. R. C. S.; Zoöl. Soc.

HIPPOLYTE LAMELLICORNIS. Dana.

Hippolyte lamellicornis, DANA; *U. S. Exploring Expedition, Crust.* i. 567. Pl. XXXVI. f. 6.

This species is very closely allied to *H. Ochotensis*, BRANDT, and to *H. affinis*, OWEN. From the latter it appears to differ in wanting teeth on the inferior side of the rostrum.

Hab. Straits of De Fuca, (Expl. Exped.)

Mus. Expl. Exped.

HIPPOLYTE LAYI. Owen.

Hippolyte Layi, OWEN; *Zool. of Beechey's Voyage*, 90, Pl. XXVII. f. 3. BRANDT; *Sibirische Reise, Zool.* i. 117.

In this and the succeeding species the rostrum is much longer than in any other herein mentioned, often exceeding three fourths that of the thorax. Only two or three of the dorsal teeth belong to the thorax proper, and the posterior one of these is at about the anterior third of its length.

Hab. Monterey, (Capt. Beechey.)

Mus. R. C. S.; Zoöl. Soc.

HIPPOLYTE SITCHENSIS. Brandt.

Hippolyte Sitchensis, BRANDT; *Sibirische Reise, Zool.* i. 116, Pl. V. f. 18.

This differs from *H. Layi*, in having a smaller number of larger and more crowded teeth on the rostrum, but it is probably only a variety.

Hab. Sitka, (Brandt;) Monterey, (A. S. Taylor.)

Mus. Acad. Petrop.

HIPPOLYTE PALPATOR. Owen.

Hippolyte palpator, OWEN; *Zool. of Beechey's Voyage*, 89, Pl. XXVII. f. 3. BRANDT; *Sibirische Reise, Zool.* i. 117. STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 89.

This species may be determined by its rather slender form, small rostrum, and very long outer maxillipeds. The dorsal crest is six-toothed above, the posterior tooth being just in front of the middle of the thorax. The rostrum is very slender, about one fourth as long as the thorax, and tapers to a sharp, sometimes bifid, extremity.

Hab. Monterey, (Capt. Beechey.)

Mus. R. C. S.; Zoöl. Soc.

HIPPOLYTE BREVIROSTRIS. Dana.

Hippolyte brevirostris, DANA; *U. S. Exploring Expedition, Crust.* i. 566. Pl. XXXVI. f. 5. STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 89.

Some individuals of this species approach so closely to *H. palpator*, that I am half inclined to consider it as a variety. Both are characterized by having greatly elongated outer maxillipeds, two subocular teeth on the margin of the carapax, and large thoracic dorsal teeth; the posterior one near the middle of the thorax. *H. brevirostris* is apparently a more robust species; the rostrum is generally shorter, and has fewer teeth; and the shield of the second abdominal segment is much larger than that of *H. palpator* as figured by OWEN. The slender flagellum of the internal antennæ is generally scarcely longer than the stout one. Posterior feet moderately spinulose. Basal joints of outer maxillipeds with serrated margins. Color, uniform light crimson or scarlet.

Hab. Straits of De Fuca, (Expl. Exped.) San Francisco Bay, (W. S.)

Mus. Expl. Exped.; Phil. Acad.; Smithsonian.

HIPPOLYTE TAYLORI. Stimpson, n. s.

In this species the rostrum is exceedingly short, consisting only of the small terminal tooth of the dorsal crest, and projecting scarcely beyond the anterior margin of the thorax. This dorsal crest is serrated with six teeth, including the terminal one. The posterior tooth is at the middle of the thorax; and the second and third (from the front) are rather above than behind the first, which is much the smallest. There is a single sharp spine beneath the eye, but hardly a vestige of another beneath this. The feet of the first pair are very stout; those of the second pair reach the tips of the maxillipeds. This species is more slender than the

preceding, and is further distinguished by the extreme shortness of the rostrum.

Found at Monterey, by Alexander S. Taylor, Esq., to whom this species is dedicated in recognition of his services in enriching our collections with new forms of Californian animals.

Mus. Smithsonian.

PANDALUS PUBESCENTULUS. Dana.

Pandalus pubescentulus, DANA; *U. S. Exploring Expedition, Crust.* i. 568. Pl. XXXVI. f. 8.

Rostrum seven-toothed below, and, including the dorsal ridge, seventeen-toothed above; teeth small; apex of rostrum bifid. Surface minutely pubescent.

The *Pandalia* may be distinguished from the *Hippolytes* by their non-chelate anterior feet.

P. pubescentulus is known only by the excellent figures and description of DANA, drawn from specimens collected in the Straits of De Fuca, by the Exploring Expedition, in the Museum of which they are deposited.

PANDALUS BOREALIS. Kroyer.

Pandalus borealis, KROYER; *Tidsskrift*, 1838, ii. 254. BRANDT; *Sibirische Reise, Zool.* i. 122.

This species is common to the boreal waters of both oceans.

Hab. Unalaschka, (Wosnessenski.)

Mus. Acad. Petrop.

PANDALUS PLATYCEROS. Brandt.

Pandalus platyceros, BRANDT; *Sibirische Reise, Zool.* i. 123.

Hab. Unalaschka, (Wosnessenski.)

Mus. Acad. Petrop.

PANDALUS HYP SINOTUS. Brandt.

Pandalus hypsinotus, BRANDT; *Sibirische Reise*, i. 125.

Hab. Unalashka, (Wosnessenski.)

Mus. Acad. Petrop.

The preceding four species appear to resemble each other closely, and may perhaps be reduced to two upon more careful examinations of numerous individuals. Having no specimens of any of them, I have preferred to follow previous authors rather than to attempt identifications from descriptions alone.

PANDALUS DANE. Stimpson.

Pl. XXI. f. 6, 7.

Pandalus Danae, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 87.

Thorax glabrous. Twelve teeth on the superior edge of the rostrum, including the dorsal crest, the posterior one being at about the middle of the carapax. Rostrum smooth above near its trifid apex, and six-toothed below, the basal tooth being large and much curved. Feet spinulose; the spinules on the third joints few and distant. Length two and five tenths inches.

This species differs from all of those above mentioned in the much smaller number of teeth on the dorsal crest. The trifid apex is also quite characteristic.

Dredged opposite Fort Townsend, in Puget Sound, by Capt. Murden, of the cutter "Jefferson Davis." This, with several other species of great interest, were forwarded by Dr. Suckley.

Mus. Smithsonian; Phil. Acad.

PALEMOM BRACHYDACTYLUS. Wiegmann.

Palemom brachydaetylus, WIEGMANN; *Archiv für Naturgeschichte*, 1836, i. 148.

Inhabits the fresh waters of Western Mexico.

Mus. Berlin.

PALEMOM HETEROCHIRUS. Wiegmann.

Palemom heterochirus, WIEGMANN; *Archiv für Naturgeschichte*, 1836, i. 149.

This is another of the large fresh-water shrimps of Mexico. They frequently attain a length of two feet, including that of the chelopoda, which are at least as long as the body.

Mus. Berlin.

STOMAPODA.

SQUILLA DESAUSSUREI. Stimpson.

Squilla scabricauda, DESAUSSURE, (non LATR.) *Rev. et Mag. de Zool.* v. 367.

Hab. Mazatlan, (Verreaux.)

Mus. of M. Verreaux, Paris.

ISOPODA.

IDOTEA CONSOLIDATA. Stimpson.

Idotea consolidata, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 89.

Body convex, broadest at the fourth thoracic segment. First four segments of thorax larger in every dimension than the last three, each bearing an umbo near the lateral margin, which is turned up a little. A sharp, slightly elevated transverse ridge across the thorax on each segment near its posterior margin. No distinct epimeral sutures. Abdomen convex, formed of a single piece, with a slight transverse impressed line, indicating the partial separation of an anterior segment; it is narrowed toward the posterior extremity, which is terminated by a slight concavity. Head emarginate at the middle in front; cephalic suture distinct, separating a small segment from the posterior part of the head; eyes strongly convex, laterally projecting; a prominent minute tubercle just in front of each eye. External antennæ half as long as the body; flagellum with ten

oblong joints. Internal antennæ reaching to the fourth joint of the peduncle of the external ones. Feet slender, slightly pilose, with rather long hairs; their terminal joints elongated. Color in one specimen opaque whitish; in another, reddish and brownish, mottled. Length, 0.4; breadth, 0.18 inch. Taken on a sandy bottom in ten fathoms, in the Bay of San Francisco near its entrance.

Mus. N. P. Expl.

IDOTÆA WOSNESSENSKII Brandt.

Idotæa Wosnessenskii, BRANDT; *Sibirische Reise, Zool.* i. 146.
Idotæa hirtipes, DANA; *U. S. Exploring Expedition, Crust.* ii. 704. Pl. XLVI. f. 6.
Idotæa Oregonensis, DANA; *Proc. Acad. Nat. Sci. Philad.* 1854, vii. 175.

An exceedingly common species, of a dark green color, found among sea-weeds on rocky or stony shores between high-water and half-tide marks.

Hab. Atcha and Sitka, (Wosnessenski;) Puget Sound, (Suckley,) "Oregon," (Expl. Exped.;) Shoalwater Bay, (Cooper;) Upper California, (Wosnessenski, Le Conte;) San Francisco Bay, (Stimpson.)

Mus. Acad. Petrop.; Paris; Expl. Exped.; Smithsonian; Phil. Acad.; Bost. Soc.

IDOTÆA MEDIA Dana.

Idotæa media, DANA; *Proc. Acad. Nat. Sci. Philad.* vii. 175.

Differs from the preceding species in having a comparatively longer abdomen.

Hab. California, (Le Conte.)

Mus. of Prof. Dana.

IDOTÆA RESECATA Stimpson.

Pl. XXII. f. 7.

Idotæa rescata, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 88.

Body slender, convex along the middle above; thorax flat or even concave below. Greatest breadth at the sixth

thoracic segment. Abdomen subrectangular, broadest anteriorly, nearly twice as long as broad, and equalling in length the four preceding thoracic segments taken together; its sides slightly concave; posterior extremity with a deep concavity, terminating on either side in a sharp angular projection or tooth. First and second segments of the abdomen sufficiently well marked, the third also distinct on the sides:—the three occupying the anterior third of the length of the abdomen. Outer antennæ reaching the fourth thoracic segment; peduncle rather stout; flagellum 17-articulate. Basal article of inner antennæ greatly expanded, suborbicular. The opercular (first) pair of abdominal feet are broad, with the terminal joint square. Inner sides of ambulatory feet with short setæ. Color greenish yellow, with a median line of dark-red. Length, 1.7; breadth, 0.33 inch. Proportion of breadth to length, 1:5.15.

This species resembles the Mediterranean *I. hectica* in general appearance, and is not liable to be confounded with any other species found on our western coast.

The only specimen known was dredged in the Straits of DeFuca, opposite Fort Townsend, by Capt. Murden.

Mus. Smithsonian.

STENOSOMA GRACILLIMUM Dana.

Stenosoma gracillimum, DANA; *Proc. Acad. Nat. Sci. Philad.* 1854, vii. 175.

Hab. California, (Le Conte.)

Mus. of Prof. Dana.

SPHERILLO AFFINIS Dana.

Spherillo affinis, DANA. *Proc. Acad. Nat. Sci. Philad.* 1854, vii. 176.

A terrestrial species found in California by Dr. Le Conte.

Mus. of Prof. Dana.

PORCELLIO GEMMULATUS. Dana.

Porcellio gemmulatus, DANA; *U. S. Exploring Expedition, Crust.* ii. 725.
Pl. XLVII. f. 7. *Proc. Acad. Nat. Sci. Philad.* vii. 176.
Philoscia tuberculata, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 89.

This little wood-louse is somewhat variable in many of its characters. The dorsal granulation is coarser in some specimens than in others, and often shows no tendency to arrangement in rows. The spines of the feet of the second pair are simple in some specimens. A comparison of many individuals convinced me of the identity of my *Philoscia tuberculata* with the species previously described by DANA.

Hab. Oregon, (Expl. Exped.); "California," (Le Conte); San Francisco, (Expl. Exped. and N. P. Exped.)

Mus. Expl. Exped.; N. P. Exped.

STYLONISCUS GRACILIS. Dana.

Styloniscus gracilis, DANA; *Proc. Acad. Nat. Sci. Philad.* vii. 176.

Hab. California, (Le Conte.)

Mus. of Prof. Dana.

ALLONISCUS PERCONVEXUS. Dana.

Alloniscus perconvexus, DANA; *Proc. Acad. Nat. Sci. Philad.* vii. 176.

Hab. California, (Le Conte.)

Mus. of Prof. Dana.

Both the above species, like the two preceding them, are terrestrial.

LYGIA OCCIDENTALIS. Dana.

Lygia occidentalis, DANA; *U. S. Exploring Expedition, Crust.* ii. 742.
Pl. XLIX. f. 7.—*Proc. Acad. Nat. Sci. Philad.* vii. 176.

The *Lygiæ* are isopoda of rather large size, and nearly amphibious habits, generally found running about with

great velocity among the stones or debris of shores after the retreat of the tide. They are never found elsewhere than in close proximity with water, which may be either salt, brackish, or fresh. *L. occidentalis* was originally discovered on the banks of the Sacramento River, by Dr. Pickering of the Exploring Expedition, and has since been found in various parts of California.

LYGIA DILATATA. Stimpson.

Pl. XXII. f. 8.

Lygia dilatata, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 88.

Body variable in its proportions, but usually very broad; the proportion of the breadth to the length being often 1:1.5. Surface granulated. Margins of the articulations raised or thickened, and smooth. Head with a transverse ridge between the eyes, interrupted at the middle. External antennæ not very slender, reaching the sixth thoracic segment; flagellum consisting of fourteen scarcely oblong joints. Caudal appendages, very short, generally not more than one fifth the length of the body, often even shorter; basal joint or peduncle as broad as long, with a sharply produced angle exterior to the insertion of the stylets, the inner one of which is provided with a terminal bristle as in *L. occidentalis*. Color blackish.

Young specimens are much less broad than the adults, as the breadth increases with growth much faster than the length. It is at first difficult to conceive how they can belong to the same species, but a careful examination of specimens of all ages shows this to be the case. The dimensions of two specimens are as follows:—

| | | | | | |
|--------|-------------------|------|--------------------|------|-------|
| Adult, | length, | 1.42 | breadth, | 0.96 | inch. |
| Young, | " | 0.98 | " | 0.45 | " |

Found in considerable numbers in the summer of 1856, at Fort Steilacoom, Puget Sound, by Dr. George Suckley, a gentleman to whose assiduous and successful researches in the field of natural science we are indebted for many

most interesting additions to the fauna of Washington Territory.

Mus. Smithsonian.

LIVONECA VULGARIS. Stimpson.

Pl. XXII. f. 9.

Livoneca vulgaris, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 88.

This is the common fish-louse of the San Francisco market. It is variable in shape, often distorted, and frequently abruptly widened at the fifth thoracic segment. Head small, wider than long; inner antennæ somewhat shorter and stouter than the outer or posterior ones. Epimeral pieces narrow, separated from the tergal piece in the anterior segments by a distinct suture, in the posterior segments by a deep incision; the point reaching the margin of the tergum in the anterior four segments, and not extending much beyond it in the posterior three. Posterior thoracic segment deeply sinuated for the reception of the middle portion of the anterior abdominal segments. Lamelliform caudal segment always transverse in the adult. Color yellowish gray; posterior pair of false feet always black. Length, 1.5; breadth, 0.9 inch. It resembles *L. Desmarestii* in general appearance.

Parasitic on fish of several kinds. Tomales Bay, (Samuels;) San Francisco Bay, (Stimpson;) Monterey, (Trowbridge.)

Mus. Smithsonian; Bost. Soc.

ÆGA MICROPHTHALMA. Dana.

Æga microphtalma, DANA; *Proc. Acad. Nat. Sci. Philad.* 1854. vii. 176.

Hab. "California," (Le Conte;) Monterey, (Taylor.)

Mus. Smithsonian.

The body in this species is generally considerably broader in the young than in the adult. Upper surface covered with

a short pubescence. Head and first three thoracic segments sculptured with impressed lines parallel to the margin. All the thoracic segments except the first are provided with large sculptured epimera; those of the first two pairs smaller in size, with two submarginal impressed lines; those of the posterior five pairs projecting beyond their segments, and marked with a diagonal median line as well as one parallel to the lower margin.

The specimens to which the above description applies approximate somewhat, in the character of the anterior thoracic feet, to the genus *Cirolana*, and, although probably only a variety of *Æga microphtalma*, may perhaps prove distinct, in which case I would propose for them the name *Cirolana pubescens*.

ÆGACYLLA LECONTII. Dana.

Ægacylla LeContii, DANA; *Proc. Acad. Nat. Sci. Philad.* vii. 177.

Hab. California, (Le Conte.)

Mus. of Prof. Dana.

SPHÆROMA OREGONENSIS. Dana.

Sphæroma Oregonensis, DANA; *U. S. Exploring Expedition, Crust.* ii. 778.
Pl. LII. f. 4. *Proc. Acad. Nat. Sci. Philad.* vii. 177.

This little crustacean is very common on the coasts of California and Oregon, and congregates in large numbers under stones near low-water mark in sheltered situations. It looks very much like an *Oniscus*, or pill-bug, rolling itself into a ball when disturbed. It was found in Puget Sound, (Pickering;) Shoalwater Bay, (Cooper;) and in San Francisco Bay, (Expl. Exped.)

Mus. Smithsonian; Bost. Soc.; Phil. Acad.; Paris; Acad. Petrop.

SPHEROMA AMPLICAUDA. Stimpson.

Pl. XXIII. f. 1.

Sphæroma amplicauda, STIMPSON; *Proc. Bost. Soc. Nat. Hist.* vi. 89.

Body gradually widening from the head backwards. Thorax transversely ridged, the ridges corresponding in number to the segments; and provided with three (sometimes five) longitudinal rows of small tubercles, those of the middle row becoming gradually larger posteriorly, the terminal one subspiniform, pointing backward. Epimeral pieces, distinct and well separated, especially those of the posterior segments, and thickened so as to give a raised margin to the thorax. Abdomen large, forming two fifths of the length of the body, triangular, terminating in an acute point; segments all coalescent with the exception of the first, next the abdomen, which is distinctly separate, and bears a tubercle on either side in the line of those of the thorax. There are sometimes also two slight, approximated tuberculous ridges, along the middle of the anterior half of the caudal plate. Lamellæ of posterior pair of false feet very large, much expanded, but not extending posteriorly beyond the extremity of the abdominal plate; the exterior margin of the outer lamella is anteriorly much reflexed. The antennæ in this species are rather long.

| | |
|---|-----------|
| Dimensions,—Length, | 0.25 inch |
| Breadth at seventh thoracic segment, | 0.119 " |
| " of caudal extremity including appendages, | 0.17 " |

The epimera in this species are much more distinct than is usual in the genus. A few specimens were found adhering to some fragments of star-fishes picked up on the beach of Tomales Bay, by Mr. Samuels.

Mus. Smithsonian.

ANISOPODA.

ARGEIA PUGETTENSIS. Dana.

Argeia Pugottensis, DANA; *U. S. Exploring Expedition, Crust.* ii. 804.
Pl. LIII. f. 7.

Found under the thoracic shield of *Crangon munitus*.
Hab. Puget Sound, (Expl. Exped.)
Mus. Expl. Exped.

ARGEIA PAUPERATA. Stimpson, n. s.

This species is somewhat larger than the preceding; the head is comparatively smaller, more tumid, and bilobate; the egg-pouch covers the eggs more completely; and the thoracic branchial appendages are apparently absent in some of the anterior segments. The inner branches of the first three pairs of abdominal appendages are broader; those of the last three pairs are wanting. Length, 0.35; breadth, 0.23 inch. This description is taken from a female.

Found in specimens of *Crangon Franciscorum*, from San Francisco Bay.

PHYLLODURUS. Nov. gen.

Feminae pedes thoracis sat validi, toti ancorales, unguiculati; appendicibus branchialibus carentes. Appendices abdominis branchiales; superiores laterales, laminis duabus æquis magnis elongatis; inferiores papilliformes. Abdominis segmentus primus setis dorsalibus unguiculatis instructus.

PHYLLODURUS ABDOMINALIS. Stimpson, n. s.

This curious form of parasitic anisopods was found attached to, and lying between the abdominal feet of the common *Gebia*, adhering by the sharp hook-shaped terminal

joints of its feet, and perhaps aided in keeping its position by the sharp dorsal setæ of the abdomen. As might be expected from this external parasitism, the shape of the body is symmetrical, being never distorted, as is almost always the case in those forms which live in the usual position—in the confined space under the thoracic shield of the shrimp or cray-fish.

In our species the thorax is somewhat cordate in shape, broadest behind, the short abdomen being set in the concavity. The thoracic segments are well separated and provided with distinct tumid epimera; the external envelope is soft, being even less hard and crustaceous than in *Argeia*. The head is somewhat broader than long, strongly tumid, and in the character of its appendages resembles somewhat that of *Ione*. The front projects abruptly, forming a horizontal margin to the head, beneath the anterior part of which the small inner antennæ are concealed. The outer antennæ arise laterally, and behind the inner ones, which they much exceed in length, being as long as half the width of the head. There are no thoracic branchial appendages. The thoracic feet are similar in character throughout; they gradually increase in length posteriorly, and are each provided with a small hand, the hooked finger of which is of moderate length, more than reaching the projecting inferior angle of the antepenultimate article.

The abdomen is triangular, and consists of six deeply separated segments, the terminal one being very minute. The basal segment is much the largest, and bears upon its dorsal surface two papillæ, one on each side, which are provided with short, stiff, somewhat hooked setæ. The lateral extremities of the abdominal segments are split by a marginal furrow into superior and inferior rami; the latter being simply conical with two or three circular wrinkles; and the former (superior) each surmounted by a cylindrical pedicle which bears two large cultriform lamellæ. There are thus twelve pairs of these lamellæ, which are of large size, and

being crowded, project in different directions, nearly concealing the posterior half of the animal. Each is about one fifth as broad as long, compressed on the inner and thickened along the outer or convex edge.

Only females of this species have as yet been found. The dimensions of one specimen are,

| | |
|---|------------|
| Length of body, | 0.58 inch. |
| “ “ abdomen, | 0.12 “ |
| “ “ superiorabdominal appendages, | 0.24 “ |
| Breadth of thorax, | 0.45 “ |

Several examples of this singular crustacean have been found on *Gebia* from Puget Sound and Tomales Bay.

AMPHIPODA.

CAPRELLA CALIFORNICA. Stimpson.

Caprella Californica, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 89.

The body in this species is slender. The antennæ are exceedingly variable in their proportions; the flagella of the superior ones 10–15 articulate; inferior ones subpediform. A more or less developed spine, which curves forward, and is sometimes of considerable length, is placed upon the dorsal surface at the anterior extremity of the first thoracic segment. Hand of the second pair of feet generally three-toothed on the inner surface; teeth (in full grown specimens) about equal in size, and placed mostly toward the outer extremity of the palm. Two or three sharp tubercles along each of the sides of the branchiferous segments; and a short dorsal spine on each of the three posterior segments. Hands of posterior feet slender. Color, variable. Length, one inch; breadth, about 0.03 inch.

Found on seaweeds, etc., below low-water mark in San Francisco Bay, near its entrance.

Mus. of the North Pacific Expedition.

COROPHIUM SPINICORNE. Stimpson.

Corophium spinicorne, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 89.

This species is rather thick and robust in shape. The inferior antennæ are half as long as the body, without flagella, and with a large, curved, sharp-pointed spine at the inferior extremity of the very thick antepenultimate article. There is also a stout spine beneath on the basal article, and a small one at the inner base of the penult. Superior antennæ slender, and but little shorter than the inferior ones. Feet well brushed with plumose hairs; those of the first pair with minute subcheliform hands, with the palm transverse; third and fourth articles with long setæ along the inferior edge. Feet of the second pair simple, but with the third and fourth joints conjoined laterally, as if forming a hand, not however subcheliform; the fourth article is placed inferiorly and fringed with long hairs. Caudal stylets placed rather underneath than on the sides of the abdomen, but otherwise much as in *C. longicorne*, except that the external ramus in the second pair is scarcely cultriform. Color brownish, darkest at the head, with transverse bands of light yellow corresponding to the segments; antennæ brownish. Length, 0.4 inch; breadth at the fifth thoracic segment, 0.08 inch.

It is common among confervæ, etc., in the little creeks of the salt marshes on the shores of San Francisco Bay.

Mus. N. P. Exp.

COROPHIUM SALMONIS, Stimpson, n. s.

In examining anatomically a species of salmon from Puget Sound, in the museum of the Smithsonian Institu-

tion, the stomach was found to be filled with Amphipoda, chiefly a species of *Corophium*. The specimens were not in a very good state of preservation, but enough remained to show that although agreeing with the preceding species in most characters, particularly in the spines of the antennæ and the hairiness of the feet, they are yet specifically distinct. The body is rather more elongated and depressed than in *C. spinicorne*; the inferior antennæ are much longer, and the superior ones smaller. The color is a reddish purple.

Mus. Smithsonian.

ERICHTHONIUS RAPAX. Stimpson, n. s.

If the obsolescence of the first two pairs of epimera in EDWARDS' *Erichthonius*, shall prove a constant and not an accidental character, the species here described will properly be referred to *Pyctilus*, DANA. There are small epimera on the first thoracic segment, and larger ones on the second; both narrow, not touching each other. Antennæ sub-equal, one third as long as the body; superior ones with six-articulate flagella; inferior ones strongly toothed at the inferior angle of their basal joint, and with ten-articulate flagella. Mandibular palpi reaching beyond the middle of the basal joint of the superior antennæ. Eyes on lobes which protrude forward between the bases of the antennæ. Hands of the first pair small, sub-cheliform; those of the second pair of great size, with a bi-articulate finger, and a thumb one third as long as the finger, with a strong tooth at the middle of its inner side. Color, brownish. Length, one fourth of an inch.

It was dredged on a sandy bottom at the depth of two fathoms, in the Bay of San Francisco, near the city.

Mus. N. P. Exp.

MEGALORCHESTIA SCABRIPES. Stimpson.

Orchestia scabripes, DANA; *U. S. Exploring Expedition, Crust.* ii. 860,
Pl. LVII. f. 4.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

MEGALORCHESTIA CALIFORNIANA. Brandt.

Megalorchestia Californiana, BRANDT; *Bulletin physico-mathém. de l'Acad. de St. Pétersb.* ix. 311. Pl. I. f. 1-6.

This differs from *M. scabripes* among other characters in the great length of the fifth epimeral, and in having the outer branch of the first pair of caudal stylets equally spinulose with the inner one. The feet are not scabrous, while the antennæ are so on a considerable portion of their surface.

Hab. Bodega, (Wosnessenski,) Monterey; (Taylor.)

Mus. Acad. Petrop.; Philad.; Smithsonian.

ORCHESTIA CALIFORNIENSIS. Dana.

Orchestia Californiensis, DANA; *Proc. Acad. Nat. Sci. Philad.* 1854, vii. 177.

Hab. California, (Le Conte;) Puget Sound, (Suckley.)

Mus. of Prof. Dana; Smithsonian.

ORCHESTIA PUGETTENSIS. Dana.

Orchestia Pugettensis, DANA; *U. S. Exploring Expedition, Crust.* ii. 859,
Pl. LVII. f. 3.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.; Smithsonian.

ORCHESTIA PICKERINGII. Dana.

Orchestia Pickeringii, DANA; *U. S. Exploring Expedition, Crust.* ii. 882,
Pl. LIX. f. 9. *Proc. Acad. Nat. Sci. Philad.* VII. 177.

California, (Le Conte.)

Mus. Expl. Exped.

ORCHESTIA TRASKIANA. Stimpson.

Orchestia Traskiana, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 90.

Male, with the inferior antennæ about one third as long as the body; the flagella forming more than half their length; and consisting of fourteen oblong joints; superior antennæ reaching to the extremity of the second joint of the inferior ones. Feet of the first pair with a small hand with a produced lobe at the inferior angle, and a minute finger, as in *O. littorea*, *pollicifera*, etc.; fourth joint and that preceding it, each with a small tooth below. Feet of the second pair with an ovate hand, with no teeth on the oblique, convex, spinous palm, which terminates posteriorly in a slight notch; finger about half as long as the hand, smooth and much curved. In the *female* the first pair of hands resemble those of the male, except in being smaller, having less produced lobes, and a comparatively longer finger; those of the second pair with a small elongated hand, with a rounded extremity and a rudimentary finger applied at about the middle of the lower edge. In *both*, the feet of the sixth and seventh pairs are about equal in length. Eyes rounded, black. Color, light gray, sometimes greenish or brownish, always very pale. Length, three fifths of an inch.

This species has much resemblance to *O. Pickeringii* and *O. Pugettensis*, but is clearly distinct from both in the following characters. From the former, it differs in the greater length and obliquity of the palm in the hand of the

second pair, which is also destitute of tooth-like lobes; in the tooth on the inferior margin of the third article in the first pair of feet; and in its shorter and stouter antennæ. From the latter, it differs in having oblong instead of transverse joints in the flagella of the inferior antennæ; the flagella being also longer than their peduncles, which are not scabrous; there is also no two-jointed process on the third joint in the second pair of feet.

O. Traskiana is exceedingly abundant in the vicinity of San Francisco, living among the rejectamenta along high-water mark. Were it not that I have had opportunity of comparing it with the original specimens kindly lent me by Prof. Dana, I should scarcely have believed that it was not identical with one of the numerous species already described from this coast.

ALLORCHESTES PUGETTENSIS. Dana.

Allorchestes Pugettensis, DANA; *U. S. Exploring Expedition, Crust.* ii. 901.
Pl. LXI. f. 6.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

ALLORCHESTES SEMINUDA. Stimpson.

Allorchestes seminuda, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 90.

Body somewhat compressed; eye oval; superior antennæ three fifths as long as the inferior ones, with flagella consisting of thirteen sub-oblong joints; inferior antennæ two-fifths as long as the body, with 14-articulate flagella. On both pairs of antennæ there are a few short setæ at the extremity of each joint. Hand in the first pair of feet small, palm oblique, almost transverse; finger of moderate size; carpus produced at its inferior angle into a sharp projection. Hand in the second pair rather large, oblong-

ovate, deeply excavated below for the reception of the point of the finger, which is more than half as long as the hand. Color pale green; antennæ red. Length, half an inch.

This species is closely allied to *A. Pugettensis*, but is smaller, and more compressed; the superior antennæ are more setose, and the hand of the first pair is different in shape, the palm being much less oblique.

It is common at San Francisco, living among barnacles and seaweed on stones and the piles of wharves, in the littoral zone.

Mus. N. P. Exp.

ALLORCHESTES PLUMULOSUS. Stimpson. n. s.

In this species, the inferior antennæ are about one third as long as the body, and thickly tufted with plumose hairs along the inferior edge; the terminal joint of the peduncle, and all the joints of the 11-articulate flagellum except those near the extremity, being provided below with plume-like bundles of branching setæ, as well as the usual simple ones above and on the sides. The superior antennæ have only a few, simple setæ, which are, however, of considerable length. The hand of the second pair is oblong, two-thirds as broad as long, and rather quadrangular than ovate, with the palm curved, less excavated, and with a much less prominent projection at the extremity of the finger than in the preceding species; the finger is scarcely half as long as the hand. In other characters this species has considerable resemblance to *A. seminuda*. Length, two fifths of an inch. Color, greenish.

It is common on gravelly shores in the littoral zone near the mouth of San Francisco Bay.

Mus. N. P. Exped.

ALLORCHESTES ANGUSTUS. Dana.

Allorchestes angustus, DANA; *Proc. Acad. Nat. Sci. Philad.* 1854, vii. 177.

This species may be recognized by its high epimerals.

Hab. California, (Le Conte.)

Mus. of Prof. Dana.

GAMMARUS PUGETTENSIS. Dana.

Gammarus Pugettensis, DANA; *U. S. Exploring Expedition, Crust.* ii. 957.
Pl. LXVI. f. 1.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

GAMMARUS SITCHENSIS. Brandt.

Gammarus Sitchensis, BRANDT; *Sibirische Reise, Zool.* i. 137. Pl. VI. f. 28.

Hab. Sitka, (Wosnessenski.)

Mus. Acad. Petrop.

GAMMARUS ATCHENSIS. Brandt.

Gammarus Atchensis, BRANDT; *Sibirische Reise, Zool.* i. 133. Pl. VI. f. 29.

Hab. Atcha and Unalashka, (Wosnessenski.)

Mus. Acad. Petrop.

GAMMARUS CONFERVICOLUS. Stimpson.

Mera confervicola, STIMPSON; *Proc. Cal. Acad. Nat. Sci.* i. 90.

Body somewhat compressed, smooth except at the posterior three abdominal segments, the dorsal surfaces of which are angular and spinulose or setose. Antennæ of both pairs slender, about equal in their length, which is half that of the body. Superior ones with thread-like 22-articulate flagella constituting two-thirds of their length;

appendiculus 4-5 articulated. In the inferior antennæ the flagellum, of 11 oblong articles, is scarcely shorter than the peduncle, the terminal and penult joints of which are of equal length, and each four or five times as long as the antepenult. The four hands are rather small, of nearly the same size and shape, suboblong; palm transverse, minutely denticulated and setose, finger short, considerably curved. Posterior caudal stylets with unequal rami; the outer ones large, nearly as long as the three posterior segments of the abdomen; inner ones very small and inconspicuous. Color, dark brownish, rarely blackish. Length, 0.5 inch.

This species differs from *G. Atchensis* in the smoothness of the dorsal surface of the first three abdominal segments.

Is found among confervæ in salt marshes near San Francisco; and a few specimens were obtained from the stomachs of salmon caught in Puget Sound.

Mus. N. P. Exped.; Smithsonian.

IPHIMEDIA PUGETTENSIS. Dana.

Iphimedia Pugettensis, DANA; *U. S. Exploring Expedition, Crust.* ii. 932,
Pl. LXIII. f. 6.

Hab. Puget Sound, (Expl. Exped.)

Mus. Expl. Exped.

PHOXUS GRANDIS. Stimpson, n. s.

This species is of a much larger size than is usual in the genus. Body broad and robust. Rostrum lamelliform, expanded over the bases of the superior antennæ, with a broadly rounded extremity. Superior antennæ bi-flagellate, the inner flagella very little smaller than the outer ones; both 12-articulate; penultimate article of peduncle entirely concealed beneath the rostrum. Inferior antennæ a little longer than the superior ones; terminal article of peduncle broad at its extremity where its outer angle is

produced and rounded; its inner angle bearing the 15-articulate flagellum. Eye transversely oblong. Feet covered with simple hairs. Those of the first and second pairs with small subcheliform hands; those of the third and fourth pairs with the third and fourth articles dilated, the fifth slender, the sixth very small. Feet of the posterior three pairs very much widened; those of the sixth pair largest. Caudal stylets of the first and second pairs with short styli-form rami, the inner ones being a little shorter than the outer ones; those of the third pair with long, flattened, equal rami, the outer ones spinulose along their outer edges, both fringed with long setæ on the inner sides. Terminal caudal spines of considerable length.

The color is yellowish-white. Length, half an inch.

It was dredged on a sandy bottom in ten fathoms, in the channel near the entrance of San Francisco Bay.

Mus. N. P. Exp.

PÆCILOPODA.

ARGULUS PUGETTENSIS. Dana.

Argulus Pugettensis, DANA; *U. S. Exploring Expedition*, *Crust.* ii. 151, Pl. XCIV. f. 2.

Several specimens of this species were taken from fishes in Tomales Bay, by Mr. Samuels.

Mus. Expl. Exped.; Smithsonian.

ECHINODERMATA.

The Echinoderms, as yet known from this coast, are few in number. In fact, the character of the greater part of the shores of California and Oregon is not such as affords the most favorable conditions for the development of numerous species of this order. Nearly the whole line of coast is

open, and presents a succession of inaccessible, perpendicular, rocky cliffs alternating with barren beaches of sand, all being completely exposed to the action of the breakers, which roll in upon them with the concentrated force of the storms of a wide and unbroken ocean. There is a want of variety in station, and a paucity of inlets, bays and islands, in the protected nooks of which such animals as we are now to consider usually find shelter. Extensive dredging operations would no doubt bring to light many species in places where the nature of the bottom is favorable, but the submarine zone in which the depth of water is not too great for the existence of animal life, is narrow; since, as we might judge from the mountainous character of the shores, the sea-bottom dips far beyond the reach of the ordinary sounding-line, in close proximity with the land.

There are but two important inlets on the coast, and of these Puget Sound is without doubt the best locality for researches among the marine invertebrata. The Bay of San Francisco, from the admixture with its waters of the turbid flood of two large rivers, and the smallness of the gate which admits to it the clear water of the ocean, is nearly barren of animal life except at its entrance. At a former epoch, and one geologically speaking quite recent, the sea had a much freer sweep through the bay. On its shores I have often observed extensive superficial deposits of shells, of the same species that now live on the coast, (*Mytili*, *Ostrea*, etc.) lying in a horizontal stratum at a slight elevation above the present high-water mark. These are particularly abundant beneath the soil in the valleys of Petaluma and Sonoma, extending thence toward the sea at Bodega; and here perhaps an ancient gate existed. Another opening may have been situated at the southern extremity, through what is now the Valley of Santa Clara.

A preponderance of *Asteriadae* will be noticed among the Echinodermata now to be described. The restricted genus *Asterias* (*Asteracanthion*, Müll. et Trosch.) is par-

ticularly well represented on the Northwest Coast. Of the *Ophiuridæ* but two species are here known to exist, neither of which can be now specifically indicated, as the specimens are not at hand. One is a small *Ophiolepis*, dredged by me near San Francisco, and the other an *Astrophyton* taken in Puget Sound by the captain of a coasting vessel, in whose hands it was seen and reported to me by Dr. Cooper.

HOLOTHURIADÆ.

HOLOTHURIA CALIFORNICA. Stimpson, n. s.

Body much elongated, of nearly the same thickness throughout; below, flattened and thickly covered with stout sucker-bearing feet not arranged in rows. Dorsal surface with about forty large conical cutaneous processes (or false feet) sparingly scattered; between which there are numerous small cirriform feet, also diskless. Tentacula twenty, short, peltate, with broad disks. Color, reddish-brown above; below, lighter. Length, $1\frac{1}{2}$ ft.; thickness, $1\frac{1}{4}$ inches.

Taken in Tomales Bay by Mr. Samuels.

HOLOTHURIA SITCHÆNSIS. Brandt.

Diploperideris Sitchænsis, BRANDT; *Prod. desc. anim. Mertens.*, 52.

Hab. Sitka, (Mertens.)

ASPIDOCHIR MERTENSII. Brandt.

Aspidochir Mertensii, BRANDT; *Prod. desc. anim. Mertens.*, 46.

Hab. Sitka, (Mertens.)

PENTACTA FRONDOSA. Jæg.

Pentacta frondosa, JÆG. AYRES; *Proc. Cal. Acad. Nat. Sci.* i. 68.

The small *Pentactæ*, found in the vicinity of San Francisco, are referred by Dr. Ayres to this species.

PENTACTA MINIATA. Brandt.

Cladodactyla miniata, BRANDT; *Prod. desc. anim. Mertens.*, 44.

Hab. Sitka, (Mertens.)

PENTACTA NIGRICANS. Brandt.

Cladodactyla nigricans, BRANDT; *l. c.* 44.

Hab. Sitka, (Mertens.)

PENTACTA ALBIDA. Brandt.

Cladodactyla albida, BRANDT; *l. c.* 44.

Hab. Sitka, (Mertens.)

CUVIERIA SITCHÆNSIS. Brandt.

Cuvieria Sitchænsis, BRANDT; *l. c.* 47.

Hab. Sitka, (Mertens.)

LIOSOMA SITCHÆNSE. Brandt.

Liosoma Sitchænsæ, BRANDT; *l. c.* 58.

Hab. Sitka, (Mertens.)

LIOSOMA ARENICOLA. Stimpson, n. s.

Body thick fusiform; skin coriaceous; surface smooth and glabrous, without suckers or processes of any kind. Tentacles fifteen in number, very small, contracting into a circular groove at the margin of the mouth, where they are each concealed in a small cavity formed by folds of the skin. Each tentacle is composed of a short peduncle with four or five digitations at the disk-like summit; these branches being also minutely pinnate toward their extremities. Oral ring composed of five slender calcareous pieces,

projecting and bifurcate below, notched above. Respiratory trees very slender; genital tubes two or three times divided. Color, yellowish-white, clouded with reddish above. Length of an alcoholic specimen four inches; thickness, two inches.

Found at San Pedro, Cal., by Lieut. Trowbridge.

The genus differs from *Chirodota* in the want of the calcareous deposits of the skin so characteristic of the latter form.

CHIRODOTA DISCOLOR. Esch.

Chirodota discolor, ESCHSCHOLTZ; *Zoologischer Atlas*, Pl. X. f. 2.

Hab. Sitka.

CHIRODOTA VERRUCOSA. Esch.

Chirodota verrucosa, ESCHSCHOLTZ; *Zoologischer Atlas*, Pl. X. f. 3.

Hab. Sitka.

ECHINIDÆ.

ECHINUS CHLOROCENTROTUS.

Echinus chlorocentrotus, BRANDT; *l. c.* 64.

This may be distinguished by its very short spines.

Hab. Sitka, (Mertens.) Dr. Cooper informs me that a green *Echinus* is common on the shores of Puget Sound, which is probably this species.

ECHINUS PURPURATUS. Stimpson, n. s.

Form depressed. Outline somewhat pentangular. Ambulacral areas of the same width as the interambulacrals; (sometimes even wider;) with eight pairs of pores in each of the very oblique rows, which are separated from each other by rows of small tubercles. Interambulacral area with

six rows of larger tubercles, between which smaller ones are interspersed; the tubercles of the two rows next within the exterior ones are largest. Auricles slender. Spines of moderate length, rather stout and blunt. Color, deep purple. Diameter, $2\frac{1}{2}$ inches; height, $1\frac{1}{2}$ inch.

Found at low-water mark on rocky ocean shores near San Francisco. It is often sold in the market, being used as food by some classes of the citizens, chiefly those from Southern Europe.

DENDRASTER EXCENTRICUS. Esch.

Scutella excentrica, ESCHSCHOLTZ; *Zoologischer Atlas*, Pl. XX. f. 2.
Echinarachnius excentricus, VALENCIENNES; *Voy. Venus*, *Zoolph.* Pl. X.
Dendraster excentricus, AGASSIZ; *Cat. des Echinides*, 77.

This is the common cake-urchin of the coast, and is found at all points from Sitka to Monterey.

ASTERIADÆ.

ASTERIAS OCHRACEA. Brandt.

Pl. XXIII. f. 2.

Asterias ochracea, BRANDT; *Prod. desc. anim. Mertens*, 69.

Rays five, each scarcely twice as long as the disk is wide. Larger dorsal spines capitate, somewhat reticulating, and forming a pentagon at the middle of the disk which encloses the madreporic body. Diameter, eight inches.

It is very common near San Francisco, on rocks at low-water mark, and was also taken at Tomales Bay by Mr. Samuels. It was originally found at Sitka. *A. ianthina*, BRANDT, is probably only a variety.

The figure represents a small portion of the upper surface of one of the rays, to show the arrangement of the spines.

ASTERIAS EPICHLORA. Brandt.

Asterias epichlora, BRANDT; *l. c.* 70.

Asterias Katherinae, GRAY; *An. & Mag. Nat. Hist.* vi. 179.

This slender-rayed species sometimes reaches a diameter of more than a foot. The specimens in the Smithsonian collection were sent from Puget Sound by Dr. Suckley.

ASTERIAS BREVISPINA. Stimpson, n. s.

Pl. XXIII. f. 3.

Rays five, each equalling in length twice the diameter of the disk. Upper surface covered with very short, blunt, nearly uniform spines, moderately numerous, sometimes forming an irregular row along the middle of the ray, and showing a tendency to reticulation on the sides. Beneath there is a single row of slender ambulacral spines, which are blunt and somewhat irregular in length; between these and the marginal channel there are four rows of short compressed spines, gouge-shaped, or notched by an oblique concavity at their truncated extremities. Madreporic body large. Color yellowish. Diameter, six inches.

Taken from a sandy bottom in ten fathoms near the mouth of San Francisco Bay. The figure represents a portion of the lower surface.

ASTERIAS GIGANTEA. Stimpson, n. s.

Pl. XXIII. f. 4. 5. 6.

Body very large, swollen; rays six in number, in length somewhat less than twice the diameter of the disk. Upper surface covered with numerous short, blunt, equidistant spines, uniform in size and regularly distributed; these spines are somewhat conical in shape, but truncated at the tip and constricted at the base, with the sides longitudinally furrowed. The spines of the lower surface are

short and thick, but slightly compressed and notched at the extremity. Diameter, two feet.

Taken in Tomales Bay, by Mr. Samuels.

ASTERIAS HELIANTHOIDES. Brandt.

Asterias helianthoides, BRANDT; *l. c.* 71.

Hab. Sitka, (Mertens;) Puget Sound, (Suckley;) Tomales Bay, (Samuels.)

ASTERIAS HELIANTHUS. Lamk.

Asterias helianthus, LAMK; GRAY; *An. & Mag. Nat. Hist.* vi. 179.

Hab. Mazatlan, (Moore.)

SOLASTER DECEMRADIATA. Brandt.

Asterias endeca, var. *decemradiata*, BRANDT; *l. c.* 71.

Hab. Sitka, (Mertens.)

LINCKIA LEVIUSCULA. Stimpson, n. s.

Disk very small; rays elongated, cylindrical, in length $2\frac{1}{2}$ times the diameter of the disk. Upper surface covered with slightly protuberant, uniform, spinulose paxilli, which are somewhat irregularly crowded together, leaving deep but very narrow chinks leading to the holes in the network of the skin. The spinules of the paxilli are so crowded that the surface of each appears nearly smooth. Below, the paxilli are still more crowded, but are here quadrate in shape and arranged in three or four rows on each side of the ambulacral furrow; those of the ambulacral row having their spinules less crowded and somewhat longer, forming the marginal series. Diameter, two inches.

Found in Puget Sound, by Dr. Suckley.

ASTERISCUS MINIATUS. Brandt.

Asterias miniata, BRANDT; l. c. 68.

This pentagonal star-fish may be readily distinguished by its thin disk and sharp edge.

Hab. Sitka, (Mertens;) Tomales Bay, (Samuels;) San Francisco, (Ayres;) Island of San Miguel, (Trowbridge.)

MEDIASTER EQUALIS. Stimpson. Nov. gen. et sp.

Pl. XXIII. f. 7, 8, 9, 10, 11.

This name is proposed for a Goniastroid star-fish, common on the coast of Oregon and California, which I cannot refer to any described genus or species, although it is not impossible that it may belong to one of the numerous genera of J. E. Gray, which are however so imperfectly characterized that it is extremely difficult, if not impossible, to identify them.

Body of little thickness, flat above and below; five-rayed; length of rays equalling or exceeding the diameter of the disk. Skin set with numerous small rounded plates, nearly uniform in size but becoming somewhat smaller toward the margin; they are rather more crowded below than above. Scattered pores on the surface of the skin between the plates. Margins with a double row of large quadrangular plates; those in the upper and lower series opposite. All of the plates above and below, including the marginal ones, are covered with granules nearly uniform in size and easily rubbed off. On the lower surface the granules are somewhat larger and angular, and those on the plates bordering the ambulacral furrows are elongated so as to form subprismatic spines, eight or ten to each plate, the inner ones largest. Anus central, surrounded by a circle of spine-like granules. No pedicellariæ or "two-lipped pores," excepting a single one in the centre

of each plate of the lower marginal series. Color in life, bright red above, pale orange below. Diameter, four inches.

Found in Puget Sound by Dr. Suckley, and by myself near San Francisco.

EXPLANATION OF THE PLATES.

PLATE XVIII.

Cancer antennarius, ♂ of the natural size.

PLATE XIX.

- Fig. 1. Side view of carapax of *Loxorhynchus grandis*, ♀ $\frac{1}{2}$ nat.
 " 2. *Porcellana rupicola*, ♂ nat. size.
 " 3. *Randallia ornata*, ♀ " "

PLATE XX.

- Fig. 1. *Cryptolithodes typicus*, ♀ nat. size.
 " 2. The same from below.
 " 3. " view from behind.
 " 4. " side view.
 " 5. Inferior surface of the head magnified.
 " 6. Portion of flagellum of external antennæ, showing the clavate setæ.

PLATE XXI.

The figures of this plate are all of the natural size.

- Fig. 1. *Clibanarius turgidus*.
 " 2. Hand of *Gebia Pugettensis*, with the setæ removed.

- Fig. 3. Hand of *Callianassa gigas*.
 " 4. " *C. Californiensis*.
 " 5. " *C. longimana*.
 " 6. *Pandalus Danae*.
 " 7. Rostrum of *Pandalus Danae*.

PLATE XXII.

The figures on this plate are all of the natural size.

Fig. 1. Orbit, antennæ, and rostrum of *Loxorhynchus grandis*, ♀ seen from beneath.

Fig. 2. Orbit, external antennæ, and rostrum of *Loxorhynchus crispatus*, ♂ seen from above.

Fig. 3. Side view of orbit, etc., of *L. crispatus*.

- " 4. Outer maxilliped of *L. crispatus*.
 " 5. Hand of *Crangon Franciscorum*.
 " 6. " *C. nigricauda*.
 " 7. *Idotea resecata*.
 " 8. *Lygia dilatata*.
 " 9. *Livoneca vulgaris*.

PLATE XXIII.

Fig. 1. *Sphaeroma amplicauda*, magnified six diameters.

- " 2. Portion of the upper surface of a ray of *Asterias ochracea*, natural size.
 " 3. Portion of lower surface of a ray of *Asterias brevispina*, nat.
 " 4. Portion of upper surface of *Asterias gigantea*, nat.
 " 5 and 6. Views of spines of *A. gigantea*.
 " 7. Part of upper surface of *Mediaster aequalis*, natural size, with the granules removed from one half to show the plates.
 " 8. Lower surface of the same.
 " 9. Part of ambulacral furrow and spines of the same, magnified.
 " 10. A paxillus of upper surface of the same, magnified.
 " 11. One from the lower surface.

ART. XXVIII.—A List of the FISHES collected in California by MR. E. SAMUELS, with Descriptions of the new Species. By CHARLES GIRARD, M. D.

I. COTTIDÆ.

1. COTTOPSIS PARVUS, GIRARD, in Proc. Acad. Nat. Sci. Philad. VII. 1854, 144.

Locality. Petaluma, Sonoma Co.

2. OLIGOCOTTUS MACULOSUS, GIRARD, in Proc. Acad. Nat. Sci. Philad. VIII. 1856, 133.
 Pl. XXIV, fig. 7.

Description. The head is but very slightly broader than deep; its upper surface is depressed and smooth, the interocular space grooved, the snout very declivous and consequently short, narrow, and rounded upon its periphery. The upper jaw protrudes slightly beyond the lower one; the mouth is small, being but moderately cleft; the posterior extremity of the maxillary extending to a vertical line intersecting the pupil. The eye is subcircular, and its diameter contained four times in the length of the side of the head, exactly once in advance of its anterior rim. The head itself forms a little less than the fourth of the entire length. A rather stout bicuspid process arises from the convexity of the preopercle with its acute spines directed obliquely upwards, no other spines being apparent upon the opercular apparatus. In speaking of the upper surface of the head, we omitted mentioning two prominent and acute nasal spines; the nostrils being as usual placed one behind and the other beneath each spine. The branchial apertures are continuous under the throat and the branchiostegal rays six in number.

The body is very much compressed, subfusiform, and deeper than broad even anteriorly. The first dorsal is lower