

Mr. F. G. Sanborn exhibited a branch of white oak, *Q. alba* Linn., from which the extremity had been severed by the larva of *Elaphidion villosum* Fabr., and which had been also perforated by the larva of *Leptostylus macula* Say.

The specimen illustrated in a striking manner a degree of intelligence displayed by the first mentioned species, which after completing its central burrow, and nearly severing the twig, as usual, between its winter quarters and the body of the tree, found its operations intruded upon by the larva of *Leptostylus*, which was engaged in penetrating the twig in the same direction, but nearer the bark than the burrow of *Elaphidion*. He maintained that the specimen showed incontestably that on making this discovery, the larva of *Elaphidion* had retired in its burrow about one half inch from this point, and successfully undertaken the by no means inconsiderable labor of severing the twig a second time in a locality sufficiently removed from the encroachments of *Leptostylus* to satisfy its somewhat misentomical feelings.

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February 3, 1869.

Dr. Charles Pickering in the chair. Sixteen members present.

The following papers were read:—

NOTES ON NEW OR LITTLE KNOWN SPECIES OF AMERICAN CANCROID CRUSTACEA. BY SIDNEY I. SMITH.

The following notes were begun as part of a more extended article on the higher crustacea of the western coast of tropical America, but the delay in bringing together the requisite material and the discovery of undescribed forms from the eastern coast, have induced me to publish in this preliminary manner the more interesting of the new or little known species of both coasts. The materials upon which the descriptions are based, unless otherwise indicated, are in the collections of the Museum of Yale College.

*Xantho denticulata* White, List of Crust. in British Mus., p. 17 (no description), 1847.

*Xantho denticulatus* White,<sup>1</sup> Annals and Mag. Nat. Hist., 2d series, Vol. II, p. 285, 1848.

Carapax naked, anteriorly deflexed and deeply areolated; gastric region elevated and surrounded laterally and posteriorly by a deep groove, the anterior lobes prominent, the antero-lateral slightly divided anteriorly and separated by a well marked groove from the median, which extends forward in a slender point to the anterior lobes; hepatic region projecting into several obtusely conical tubercles, and separated from the branchial region by a deep furrow; antero-lateral lobe of the branchial region prominently projecting; postero-lateral slope and margin crossed obliquely by a slight furrow. Front projecting, slightly deflexed, and with a slight groove along the anterior edge, which is nearly straight as seen from above, but sinuous in its margin as seen from before. Antero-lateral margin armed with about nine spiniform teeth, the anterior one being small, and situated below the level of the others. Inner sub-orbital tooth prominent. Latero-inferior regions slightly granulous. Basal segment of the external antennæ joining a slight process from the front.

Chelipeds with the carpus and hand rugose above; the hand smooth below and on the inside, the fingers black and slightly and obtusely toothed within, ambulatory feet nearly smooth, the dactyli slender, compressed, and slightly hairy along the edges.

Length of carapax in a female from the Abrolhos Reefs, 16.6 millim.; breadth, including teeth, 26.5 millim.; ratio of length to breadth, 1: 1.66.

Abrolhos Reefs, Brazil; C. F. Hartt. Aspinwall; F. H. Bradley. Bermuda; J. M. Jones.

*Xantho Stimpsonii* differs from this species in having the front quadrilobate and the carpi and hands of the chelipeds tuberculated above, in the areolation of the carapax, etc.

#### PANOPEUS Edw.

The species of this genus, which, as far as known, is peculiar to America, are becoming quite numerous, although but a single one was known to Milne Edwards at the time of the publication of his *Histoire naturelle des Crustacés*. There have already been described twelve species:—*P. Herbstii* Edw., *P. Harrisii* Stimp., *P. Wurde-mannii* Gibbes, *P. occidentalis* Sauss., *P. serratus* Sauss., *P. america-*

<sup>1</sup> Stimpson, being apparently unaware of White's species, has described (Annals Lyc. Nat. Hist., N. Y., Vol. VII, p. 207, 1860) an allied species from Cape St. Lucas, as *Xantho denticulata*, which I will here designate as *Xantho Stimpsonii*.

*pus* Sauss., *P. texanus* Stimp., *P. transversus* Stimp., and *P. abbreviatus* Stimp., from the eastern coasts of North America and the West Indies; *P. chilensis* Edw. et Lucas, *P. crenatus* Edw. et Lucas, and *P. transversus* Stimp., from the western coasts of Central and South America; and *P. lævis* Dana, described as from an unknown locality, but referred to the west coast of South America by Stimpson (Annals Lyc. Nat. Hist., N. Y., Vol. VII, p. 54). In these notes seven additional species are described, four of them from the east and three from the west coast.

I add here a table to facilitate the determination of the species.

A. A tubercle on the sub-hepatic region just below the first lobe of the antero-lateral border of the carapax.

a. Antero-lateral margin of the carapax armed with projecting teeth, of which the three posterior ones on each side are prominent and sharply angular.

1. External hiatus of the orbit a broad and deep opening. Tubercle of the sub-hepatic region prominent.

*P. Herbstii*, *P. validus*.

2. External hiatus of the orbit a deep notch rather than an opening. A groove along the outer border of the carpus next the articulation with the hand.

*P. occidentalis*, *P. serratus*, *P. Hartii*, *P. Bradleyi*.

b. Antero-lateral margin divided by slight incisions into four lobes (the first being composed of the angle of the orbit coalesced with the second normal tooth), the first three truncate, the fourth forming the lateral angle of the carapax. Tubercle of the sub-hepatic region not prominent.

*P. transversus*, *P. politus*, *P. planus*.

B. No tubercle on the sub-hepatic region. External hiatus of the orbit small.

*P. crenatus*, *P. Harrisii*, *P. depressus*, *P. Sayi*.

Having had no opportunity to examine *P. americanus*, *P. texanus*, *P. abbreviatus*, *P. chilensis*, *P. Wurdemanni* and *P. lævis*, they are not included in the table.

**Panopeus Herbstii** Edw., Hist. nat. des Crust., tome i, p. 403, 1834 (non *Cancer Panope* Herbst).

Carapax moderately convex and crossed by a few very slight granulous rugæ, areolation distinctly marked, but the areolets not pro-

tuberant; front and antero-lateral border finely granulous and clothed with scattered, coarse pubescence. Front prominent and nearly horizontal, the edge thin, obscurely four-lobed as seen from above, median lobes much the largest, extending a little further forward than the lateral and separated on the upper edge by a short, deep groove. Superior margin of the orbit with two distinct fissures. Post-orbital tooth separated from the second tooth of the antero-lateral margin by a rounded sinus, and forming with it a prominent bidentate lobe, with the inner tooth obtusely triangular and extending forward to a line with the outer angle of the inferior margin of the orbit, the outer tooth rounded at the tip; remaining teeth of the antero-lateral margin large and prominent; third tooth with its anterior edge straight, and the outer, or posterior, edge arcuate; fourth acutely triangular, the anterior edge thickened and curved slightly forward; fifth, or posterior tooth slender and acute, the anterior edge much thickened and strongly curved forward. Inferior lateral regions granulous and pubescent. Inferior margin of the orbit divided by a deep fissure, the inner lobe projecting as a sharp tooth nearly to a line with the front, the outer lobe broad, with the edge thin and straight.

Chelipeds with the carpi and hands smooth or slightly rugose; hands unequal, stout, larger one (either the right or the left) with a tubercle on the outer side projecting forward from the edge between the bases of the fingers; dactylus with a strong basal tooth within; smaller hands with the fingers more slender and slightly deflexed, the dactylus wanting wholly the basal tooth; fingers of both hands with longitudinal impressed striæ. Ambulatory feet with the basal joints pubescent along the edges, the terminal joints wholly pubescent.

Color of alcoholic specimens dark olive above; the fingers black, lighter at the tips.

Several specimens give the following measurements:—

Locality.	Sex.	Length of carapax.	Breadth of carapax.	Ratio.
Florida ?	♂	17.9 mm.	24.0 mm.	1 : 1.34.
Egmont Key, Fla.,	"	21.5 "	30.0 "	1 : 1.39.
" " "	"	26.0 "	35.6 "	1 : 1.36.
Bahamas,	"	26.4 "	39.0 "	1 : 1.47.
Florida,	"	33.0 "	49.8 "	1 : 1.48.
Bahamas,	"	35.0 "	51.8 "	1 : 1.46.
Egmont Key, Fla.,	♀	13.4 "	17.8 "	1 : 1.33.
" " "	"	17.8 "	24.8 "	1 : 1.39.
Florida ?	"	25.8 "	37.6 "	1 : 1.42.
"	"	27.0 "	38.7 "	1 : 1.43.

South Carolina (Coll. Essex Institute). Bahamas; Dr. H. Bryant (Coll. Boston Soc. Nat. Hist.). St. Augustine, Fla.; Col. W. E. Foster. Egmont Key, west coast of Florida; Col. E. Jewett. Aspinwall; F. H. Bradley.

The *Cancer Panope* Herbst (Krabben und Krebse, Tab. 54, fig. 5, Vol. III, zweites Heft, p. 40, 1801), if we may trust the figure, is very different from this species, and cannot be referred to any described species of *Panopeus*; moreover, Herbst distinctly states that it is an East Indian species.

Variety **obesus**.

Carapax strongly convex. Front broad, deflexed, not prominent, the edge as seen from above nearly straight, and not at all four-lobed. Post-orbital tooth not prominent, slightly separated from the second normal tooth of the antero-lateral margin by a very shallow sinus; remaining teeth of the margin not very prominent; the third broad, and its outer edge truncate; fourth broad, the anterior edge very short, but slightly hooked forward at the apex, and the outer edge slightly arcuate; last tooth very short, but acute, and its apex slightly curved forward. Inferior regions, chelipeds, etc., very nearly as in *Herbstii*.

Color of alcoholic specimens, brownish olive, clouded and spotted with dull red on the anterior part of the carapax, and on the upper side of the chelipeds; fingers black or dark brown, lighter at the tips. In all the specimens the hands are spotted externally with red.

Length of carapax in a male, 23.6 millim.; breadth, 33.4 millim.; ratio, 1 : 1.41.

Egmont Key, Fla.; Col. E. Jewett. Aspinwall; F. H. Bradley.

Specimens from Egmont Key appear quite distinct from specimens of *Herbstii* from the same locality, having the carapax broader and much more convex, the teeth of the antero-lateral margin less prominent and somewhat different in form, and the coloration quite different; but specimens of *Herbstii*, in the Society's collection, from Bahama and Florida, approach quite closely to the variety, in the breadth and convexity of the carapax, the form of the teeth of the antero-lateral margin of the carapax, and even slightly in coloration.

**Panopeus validus**, sp. nov.

Carapax slightly convex, deeply areolated, and crossed anteriorly by a few coarsely granulous rugæ, lateral regions and the anterior part of the gastric region sparsely and coarsely granulous, and clothed with hairy pubescence. Front prominent and horizontal, the edge granu-

lous and distinctly four-lobed as seen from above, the median lobes much the largest, extending farther forward than the lateral, and separated by a distinct fissure from which a deep median groove extends a short distance backward. Superior margin of the orbit divided by two deep fissures. Post-orbital tooth stout, separated from the second tooth of the antero-lateral border by a deep, rounded sinus, and forming with it a prominent bidentate lobe, the teeth being of nearly equal prominence; remaining teeth large and very prominent; third tooth with its apex strongly hooked forward, and its outer or posterior edge arcuate; fourth tooth very long, the apex rather slender and turned abruptly forward; fifth, or posterior tooth, narrow and vertically thickened, the apex slender and curved forward. Inferior lateral regions rather coarsely granulous and clothed with a hairy pubescence. Inferior margin of the orbit divided by a deep fissure into two lobes, the inner one projecting forward as a long, stout tooth, the outer one broad, with the outer angle of the anterior edge strongly projecting. Tubercle of the sub-hepatic region stout and spiniform.

Chelipeds with the carpi rugose externally, and with a shallow depression along the outer border next the articulation with the hand; hands a little unequal, stout, obtusely carinated on the upper edge, very slightly rugose above; dactyli with a rounded carina on the upper edge at the base; all the fingers irregularly toothed within, and marked with distinct longitudinal impressed striæ; in the larger hand, a stout tooth at the base of the dactylus, and a rudimentary tubercle on the outer anterior edge of the palm between the bases of the fingers. Ambulatory feet stout and very pubescent, especially on the terminal joints. Fingers dark brown, lighter at the tips.

Length of carapax in a male, 30.0 millim.; breadth, 43.2 millim.; ratio, 1: 1.44.

Panama and Acajutea; F. H. Bradley.

This species appears to be closely allied to *P. chilensis* Edw. et Lucas (Voy. dans l'Amér. Mérid. de D'Orbigny, Crust., p. 16, pl. VIII, fig. 2), but the fingers in that species are said to be "*non cannelés*," and the carapax seems to be much smoother than in the Panama species.

***Panopeus occidentalis*** Saussure, Crust. nouv. de Mexique et des Antilles, p. 15, pl. I, fig. 6, 1858.

In the Society's collection there is a specimen of *Panopeus* collected at the Bahamas by Dr. Bryant, which evidently belongs to this species.

The general outline of the carapax is very similar to that of *P. Herbstii* of the same size, but the carapax is smoother, the areolets slightly swollen and more distinctly marked, the three posterior teeth of the antero-lateral margin are broad and stout, obtusely triangular, strongly upturned, and not at all hooked forward; the carpus is smooth and the groove on the outer anterior margin is rather broad and shallow; the hands are very much as in *Herbstii*, but smoother; the ambulatory feet are relatively longer and slenderer than in *Herbstii*.

Length of carapax in the single male specimen, 20.9 millim.; breadth, 29.2; ratio, 1:1.40.

**Panopeus serratus** Saussure, op. cit., p. 16, pl. 1, fig. 7.

I refer to this species a single female specimen collected at St. Thomas by Prof. C. F. Hartt. It differs from the last species in the rougher carapax, the more slender and acute teeth of the antero-lateral margin, and markedly in the very rugose upper sides of the carpi and hands. From *P. Harttii* it differs in having the carapax much narrower in proportion, much more convex, the areolets not nearly so well marked nor so prominent, and the front only very obscurely four-lobed.

Length of carapax, 12.2 millim.; breadth, 16.2; ratio, 1:1.33.

**Panopeus Harttii**, sp. nov.

Carapax broadest at the penultimate teeth of the antero-lateral margin, convex anteriorly, slightly flattened behind; areolets well marked and somewhat protuberant anteriorly; coarsely granulous and slightly pubescent on the front and antero-lateral borders; hepatic regions prominent and bearing a transverse ridge; anterior lobes of the gastric region prominent; the anterior part of all the regions crossed transversely by slight granulous rugæ. Front very much deflexed, the anterior edge thin and four-lobed, the median lobes much the largest, evenly rounded, and a little more prominent than the lateral, which project as small obtusely triangular teeth. Post-orbital tooth short and slender, and separated from the second tooth of the antero-lateral margin by a broad sinus which breaks the margin completely; remaining teeth triangular in form, much thickened vertically, and separated by quite broad sinuses, the posterior two on each side very slender, and of nearly equal prominence. Inferior lateral regions coarsely granulous. Inferior margin of the orbit broken by a deep fissure, the inner lobe forming a stout tooth, the outer lobe

broad, and the lateral angle projecting slightly in advance of the post-orbital tooth.

Chelipeds with the carpi externally granular-rugose, and with a deep groove along the outer margin next the articulation with the hand; hands a little unequal, slightly rugose above; fingers slender, deflexed, with slight impressed lines, and slightly and obtusely toothed within, the dactylus in the larger hand having usually a larger tooth at the base. Ambulatory feet slender and pubescent along the edges. Fingers black, lighter at the tips, the color not spreading upon the palm.

Length of carapax in a male, 15.0 millim.; breadth, 22.5 millim.; ratio, 1:1.50.

Abrolhos Reefs, Brazil; Prof. C. F. Hartt.

**Panopeus Bradleyi**, sp. nov.

Carapax slightly convex in an antero-posterior direction, but not at all transversely; antero-lateral border slightly upturned, so that the points of the teeth are nearly, or quite, on a level with the middle of the carapax; areolations well marked, and the regions somewhat protuberant; microscopically granulous on the margins, and with a few very slight transverse rugæ. Front slightly prominent, nearly horizontal, the edge thin, with a minute median incision, and the lateral angles projecting as narrow obtuse teeth. Incisions of the superior margin of the orbit well marked. Post-orbital tooth small, triangular, and separated from the second tooth of the antero-lateral margin by a rounded sinus; remaining teeth rather prominent, triangular, thickened along the anterior edge, and with sharp depressions running back upon the carapax between their bases. Postero-lateral border crossed by a slight depression. Inner angle of the inferior margin of the orbit projecting into a prominent sharp tooth, outside of which the edge of the orbit is thin, straight and not prominent. External hiatus of the orbit a deep, acutely triangular notch. Tubercle of the sub-hepatic region very small and close under the margin of the carapax.

Chelipeds with the carpi rugose externally, and with a deep and narrow groove along the anterior margin of the outer side; hands unequal, with a slight double carina along the upper edge; larger hand stout, fingers short, widely gaping, irregularly toothed within, and with a stout tooth at the base of each finger, the one on the dactylus shutting just within the other; smaller hand with the fingers slender,



not gaping and wanting the basal teeth. Fingers brown, lighter at the tips, and the dactyli lighter than the other fingers.

Length of carapax in the male, 8.4 millim.; breadth, 11.5 millim.; ratio, 1:1.37.

Panama; F. H. Bradley.

**Panopeus politus**, sp. nov.

Carapax entirely naked above, broad, moderately convex in two directions, slightly granulous and uneven on the front and antero-lateral border, smooth on the median region and posteriorly; regions slightly, but distinctly marked. Front strongly deflexed, the edge somewhat beveled from above, four-lobed, the median lobes being very broad, prominent, and separated by a sharp notch, the lateral lobes projecting as small teeth. First lobe of the antero-lateral margin broad, and its edge slightly concave; remaining lobes truncate and separated by three slight notches, from which slight grooves extend back upon the carapax, that from the second notch being most distinct, and forming the posterior limit of the hepatic region. Inner angle of the inferior margin of the orbit forming a prominent tooth, the outer part of the margin projecting very little. All the sub-orbital and sub-hepatic regions distinctly granulous; the tubercle on the sub-hepatic region being much depressed, forming a slight granulous prominence.

Chelipeds with the carpi and hands smooth and evenly rounded above; hands a little unequal, fingers rather stout, irregularly toothed within, and with a prominent tooth at the base of the dactylus in the larger hand. Ambulatory feet nearly naked, except the dactyli, which are covered with a close pubescence.

Color of alcoholic specimen light brown above, tinged with bluish purple on the anterior part of the carapax and the upper side of the chelipeds; fingers black, lighter at the tips, the color not spreading upon the palm.

Length of carapax in a female, 13.8 millim.; breadth, 21.4 millim.; ratio, 1:1.55.

Abrolhos Reefs, Brazil; Prof. C. F. Hartt.

This species is allied to *P. transversus* Stimpson (Annals Lyc. Nat. Hist. N. Y., Vol. VII, p. 210, 1860), from the west coast of Central America, but is easily distinguished from it by the more deeply areolated and uneven carapax, the more produced front, the concave instead of convex post-orbital lobe, and by the more deeply notched and uneven antero-lateral margin. The color also is very different.

**Panopeus planus**, sp. nov.

Carapax naked, very broad, depressed and very flat above; front and sides crossed by numerous granulous rugæ; areolation very distinct, the gastric region surrounded laterally and posteriorly by a deep groove, a deep groove extending from the anterior extremity of the median gastric lobe to the middle of the front, and a similar groove separating the hepatic from the branchial region, and joining the middle incision of the antero-lateral margin. Front nearly horizontal, scarcely at all prominent, the edge slightly thickened and granulous, a very little arcuate in the middle, with a slight median incision, and the lateral angles projecting as small teeth, nearly or quite to a line with the middle. First lobe of the antero-lateral margin broad, not at all advanced, and its edge straight; remaining lobes not at all prominent and separated by very slight notches. Sub-orbital and sub-hepatic regions very much as in *P. politus*, but rather more strongly granulous and quite pubescent.

Chelipeds with the carpi and hands smooth and evenly rounded above, the fingers rather slender, slightly deflexed, and with very slight, longitudinal, impressed striæ. Ambulatory feet long and slender, pubescent along the edges and the dactyli wholly pubescent.

Length of carapax in a male, 16.5 millim.; breadth, 26.4 millim.; ratio, 1:1.60.

Panama; F. H. Bradley.

This species is at once distinguished from all others in the genus by its very flat carapax.

**Panopeus depressus**, sp. nov.

Carapax depressed, slightly convex, crossed by numerous transverse granulous rugæ, and granulous and slightly pubescent on the front and antero-lateral border; regions slightly marked and not protuberant, except the anterior part of the gastric which is somewhat swollen. Front broad, nearly horizontal, not at all prominent, and its edge thin, almost perfectly straight, and with a slight median notch in the larger specimens. First lobe of the antero-lateral margin broad, composed of the angle of the orbit coalesced with the second normal tooth, its edge thin, the inner angle slightly curved forward to form the angle of the orbit, the outer angle slightly rounded; remaining teeth of the antero-lateral margin separated by deep triangular notches; third normal tooth broad, truncate, its anterior angle sharp, posterior angle rounded; fourth tooth prominent, its anterior edge straight or slightly hooked forward at the apex, outer and pos-

terior edge arcuate; last tooth narrow, its apex slender and hooked forward. Inferior lateral regions pubescent and thickly granulate. Inferior margin of the orbit thin, its edge as seen from below continuous but somewhat concave, and the inner angle projecting forward to a line with the inner angle of the superior margin.

Chelipeds unequal, carpi and hands slightly granulous above; larger hand stout, the dactylus curved strongly and without a strong basal tooth within; smaller hand with the fingers slender and somewhat spoon-shaped at the tips; all the fingers with slight longitudinal impressed striæ. Ambulatory feet pubescent along the edges, the dactyli in the posterior pair much shorter than the others. Terminal segment of the male abdomen narrower than the penult, about three-fourths as long as broad, the sides convex and the tip rather broadly rounded. Fingers black, lighter at the tips, the black spreading far upon the palm.

Length of the carapax in a male, 18.6 millim; breadth, 26.8; ratio, 1:1.44.

New Haven, Conn., common. Found in abundance at Egmont Key, Fla., by Col. E. Jewett. There are also specimens in the Society's collection.

This species, as well as the next, has very likely been confounded with the young of *P. Herbstii*, but it is very different, and is easily distinguished from it by the more depressed carapax, the very different teeth of the antero-lateral margin, and by the entire absence of the tooth at the base of the dactylus in the larger hand.

**Panopeus Sayi**, sp. nov.

*Cancer Panope* (pars) Say, Journal Acad. Nat. Sci. Philadelphia, Vol. I, p. 58, 1817 (non Herbst).

Carapax narrow, strongly convex, microscopically granulous and slightly pubescent; regions distinctly marked and protuberant. Front very prominent and slightly deflexed, the edge thin, strongly arcuate as seen from above, with a distinct median incision, the lateral angles rounded and not at all projecting. First lobe of the antero-lateral margin composed of the angle of the orbit coalesced with the second normal tooth, not at all prominent, slightly concave, the inner angle slightly projecting to form the angle of the orbit, outer angle short and rounded; third normal tooth projecting much more than the lobe in front of it, and truncate; fourth tooth prominent, somewhat triangular and separated from the third and fifth by rather deep triangular notches; fifth, or last, narrow, triangular, much thick-

ened and with a ridge extending back upon the carapax. In some young specimens the tips of the teeth are slightly hooked forward. Inferior lateral regions finely granulate. Inferior margin of the orbit not broken by a notch, but the inner angle rather abruptly projecting as an obtusely triangular tooth. External hiatus of the orbit a small and very narrow incision.

Chelipeds unequal (either the right or left being the larger), carpi and hands smooth or slightly rugose above; larger hand very stout, the fingers short and thick, obtusely toothed within, and without a strong basal tooth on the dactylus. Ambulatory feet somewhat pubescent, all the dactyli long and slender. Terminal segment of the male abdomen broader than the penult, about two-thirds as long as broad, the side slightly concave and the tip abruptly triangular. Fingers black, the tips lighter and the black spreading broadly upon the palm.

Length of carapax in a male from New Haven, 18.8 millim.; breadth, 25.2 millim.; ratio, 1:1.34. Length of carapax in a male from Cape Cod, 19.2 millim.; breadth, 25.2 millim., ratio, 1:1.31.

New Haven, Conn., in the same localities with the last species and in about equal abundance. Eastham, Cape Cod; W. C. Fish (Collection of the Essex Institute).

This species is easily distinguished from *P. depressus* by its narrower and much more convex and swollen carapax, the projecting and arcuate front, the more abruptly projecting inner angle of the inferior margin of the orbit, and by the very different form of the terminal segment of the male abdomen. The teeth of the antero-lateral margin are also quite different. In some respects it agrees with Stimpson's description of *P. texanus* (Annals Lyc. Nat. Hist. N. Y., Vol. VII, p. 55, 1859) and it may possibly prove to be that species, but over one hundred specimens examined agree in having the fingers black, the left hand frequently the larger and the first second normal teeth of the antero-lateral border coalescing.

***Pilumnus limosus*, sp. nov.**

Body and feet covered with a light brown, velvet-like pubescence composed of short clavate hairs, among which the tubercles and granules appear as little depressed pits in the general surface. Carapax strongly deflexed in front but much flattened posteriorly, distinctly areolated, and ornamented above with about forty, scattered, small tubercles or granules, of which fourteen of the larger ones are on the gastric region, two being on each of the anterior lobes, three on each of

the antero-lateral, one on the extremity of the median, and three arranged in a triangle behind it; the remaining ones which are smaller, irregularly distributed over the branchial and posterior regions. Front very strongly deflexed and four-lobed, the median lobes much larger than the lateral, projecting almost perpendicularly downward, separated by a deep, acutely triangular sinus, and their outer and anterior edges slightly denticulate; the lateral lobes projecting as slender teeth. Superior margin of the orbit armed with three small tubercles, of which the outer one forms the external angle. Antero-lateral margin armed with three long, triangular teeth which are separated from the angle of the orbit by a broad shallow sinus, below which, on the inferior region, there is a slender tubercle. Inferior margin of the orbit broken by a deep sinus, the inner lobe prominent and usually somewhat bituberculate at the tip, the outer lobe armed along the margin with three or four small tubercles; external hiatus well marked. Inferior orbital region with a few scattered granules. An oblique line of eight or ten small tubercles on the sub-branchial region terminating just behind the posterior tooth of the antero-lateral margin.

Chelipeds slightly unequal, carpus armed with a strong spine on the inner edge and a few scattered tubercles on the upper surface, hand tuberculose above and externally, the palm with a naked and smooth space on the lower edge at the base of the finger, fingers smooth, striate and dark brown, the color not spreading upon the palm. Ambulatory feet slender and armed with a few scattered sharp granules on the upper side.

Length of the carapax in a male from Panama, 11.4 millim.; breadth, 15.0; ratio, 1:1.31. Length of carapax in a female from the same locality, 11.0 millim.; breadth, 14.5 millim.; ratio, 1:1.32.

Zorritos, Peru, and Panama; F. H. Bradley.

**Trapezia formosa**, sp. nov.

Carapax without lateral spines or teeth, very smooth and shining, convex in two directions, very broad in the middle but much contracted at the orbits; regions not at all defined; two puncta on the posterior part of the gastric region, a scattered group of several on each side in front of these and quite near the orbits, and an irregular sub-marginal line of small ones along the front. Front with a slight groove along the margin above, the edge thin, slightly crenulated, and somewhat six-lobed, the median lobes narrow but more prominent than the others; outer angle of the orbit not at all promi-

ment; sides very convex, the edge obtusely rounded, and, in the younger specimens, a very slight rounded projection on the anterior margin of the branchial region, which is entirely wanting in the larger specimens.

Chelipeds slightly unequal, smooth and glabrous, with a very few scattered puncta on the upper side; meros rather short; the anterior edge armed with about six small teeth; carpus with a slight, obtuse and rounded projection on the inner margin; hand stout but not swollen, the fingers short, considerably incurved, with a few sharp teeth within, not gaping but the pointed tips somewhat hooked by one another. Ambulatory feet slender, and glabrous to the tarsi.

Color of alcoholic specimens uniform orange, a little darker above than below; the fingers brownish.

A number of specimens give the following measurements:—

Sex.	Length of carapax.	Breadth of carapax.	Ratio.	Breadth at outer angles of orbits.	Breadth of front between orbits.
♂	5.6 mm.	6.8 mm.	1:1.21	6.2 mm.	3.6 mm.
"	7.4 "	9.2 "	1:1.24	8.1 "	4.6 "
"	7.6 "	9.6 "	1:1.26	8.4 "	5.0 "
♀	6.9 "	8.4 "	1:1.22	7.4 "	4.0 "
"	8.9 "	11.8 "	1:1.31	9.5 "	5.6 "

Pearl Islands, Bay of Panama, among *Pocillipora capitata* Verrill; F. H. Bradley.

This species is easily distinguished from the next by the carapax being much broader in proportion, much narrowed in front, the outer angles of the orbits short and rounded, the sides arcuate and without a marginal tooth on the anterior lobe of the branchial region.

? *Trapezia cymodoce* Guérin, Dana, U. S. Expl. Expd., Crust., p. 257, pl. 15, fig. 5.

This species, or one so closely allied that the published descriptions and figures do not enable me to distinguish it, was collected by Mr. Bradley with the last species, and in much greater abundance.

Carapax smooth and glabrous, broad, slightly convex, and in younger specimens quite as broad at the outer angles of the orbits as between the lateral teeth, but in large specimens, and especially females, it is slightly contracted in front; the puncta arranged much as in the last species but less marked and regular on the front. Front distinctly six-lobed, without a groove along the upper margin, the edge thin, and in some specimens very slightly crenulate; external angle of the orbit rather prominent and in young specimens acute

and somewhat spiniform; lateral edges thin, not at all rounded, and with a very distinct tooth on the anterior lobe of the branchial region, which, in young specimens, projects forward as a sharp spine.

Chelipeds much as in the last species, but the meros more strongly toothed. Ambulatory feet slightly hairy on the terminal segments.

Coloration very much as in *T. formosa* but the fingers a little darker.

Several specimens give the following measurements:—

Sex.	Length of carapax.	Breadth of carapax.	Ratio.	Breadth at outer angles of orbits.	Breadth of front between orbits.
♀	7.2 mm.	8.6 mm.	1:1.19	8.6 mm.	4.9 mm.
"	8.4 "	9.8 "	1:1.17	9.4 "	5.1 "
"	9.8 "	11.3 "	1:1.15	11.1 "	6.6 "
"	11.6 "	13.5 "	1:1.16	12.6 "	7.4 "
♂	6.8 "	8.0 "	1:1.18	7.9 "	4.8 "
"	11.6 "	13.8 "	1:1.19	13.1 "	7.6 "

It appears to be a much larger species than *T. formosa*.

**Quadrella nitida**, sp. nov.

Carapax smooth, convex in two directions, broadest in the middle; front armed with six spiniform teeth, the median ones larger, more prominent, and separated by a deeper sinus than the others; external angle of the orbit projecting as a sharp spine; sides convex, the edge obtuse and rounded, with a single slender spine, or in the larger specimens only a slight angular projection, at the anterior lobe of the branchial region. Inner angle of the sub-orbital margin armed with a slender spine which projects considerably beyond the spine of the front above it.

Chelipeds somewhat unequal, very large; meros long, its posterior edge rounded, the anterior edge armed with six to eight slender spines, usually eight in the larger and six in the smaller cheliped; carpus smooth, evenly rounded on the outer side and with a single short spine on the anterior part of the inner side; hands stout and considerably swollen, especially the larger one, smooth and unarmed, equaling or exceeding in length the breadth of the carapax, the fingers not gaping, those of the larger hand rather stout and strongly incurved, those of the smaller hand longer and more slender. Ambulatory feet slender and smooth except the dactyli which are slightly pubescent.

Color of alcoholic specimens light yellowish, the fingers tinged with orange and encircled with a median band of black.

Length of carapax in a male, excluding the teeth of the front, 9.3 millim.; breadth, 11.2 millim.; ratio of length to breadth, 1:1.20; length, including spines of the front, 10.0 millim. Another male gives, length of carapax, 7.3 millim.; breadth, 8.5 millim.; ratio, 1:1.16; length including spines, 7.8; length of meros in larger cheliped, 6.4; length of hand, 10.4; breadth of hand, 4.3; length of meros in smaller cheliped, 5.8; length of hand, 9.4; breadth of hand, 3.3. Length of carapax in a female, 8.0 millim.; breadth, 9.6 millim.; ratio, 1:1.20; length including spines, 8.6 millim.

In young specimens the sides of the carapax are less convex than in adults.

Pacheca, one of the Pearl Islands, Bay of Panama, six to eight fathoms among pearl oysters; F. H. Bradley.

*Q. coronata* Dana, the only other described species of the genus, was from the Sooloo Sea, or Balabac Straits.

#### NOTES ON THE CONCENTRIC STRUCTURE OF GRANITIC ROCKS.

BY N. S. SHALER.

Von Buch, in his paper on the concentric form of massive rocks, called attention to the peculiar onion-like lamellation visible upon the outside of almost all granite masses; he left, however, the question of the origin of this peculiar structure quite unexplained. It probably afforded him another proof of the theory of upheaval of volcanic and other dome-like elevations, an opinion which it oftentimes seems to support. So far as is known to the author, though several writers have referred to the existence of this peculiar feature in certain massive rocks, no effort has been made to trace the cause of its existence.

As affecting the disintegration of granitic and other massive rocks where it occurs, this feature in their structure has a very great importance. Being most marked in those regions where the ordinary joints and fissuring have had the least effect in preparing the way for detrital agents, it enables flowing water, frost and waves, to break open masses which, but for this element of weakness, would be very little affected by the agents of decay. The shore of New England and the more northern portions of the Continent of North America, abound with cliffs of the hummocky form so characteristic of granitic shores, which, on inspection, show how far this feature renders the pounding of the sea effective. Looking closely at the structure of any portion of such a shore line, we perceive that the waves, finding