

NOTES ON NORTH AMERICAN DECAPODA. BY J. S. KINGSLEY.

The specimens upon which this paper is based are to be found in the Museum of the Peabody Academy of Science at Salem, Mass.

MAIOIDEA.

Family MAIIDAE. Sub-Family PISINAE.

Genus MICROPHRYS M. Edw., (MILNIA Stm.).

Microphrys error sp. n.

Microphrys depressa Streets and Kingsley, Bulletin Essex Institute, IX, 103 (1877). (*non Fisheria depressa* Lockington.)

A further examination of the specimen sent by Mr. Lockington as a type of his *Fisheria depressa* convinces me that it is not the species described by him under that name. I regard it as belonging to the genus *Microphrys* (Milnia Stm.) but it differs from Stimpson's diagnosis of the genus in the following respects. The orbits have a distinct fissure above, and no trace of a second; the basal joint of the antenna has one strong spine at the external angle, but no second smaller one. The external maxillipeds and dactyli of the ambulatory feet strongly resemble those of *M. bicornutus*. Should it be thought that these characters of antennae and orbits are of generic value, I would propose the generic name *Eumilnia*.

In the single specimen (a male) before me, I note the following characters.

Carapax depressed, regions very distinct and protuberant (more so than in *M. bicornutus*), hairy and armed with smaller and more acute tubercles than in that species. There are two strong spines on the posterior portion of the branchial region, near together and placed further back than the single one in *M. bicornutus*. A transverse crowded row of spiniform tubercles crosses the intestinal region. Margin of the hepatic region with an imbricated process, and on the branchial region an imbricated laminiform ridge, beneath the anterior portion of which is a strong styliform tooth. Rostrum with the horns straight, divergent, and not at all incurved at the tips. Orbits with a strong, prominent, acute tooth at the inner angle and a single distinct fissure above. Basal joint of antenna with a single spine at the external distal angle, which is longer and more acute than in *M. bicornutus*. Chelipeds moderate; meros with one or two teeth at the

proximal portion above, distally with a laminiform crest; carpus externally tuberculate; hand compressed, fingers widely gaping, distally toothed, pollex bent downwards and then upwards, dactylus regularly curved, with a tooth on the occludent margin near the base.

Remaining feet slender, cylindrical, decreasing in length backward; meros and carpus of the first pair of ambulatory feet, each with a long, slender, acute spine above, near the distal extremities; propodal joints of all the feet with a rounded laminiform process for the articulation of the dactyli; dactyli strongly curved, pectino-denticulate beneath.

One male in the Museum of the Peabody Academy of Science from Lower California gives the following measurements.

Length of carapax, 17.5 mm.; breadth, 13.5 mm.; ratio, 1: 0.72.

This species differs from *M. aculeatus* as shown in Bell's description and figure (Trans. Zool. Soc., London, II, 50, pl. ix, f. 7.) in having many tubercles on the cardiac region, and only two spines on each branchial region (*M. aculeatus* has four), in wanting the spines on the meros of third pair of feet, and from both *M. aculeatus* and *M. bicornutus* in having the horns of the rostrum straight and not incurved.

Genus ANAPTYCHUS Stm. (ALA Lockington).

Anaptychus cornutus Stm.

Anaptychus cornutus Stimpson, Annals N. Y. Lyceum, VII, 184, pl. II, f. 1, (1859); Streets and Kingsley, l. c., IX, 105, (1877). *Ala spinosa* Lockington, Proceedings of the California Academy of Science, VII, 66, (1877, extras issued in 1876).

In addition to the characters given by Stimpson, the following may be observed in the specimen sent by Mr. Lockington from the Gulf of California as the type of his *Ala spinosa*. The median portion of the posterior crest six lobed; there are nine depressed tubercles on the gastric region, and in our specimen the first tooth of the antero-lateral margin is narrower and more slender than it is represented in Stimpson's figure.

Length of carapax, 19 mm.; greatest breadth, 24 mm.; ratio, 1: 1.24.

Sub-Family MITHRACINAE.

Genus MITHRACULUS White.

Mithraculus areolatus Streets and Kingsley.

Mithrax areolatus Lockington, l. c. VII, 71, (1876). *Mithraculus areolatus* Streets and Kingsley, l. c. IX, 104, (1877).

Carapax naked, depressed, deeply areolate, areolations less broken than in *M. sculptus*, punctate, a transverse of five tubercles on the gastric region and two more acute ones on the outer posterior portion of each branchial region, two prominent tubercles at the base of the rostrum, one on each side of the median line. Rostrum short, bifid, outer margins of horns arcuate, inner straight. Orbits with one distinct fissure above, inner angle prominent, rounded; outer also rounded but less prominent; external hiatus a rounded opening. Antero-lateral margin with three teeth, besides the external angle of the orbit, first and second teeth stout, prominent, obtuse, the second the larger; third tooth slender, acute, hooked forward; a small acute tooth on the postero-lateral margin behind the lateral angle. A tubercle on the subhepatic region beneath the first tooth of the antero-lateral margin. An oblique row of rounded tubercles running backward from the palatal region. Basal joint of antenna with two short blunt teeth. Chelipeds small; posterior margin of meros four toothed, upper surface with one tooth, inner margin with a single rounded tubercle; carpus prominently tuberculate; hand smooth, inflated, cristate above at the base, a small depressed tubercle on the outer surface at the articulation with the carpus; fingers moderately gaping, denticulated at the extremity, a basal tooth on the dactylus in both sexes, but the larger in the male. Ambulatory feet with spinous tubercles on the basal joints, becoming obsolete on the distal ones; dactyli strongly arcuate. Specimens from the Gulf of California sent by Mr. Lockington have the following dimensions.

Length of carapax, ♂, 11 mm., ♀, 11.7 mm.; breadth, ♂, 13.5 mm., ♀, 15 mm.; ratio, ♂, 1: 1.23, ♀, 1: 1.28.

This species differs from *M. cinctimanus*, *denticulatus*, *hirsutipes* (sp.n.) and *minutus* (*Mithrax minutus* Saussure) in having but three teeth on the antero-lateral margin; from *M. denticulatus*, *ruber*, *hirsutipes* and *sculptus* in the presence of a basal tooth on the dactylus of the chelipeds; from *M. sculptus*, *cinctimanus* and *coronatus* in having the ridge running backward from the palatal region tuberculate; from *M. nodosus* in having the orbit fissured above, and in the more acute lateral tooth. It appears to be most closely allied to *M. ruber* but lacks the sinuous character of the anterior margin of the external maxillipeds, found in that species.

***Mithraculus hirsutipes* sp. n.**

Carapax smooth, naked, sculptured, with four tubercles on the

externo-posterior portion of each branchial region, and a single one at the base of each horn of the rostrum. Rostrum short, bilobed; orbits with a single fissure above, below with a deep groove externally and a fissure further in. Antero-lateral margin with four teeth, besides the external orbital angle, the first rather obtuse, the rest acute, second the largest, the last the most acute and strongly hooked forward; behind this last is a small tooth on the postero-lateral margin; a small tubercle on the subhepatic region a little in advance of the first antero-lateral tooth. The oblique ridge running backward from the palatal region is tuberculate. Basal joint of antenna with a short obtuse tooth, the two last joints of the peduncle with a stiff bristle on the inner distal angle. Chelipeds moderate, meros with spiniform tubercles above, inner margin with two spines near the distal extremity; carpus and hand smooth, the latter compressed, the fingers not so long as the palm, not denticulate, and with no tooth on the dactylus at the base. Remaining feet stout; meral, carpal and propodal joints armed with spiniform tubercles, and together with the basal portion of the dactyli, covered with long, stout hairs; distal portion of dactyli naked, strongly curved. Two specimens were brought from Key West, Fla., by Dr. A. S. Packard, Jr.

Length of carapax, 14 mm.; breadth, 17 mm.; ratio, 1: 1.21.

It differs from *M. nodosus*, *coronatus*, *areolatus*, *ruber* and *sculptus* in having the antero-lateral margin four-toothed; from *M. coronatus* in its narrower carapax and rounder outline; from *M. cinctimanus* in the broader carapax, the acute antero-lateral teeth and the absence of teeth on the fingers of the chelipeds; from *M. minutus* and *denticulatus* in the same character of the fingers.

Genus MITHRAX Leach, Stimpson.

Mithrax trispinosus sp. n.

Carapax depressed, pubescent, about as long as broad, surface granulate, with scattered tubercles. Of these there is one on each side of the median line near the base of the rostrum, three on each hepatic region, four on each branchial region near the base of the second tooth, and others posterior to these, a transverse row of four prominent ones, with smaller ones on each side, near the posterior margin. Rostrum short, depressed, bifid, each horn terminated by three spines. Orbits with two large fissures above, below with two broad, acute teeth. Antero-lateral margin with four sub-equal, slender, acute, curved teeth; a small one on the postero-lateral mar-

gin behind the lateral tooth. Sub-hepatic regions with spiniform tubercles. Basal joints of antennae with hairs and short setae. Chelipeds short and very slender, hand naked, the other joints and ambulatory feet above with spines and spiniform tubercles interspersed with short hairs. Dactyli of four posterior pairs curved, acute.

Florida. A. S. Packard, Jr.

A male gives the following measurements.

Length of carapax, 10 mm.; breadth, 10.5 mm.; ratio, 1:1.05.

This species differs from *M. affinis*, *acuticornis*, and *Holderi* in having the rostral horns spined instead of obtuse and unarmed; from *M. coronatus* in the broader carapax and non-acuminate horns; from *M. spinosissimus* in the simple character of the antero-lateral teeth; from *M. aculeatus* and *verrucosus* in having the basal joint of antennae two spined; from *M. hispidus* in the absence of sulci, and presence of granulations on the carapax, the more spiniform marginal teeth and longer rostral horns; from *M. pleuracanthus* in the granulate carapax and the character of rostrum, and from *M. verrucosus* in the rostral horns and the acute marginal teeth.

Mithrax triangulatus.

Mithraculus triangulatus Lockington, Proc. Cal. Acad., VII, 73, (1876).

Carapax with the regions very protuberant and tuberculate, especially the outer part of the branchial, the gastric and cardiac. Rostrum short, bifid, horns extending beyond the orbits, with the margins crenulate. Inner angle of orbits prominent, acute; superior margin with two nearly obsolete fissures, external hiatus moderate; below, a fissure at the junction of the basal joint of antennae. Antero-lateral margin three lobed, and below the lobes perpendicular. Below with two tubercles beneath the orbit, one small one on the subhepatic region and three rows of tubercles on the perpendicular surface of the branchial region, the lower of which extends obliquely forward to the angle of the palatal region. Basal joint of antennae very broad with two teeth, (not spines). Chelipeds moderate, meros sub-cylindrical with a few small tubercles; carpus nearly smooth, rounded; hand inflated, smooth, fingers moderately gaping, extremities denticulate, a strong basal tooth on the dactylus. Remaining feet small, spino-tuberculate.

Gulf of California. W. N. Lockington.

Length of carapax, ♂, 12.4 mm., ♀, 11.1 mm.; breadth, ♂, 11.5 mm., ♀, 11.0 mm.; ratio, ♂, 1 : .93, ♀, 1 : .99.

Family PARTHENOPIDÆ. Sub-Family PARTHENOPINÆ.

Genus LAMBRUS Leach.

Lambrus granulatus sp. n.

Carapax broader than long, everywhere granulate and with scattered tubercles; of these there are four in the median line, three on the cardiac region and the fourth on the posterior margin; four distant ones on the branchial regions and an indistinct one on the hepatic region. Rostrum moderate, directed downward, the sides (inner borders of the orbits) elevated, extremity acute with a single tooth on each side at the base. Orbits with a distinct fissure above. Antero-lateral margin strongly angulated at about the middle, with about thirteen serrated teeth, of which seven are posterior to the angle; posterior tooth larger and stouter than the rest and directed slightly backwards. Posterior margin with three tubercles. Sub-hepatic and pterygostomian regions excavate as in *L. crenulatus* and *laciniatus*. Sternum granulate. Chelipeds long, surface everywhere granulate; meros nearly triangular in section, bordered with large serrated teeth on the two upper margins and with smaller ones beneath; a tuberculate crest on the upper surface; carpus with two large teeth on the outside and a number of smaller ones on the inner; upper surface of hand without tubercles, superior and inferior margins with fine teeth, outer margin with alternate large and small teeth; fingers strongly inflexed. Remaining feet slender, of moderate length. First segment of male abdomen with a transverse series of five tubercles.

Tortugas, Fla., (9 faths.). Lieut. Jacques.

Length of carapax, ♂, 8 mm.; breadth, 9 mm.; ratio, 1: 1.25.

This form differs from *L. Pourtalesii* in the ornamentation of the carapax, the absence of a hepatic tooth, in the large number of marginal teeth; from *L. agonus* in the angulated sides.

It is nearest *L. crenulatus* and would fall in the section which Dr. Stimpson has designated under the name *Platylambrus*.¹ It is, however, separated from this species by the more slender rostrum, the less prominent tooth at the lateral angle, the and smaller number of tubercles on the carapax; the regions also are not so well defined.

¹ Bulletin Museum Comparative Zoology, II, 129, (1871).

CANCROIDEA.

Family CANCRIDÆ. Sub-Family XANTHINÆ.

Genus PANOPEUS Edwards.

Panopeus affinis Streets and Kingsley.

Panopeus transversus Lockington, Proc. Cal. Acad., VII, 102 (1876)
non Stm. *Panopeus affinis* Streets and Kingsley, Bulletin Essex
Inst., IX, 106 (1877).

Carapax depressed, slightly convex, and with the exception of frontal and antero-lateral portions which are granulate and sparsely pubescent, the surface is smooth and naked. Front rather prominent, bilobed, the lobes being truncate, not sinuate, the sides more advanced than the middle. The two fissures of the upper margin of the orbits more distinct than in *P. transversus*; the inner portion of the upper margin is elevated, forming a distinct angle with the upper surface of the frontal region. Antero-lateral margin with teeth rather than lobes, the first (the second normal tooth united to the angle of the orbit) is slightly sinuate as in *P. crenatus*, but is not so broad as in that species. Remaining teeth acute with their exterior margins arcuate, the margins of all the teeth slightly elevated. Under surface granulate, pubescent, subhepatic tubercle indistinct. Chelipeds unequal, carpus of each smooth, with a short spine on the inner margin; large hand smooth, the tooth on the outside of the palm obsolete; dactylus of larger hand with a strong basal tooth. Palm of smaller hand roughened above; fingers of both hands with longitudinal impressed lines, better defined, however, on the smaller. Remaining feet compressed, pubescent; dactyli of second, third and fourth pairs long and slender, of fifth pair much shorter. Terminal segment of male abdomen no broader than the preceding joint, sides slightly arcuate, tip rounded.

Lower California. W. N. Lockington.

Length of carapax, ♂, 10.8 mm., ♀, 12.7 mm.; breadth, ♂, 15.2 mm., ♀, 16.7 mm.; ratio, ♂, 1: 1.41, ♀, 1: 1.31.

It is closely related to *P. transversus* Stm., and *P. crenatus* Edw. and Lucas, but is distinguished from both by the truncate, non sinuate front and the less lobular teeth of the antero-lateral margin with their elevated borders. From *P. crenatus* it is also separated by the presence of a sub-hepatic tubercle and a more depressed carapax; from *P. transversus* by the more concave upper margin of the orbit, its elevated inner portion and the more acute carpal spine.

Panopeus purpureus Lockington.

Panopeus purpureus Lockington, *l. c.* VII, 101, 1876; Streets and Kingsley, *l. c.* IX, 105 (1877).

This form is very near *P. validus* Smith, and probably will prove to be merely a variety of it. In comparison with Smith's description and with authentic specimens of *P. validus* brought from the Gulf of Fonseca, by J. A. McNeil, it presents the following differences: Carapax smoother, and the granulous rugæ less numerous; front less prominent and, seen from above, nearly straight; fissures of the orbit less evident; tooth at inner angle of orbit below broader and shorter, second normal tooth of antero-lateral margin separated from the angle of the orbit by a narrower, more triangular notch; notches between the remaining teeth narrower, the teeth themselves having a distinct elevated margin. Propodus of chelipeds with an obtuse crest above; the tooth on the outer surface of larger hand nearly obsolete, dactylus with a large basal tooth. Ambulatory feet less compressed than in *P. validus*.

Lower California. W. N. Lockington.

Length of carapax, ♂, 11.1 mm.; breadth, 15.4 mm.; ratio, 1:1.39.

Gulf of Fonseca, west coast of Nicaragua, J. A. McNeil.

Length of carapax, ♂, 13.2 mm.; breadth, 18.3 mm.; ratio, 1:1.39.

Panopeus Packardii sp. n.

Carapax moderately convex; areolations less prominent than in *P. Herbstii*, surface minutely granulous. Front prominent, nearly horizontal; edge thin, arcuate, bilobed, the lobes being separated by a shallow groove. Orbits with two fissures above; post orbital tooth separated from the second tooth nearly as in *P. americanus* Saussure; the remaining teeth more acute than in *P. Herbstii*. External hiatus of orbit a narrow fissure. Sub-hepatic tubercle present, small; sub-hepatic regions minutely granulate. Chelipeds unequal; meros with one or two spines on the superior margin near the middle; carpus with a spine on the inner margin; larger hand stout, a rounded tooth below the articulation of the dactylus, dactylus with a strong basal tooth; fingers slightly deflexed; smaller hand with the tooth near the articulation of the dactylus broader and less prominent, and the fingers more strongly deflexed than in the larger hand, dactylus without a basal tooth.

Key West, Florida. A. S. Packard, Jr.

Length of carapax, ♂, 10.5 mm.; breadth, 14 mm.; ratio, 1:1.35.

This species differs from *P. serratus*, *Harti*, *americanus*, *politus* and *transversus* in the acute antero-lateral teeth; from *P. Herbstii*, *planissimus*, *abbreviatus* and *depressus* in the produced, arcuate, bilobed front; from *P. texanus* in the presence of a tooth on the external surface of the hand, and in having the terminal joint of the male abdomen triangular and no broader than preceding joint; from *P. occidentalis*, *Saji* and *texanus* in the basal tooth of the dactylus; and from *P. Wurdemanni* and *Harrisii* in having the edge of the front simple, while in those species it is bi-marginate.

Panopeus sp.

? *Xanthodes leucomanus* Lockington, *l. c.* VII, 100 (1876).

The specimen sent by Mr. Lockington as the type of his *X. leucomanus* is a species of *Panopeus* very near *P. crenatus* Edw. and Lucas, but is too young for specific determination.

Genus XANTHO Leach.

Xantho novem-dentatus Lockington.

Xantho novem-dentatus Lockington, *l. c.* VII, 82 and 99 (1876).

Carapax moderately convex in front, the anterior portion roughened, behind smooth; the areolations in front are well marked and protuberant. Front produced as in the allied species (*X. 16-dentatus* and *vittata*) two lobed, lobes arcuate with crenulated margins and separated from each other by a slight fissure, and from the prominent inner angle of the orbit by a deep rounded notch. Orbits two fissured above. Antero-lateral margin with seven small, sharp, distant teeth; one or two small teeth on the postero-lateral margin behind the lateral angle. Chelipeds unequal, carpus and hand roughened above, the spine on the inner surface of the carpus small, acute; hands with a sulcated crest above. Posterior feet compressed, ciliated, not armed with spines.

Lower California. W. N. Lockington.

Length of carapax, 11.7 mm.; breadth, 15.2 mm.; ratio, 1: 1.30.

Is very closely allied to *X. 16-dentatus* Edw. and Lucas, *X. vittata* Stimpson, and falls in Lucas' genus *Paraxanthus*. It is separated from *X. 16-dentatus* by the more distinct areolation of the carapax, and the arcuate front; from Stimpson's description of *X. vittata* by not having the gastric region divided into three lobules, and by the crenulated non-ciliated front.

Genus CHLORODIUS Leach.

Chlorodius Fisheri Lockington.

Chlorodius Fisheri Lockington, *l. c.* VII, 104 (1876). Streets and Kingsley, *l. c.*, IX, 106 (1877).

This species belongs to the second section of the genus characterized by Prof. Dana, in the U. S. Exploring Expedition Crustacea, as having the carapax areolate in front, behind smooth or imperfectly areolate. Areolet "2 m" not subdivided. Anterior feet unarmed above. Third joint of the eight posterior feet not spinulose.

Carapax moderately areolate in front, obscurely so posteriorly, areolets not so prominent as in *C. floridanus* and *exaratus*; surface slightly rugulose anteriorly, but less so than in *C. floridanus*. Front two lobed, lobes separated by a narrow, acute fissure and with their anterior margins truncate, margins sulcate but not so deeply as in *C. floridanus*. Orbits two fissured above, entire below, the inner inferior angle acute. Antero-lateral margin four-toothed, teeth nearly as in *C. floridanus*. A small tubercle exists between and below the angle of the orbit and the first antero-lateral tooth. Carpus and hand of chelipeds slightly roughened exteriorly, but not so much so as in *C. floridanus*. Posterior feet compressed, unarmed.

Gulf of California. W. N. Lockington.

Length of carapax, ♂, 10 mm., ♀, 15.4 mm.; breadth, ♂, 14 mm., ♀, 22 mm.; ratio, ♂, 1 : 1.40, ♀, 1 : 1.43.

This species differs from Stimpson's short description of *C. occidentalis* (Annals N. Y. Lyc., x, 108) in the narrower carapax, the length being to the breadth in the ratio 1 : 1.64, and in the form of the front. Stimpson says "the median lobes, or teeth of the front, do not project beyond the lateral ones." From *C. floridanus* it differs in the less protuberant areolets, the truncate frontal lobes, the smoother chelipeds, and the less concave sides of the terminal segment of the male abdomen.

Family ERIPHIDAE. Sub-Family OZINÆ.

Genus PILUMNUS Leach.

Pilumnus spinohirsutus Streets and Kingsley.

Acanthus spinohirsutus Lockington, *l. c.*, VII, 82 and 102 (1876).
Pilumnus spinohirsutus Streets and Kingsley, *l. c.*, IX, 107 (1877).

Carapax arcuate, covered with scattered tubercles, which behind

are squamiform and nearly obsolete, but in front are prominent and almost spiniform. Areolations but faintly marked. Front depressed with two prominent lobes separated by a fissure, and each lobe armed with a varying number (three to five) acute spines. The lobes are emarginate near the orbit, at the angle of which is a single stout spine. Orbits with distant spines above and below. Antero-lateral margin with three strong spines, and beneath and in front of the first of these is another. Pterygostomian region tuberculate. Meros of chelipeds with a spine, at the upper distal angle an emargination interior to this spine, behind which is a second spine; carpus and propodus with strong spines and hairs on the upper and outer surfaces, which below are arranged in rows and become tuberculiform; fingers dark brown, almost black. Ambulatory feet with long hairs on all the joints, and slender spines on the carpal, meral, and distal portion of the ischial joints.

Gulf of California. W. N. Lockington.

Length of carapax, ♂, 11 mm., ♀, 17.8 mm.; breadth, ♂, 16.7 mm., ♀, 24.8 mm.; ratio, ♂, 1:1.52, ♀, 1:1.41.

***Pilumnus dasypodus* sp. n.**

Carapax transversely nearly flat, but longitudinally strongly arcuate, smooth behind but with the areolations moderately distinct anteriorly, clothed with long clavate hairs and stiff setae. Front depressed, prominent, two lobed, the lobes being separated by a deep narrow fissure, and each armed with minute teeth. Orbits with distant spines above and below, hiatus wanting. Antero-lateral margin with three strong simple spiniform teeth besides the one at the angle of the orbit. No spines on the hepatic or pterygostomian regions. Chelipeds unequal, carpus and propodus armed above with strong spines, stiff setae and long clavate hairs which on the smaller hand extend on the external surface where the spines become tuberculiform, and are arranged in distinct rows; fingers short, stout, denticulated. Ambulatory feet stout, compressed.

Key West, Florida. A. S. Packard, Jr.

Length of carapax, ♂, 5 mm., ♀, (with eggs) 6.2 mm.; breadth, ♂, 7.2 mm., ♀, 8.8 mm.; ratio, ♂, 1:1.44, ♀, 1:1.42.

This form is distinguished from *P. aculeatus* by the absence of spines on the hepatic region, from *P. Xantusii*, *gemmatus*, *reticulatus*, *ceratopus*, *marginatus*, *Agassizii*, *caribaeus*, *floridanus*, *granulimanus*, *lacteus* and *nudifrons* by having the orbits with spines above and below; from *P. depressus* in the simple character of the antero-lateral

teeth, from *P. lunatus* by the ridge on the endostome. It is nearly related to *P. spinohirsutus* of the Pacific coast, but differs in the denticulated instead of spiny front, and the absence of granulations on the pterygostomian region, etc.

***Pilumnus melanacanthus* sp. n.**

Carapax depressed, regions but faintly indicated, minutely granulated, with several small spines on the hepatic regions. Front broad, horizontal, almost bimarginate; on the upper margin a transverse row of spines directed forward, below which is a second margin of four dentated lobes, the median two being narrow, long, and truncate, the lateral ones broad and arcuate in outline, the teeth becoming larger near the orbits. Orbits above and below with minute acute spines. Antero-lateral margin with three strong, acute spines (besides the angle of the orbit) hooked forward, between which are a number of smaller ones. No spines on the pterygostomian region. Anterior margin of palatal region spined. Chelipeds stout, and armed above with stout black spines. Ambulatory feet without spines, stout, compressed and hairy above.

Key West, Florida. A. S. Packard, Jr.

Length of carapax, 7 mm.; breadth, 9 mm.; ratio, 1: 1.28.

Is most nearly allied to *P. depressus* of the west coast, from which it differs in the spines of the antero-lateral margin, the absence of a subhepatic tooth and the spiniform ornamentation of the chelipeds. From *P. aculeatus* it is distinguished by the greater number of hepatic spines, and the absence of the pterygostomian spine; from *P. spinohirsutus* by the depressed and narrower carapax, and having the hands armed above only; from *P. gemmatus*, *Xantusii*, *reticulatus*, *lunatus*, *ceratopus*, *marginatus* and *floridanus* in having the orbits toothed above and below and with no hiatus, except the one at the inner angle; from *P. Agassizii* in the depressed carapax, absence of arcolation, etc.

Family PORTUNIDAE. Sub-Family LUPINÆ.

Genus CALLINECTES Stimpson.

***Callinectes dubia* sp. n.**

Surface finely granulate, median lobes of front small and not projecting as far as the lateral ones. Orbits with two, obsolete fissures above. Antero-lateral margin with nine teeth, including the lateral tooth of the carapax; anterior tooth truncate, posterior acute, lateral

tooth nearly three times as long as preceding one. Eyes moderate. Antennae about one-third the length of the carapax, the two distal joints of the peduncle subequal. External maxillipeds fringed with hairs, the surface granulate. Ischium of chelipeds minutely granulate, with three spines on the inner margin, the third farther from the second than the second from the first, external margin distally emarginate, external distal angle with a short acute spine; carpus externally with several irregular raised lines, a small spine externally. Hand slender, nearly as long as the carapax, and ornamented with raised lines; of these there are two on the upper surface, three on the inner, the lower being less distinct than the other two, and on the outer surface are two more, the lower being more distinct on the thumb but fading out about the middle of the palm. Fingers about as long as the palm, slender, and somewhat curved downward. Second and third pairs of feet compressed, subequal, fourth pair also compressed, the extremity of the dactylus reaching to the propododactylic articulation of the preceding pair. Fifth pair equalling the fourth in length, the dactylus being a half longer than broad. Sternum nearly as long as broad, transversely but slightly convex. Abdomen of male slender, the sutures mostly indistinct, last segment tapering, as long as broad, extremity rounded. Verges slender, their distal portion straight and reaching to the middle of the third segment of the sternum, or nearly to the extremity of the penultimate segment of the abdomen.

This species resembles *C. pleuriticus* Ordway, more closely than it does any other west coast form. It differs however in the following particulars. The external teeth of the front are more prominent, the antero-lateral teeth are more crowded together, the fissures between them being nearly closed, the male verges are larger and with the extremities straight, and the antero-lateral margin is but very slightly arcuate.

Several specimens from the Gulf of Fonseca, west coast of Nicaragua. A male gives the following measurements.

Length of carapax, 21.3 mm.; breadth, 45 mm.; ratio, 1 : 2.11.

I have found it very difficult to distinguish the species of this genus as the published descriptions are almost wholly comparative, and unless one has a large proportion of the species, determination is by no means an easy matter.

OCYPODOIDEA.

Family GRAPSIDÆ. Sub-Family GRAPSINÆ.

Genus PACHYGRAPSUS Randall, Stimpson.

Pachygrapsus transversus Gibbes.

Grapsus transversus Gibbes, Proc. Am. Assoc. Adv. Sci., III, 181 (1851). *Pachygrapsus transversus* Gibbes, l. c., 182, Stimpson, Annals N. Y. Lyc., VII, 64 (1859); *ibid.*, l. c., x, 113 (1871); Smith, Report Peabody Acad. Science, III, 91 (1871). *Metopograpsus dubius* Saussure, Crustacés Antilles, Mexique et États Unis, p. 29, pl. II, f. 16 (1858). *Metopograpsus miniatus* Saussure, l. c., p. 28, pl. II, f. 17, (1858).

Carapax smooth, shining, with crenulated transverse ridges, oblique on the branchial regions. Supra-frontal lobes prominent, but not so much as in specimens of *P. plicatus* from Tahiti. Front sinuate, making with the inner margin of the orbit a right angle, and viewed from in front, undulating. Orbits with the inferior margin making a sharp angle with the external tooth. A single acute tooth on the lateral margin, margin generally arcuate. The meros of the external maxillipeds is as broad as long, chelipeds unequal; meros crossed by crenulated ridges similar to those on the carapax, inner distal margin armed with from three to five acute teeth; carpus with the ridges less distinct, a prominent rounded tooth on the inner surface; hand minutely granulate, margins rounded; a ridge runs on the lower outer surface from near the base of the palm to the extremity of the pollex; fingers slightly gaping, smooth above and below, the occludent margins finely toothed. Posterior feet with the distal inferior angle with two to four teeth; meros of the first three pairs with a sharp ridge on the anterior and posterior margins; meral and propodal joints of all the ambulatory feet with long hairs; dactyli spinose, stout and with scattered long hairs.

In examining fifty-five specimens of *Pachygrapsi* brought from Key West, Florida, by Dr. Packard, I found forty-nine specimens which I referred without a doubt to *P. transversus*, four to *P. gracilis* and two doubtful ones which resemble Saussure's description and figure of *Metopograpsus miniatus*. These have the narrower front and slightly more arcuate lateral margins, but I can hardly consider them as distinct from *P. transversus*. In the above forty-nine specimens of *P. transversus* I found a variation in the arcuation of the lateral margin, and

in the relative widths of front and carapax; there is also a variation in the ornamentation of the carapax; in some the cardiac region is smooth, in others crossed by elevated ridges. It would thus seem proper to unite these two forms, especially since Saussure says in the closing paragraph of his description of *Metopograpsus dubius*, "Je ne connais pas suffisamment bien les rapports de différence qui séparent les crustacés assez rares de se genre pour oser rien formuler de précis quant à cette espèce, qui je serais enclin à considérer comme le femelle du *M. miniatus*, sans l'extrême largeur de son front et la forme bien différente de sa carapace."

Pachygrapsus gracilis Stimpson.

Metopograpsus gracilis Saussure, *l. c.*, p. 27, pl. II, f. 15 (1858).

Pachygrapsus gracilis Stimpson, *Annals N. Y. Lyc.*, x, 113 (1871).

This species is readily separated from the preceding by the following characters. Cardiac region without transverse elevated lines, supra-frontal lobes nearly obsolete; front regularly arcuate, making an angle of about one hundred and twenty degrees with the inner margin of the orbit, and viewed from in front nearly horizontal; inferior margin of orbit not making an angle with the external orbital tooth; lateral margin nearly straight; meros of external maxilliped a half broader than long. The upper margin of the dactyli of the chelipeds and lower margins of the hand are denticulated; the carapax is narrower and more convex than in *P. transversus*. There appears also the following difference in alcoholic specimens. In *P. transversus* there are irregular patches of darker color on the carapax and hands, while in *P. gracilis* there are minute specks of black on the same portions.

LEUCOSOIDEA.

Family CALAPPIDÆ. Sub-Family CALAPPINÆ.

Genus CALAPPA Fabr.

Calappa convexa Saussure.

Calappa convexa Saussure, *Revue et Magazin de Zoologie*, v, pl. XIII, f. 3, (1853); Stimpson, *Boston Journal Nat. Hist.*, vi, 470, (1857); *ibid.*, *Annals N. Y. Lyceum Nat. Hist.*, x, 114, 1871. *Calappa xantusiana* Stm., *Ann. N. Y. Lyc.*, vii, 237, (1860).

A large male of this species from Panama (J. H. Sternberg) gives the following measurements.

Length of carapax, 55 mm.; breadth, 83 mm.; ratio, 1: 1.51.

Saussure's measurements are : length of carapax, 1 in. 7 lines; breadth, 2 in. ; ratio, 1: 1.26.

Stimpson's measurements are: length of carapax, 1.15 in. ; breadth, 1.46 in. ; ratio, 1: 1.27.

Other than this variation in proportions, which may be due to age, the specimen agrees well with the descriptions and figures quoted above. The following additional characters may however be noted: External maxillipeds hirsute, the ischium toothed on the inner margin; chelipeds externally tuberculate, the tubercles growing smaller and exhibiting a tendency to arrange themselves in rows below; a strong spine arises from the inferior margin of the propodus near the base and extends horizontally outward and forward. The dactylus of the (in our specimen) right hand is compressed, with a crest of rounded teeth above, the first being larger than, and somewhat distant from, the rest; a strong curved tooth projects downward from the outer surface of the dactylus near the articulation with the propodus. The second and third joints of the abdomen are broader than the following ones, the second being tuberculate; the last joint is a third longer than broad.

ON A POSSIBLE ORIGIN OF PETROSILICIOUS ROCKS.

BY W. O. CROSBY.

One of the most interesting, and, geologically at least, one of the most important, results of the deep sea investigations carried on during the last decade, particularly by the Challenger Expedition, is the discovery that over very extensive areas in the deeper parts of the ocean, two remarkably fine and uniform and yet very dissimilar kinds of sediment are slowly accumulating. Of these, the first discovered and the best known is the globigerina-ooze, which appears in the dredge as an impalpable and tenacious calcareous slime or mud, consisting essentially of the shells of Globigerina and other Foraminifera, though often perceptibly silicious from the presence of sponge spicules, radiolarian skeletons, and diatom frustules, and frequently containing the hard parts of higher animals. This material forms a white powder on drying, and it is now generally recognized as a modern chalk deposit; a slight degree of induration, and a segregation of the silica being all that is required to give it the aspect of the true chalk with flints; and in many parts of the ocean its deposition has probably been uninterrupted since Cretaceous time.