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P R O C E E D I N G S

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*January 7th.*

Dr. LEIDY in the Chair.

Fourteen members present.

A paper was presented for publication entitled

Description of new Cretaceous Fossils from Nebraska Territory, etc.,  
by F. B. Meek and F. V. Hayden, M. D.

Mr. Cope stated that he had examined the dentition of the Siamese river snake, *Herpeton tentaculatum*, respecting which some difference of opinion existed among European herpetologists. He had found the posterior maxillary teeth to be grooved, in accordance with the statement of M. Duméril.

Regarding another point of difference between naturalists—the native country of the *Gerarda prevostiana* (*Campylodon* Dum.)—Mr. Cope adhered to the statement in the *Erpetologie Generale*, that it inhabited the Philippine Islands. Others had stated that the form was West Indian.

Dr. Günther had corrected the above-mentioned work in its statement that the *Rhabdosoma* (*Catostoma*) *lineatum* was West African. Mr. Cope was able to confirm the Doctor's opinion through specimens obtained in Trinidad, and lent him by Prof. Gill.

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*January 14th.*

Vice President VAUX in the Chair.

Twenty members present.

The following papers were presented for publication :

Notes on some American Ash Trees, (*Fraxinus*), with descriptions of new species, by S. B. Buckley.

On the Leucosomi inhabiting the basin of the Delaware, by C. C. Abbott.

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*January 21st.*

Vice President BRIDGES in the Chair.

Twenty-nine members present.

The following papers were presented for publication :

Descriptions of new Plants from Texas, by S. B. Buckley.

On the uniformity of relative characters between allied species of European and American Trees, by Thomas Meehan.

Notice of a new species of *Hemilepidotus*, by Theo. Gill.

On the subfamily of *Argentininae*, by Theo. Gill.

Notes on the *Sciænoids* of California, by Theo. Gill.

Appendix to the Synopsis of the subfamily of *Percinæ*, by Theo. Gill.

Mr. Cassin gave an account of a flock of crows, lost in a fog whilst passing over the city early on Sunday morning, the 12th inst.

Mr. Haldeman stated that he had frequently noticed the bald eagle dive for fish in the Susquehanna, when it could not procure its food by robbing the fish hawk.

Dr. Rogers made some remarks on the influence upon the health of communities from the thawing of snow in the streets by means of salt, exposing what he considered to be the fallacies of the common prejudices on the subject.

*January 28th.*

Vice President BRIDGES in the Chair.

Twenty-four members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings :

**Notes on some of the American Ash Trees, (*Fraxinus*,) with descriptions of new Species.**

BY S. B. BUCKLEY.

The great accuracy of the plates in Michaux's *Sylva* is admitted by all who have seen both them and the trees whose portions are there represented. That the text contains a few errors is well known, but the figures are true to nature and correctly represent the object described. The wonder is that a work published at that early day, in the infancy of botany, should so well and truthfully describe our forest trees.

It is supposed by some botanists that the fruit in the plate of *Fraxinus americana* is that of the green ash, (*F. viridis*,) or that the fruit of these two species of ash has been substituted the one for the other by mistake. The original proof-plates of the *Sylva* are in the Library of the Academy of Natural Sciences at Philadelphia, in which the figure of the white ash differs little from the one in the last edition. Had there been an error, it would have probably been corrected, as several editions of the *Sylva* passed under the eye of Michaux; nor does the fruit of the white ash differ from his description of that species. In his account of the green ash, he states that "*its seeds are only half as large as those of the white ash, but similar in form* ; and also, in describing *F. pubescens*, he remarks that "*its seeds are shorter than those of F. americana, but similar in form and arrangement*." These statements in the text agree perfectly with his pictures of these species.

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The true *Fraxinus americana* (Linn.) is common in the public grounds and on the sidewalks of some of the streets of Philadelphia. It also grows along the Delaware and Schuylkill rivers in the vicinity of the city. Specimens of it are in the herbarium of the Academy of Natural Sciences which were collected in the vicinity of Boston, Mass., by Mr. Pickering, from whence it extends as far south as Louisiana, the author having gathered specimens of it in the woods two or three miles west of the Mississippi River, opposite New Orleans. In the year 1790, William Bartram assisted in making out a list of trees to be planted in Independence Square, Philadelphia. (See Pennsylvania Archives, vol. ii. p. 674.) Bartram's fondness for American trees led him to select for that purpose a great variety of indigenous species, so that the native trees of Pennsylvania are now well represented in this celebrated Square, among which the *Fraxinus americana* is conspicuous.

Cotemporaries of Bartram, and at that time residing in the city of Philadelphia, were Zaccheus Collins and Dr. Kuhn, botanists, both pupils of Linnæus, to whom they sent specimens, from which he described many American plants, including probably the *F. americana*. *Fraxinus pubescens* (Walt.) also grows in the neighborhood of Philadelphia, and, as Michaux observes, there is little difference in external appearance between it and the white ash. Any one who will compare the plates of these two species in the Sylva will see the striking resemblance in the fruit of each, but that of the red ash is shorter and more pointed. Its petioles are also more or less grooved, and the under side of its leaves and the petioles and young branches are much more pubescent than those of *F. americana*. Still the two are often considered as the same species by casual observers. It grows in most of the Southern States, and extends as far west as Minnesota.

*Fraxinus euptera* (Mich.) was regarded by the younger Michaux and Nuttall the same as *F. americana*. It has been thus considered by the best American botanists. Had it been different, it would have been included in the Sylva by the younger Michaux. Specimens labelled by some of the old botanists *F. euptera* (Mich.) are now in the herbarium of the Academy, and they differ not in the least from the *F. americana*.

De Candolle makes *F. viridis* (Mich.) a synonym of *F. juglandifolia*. Specimens of the latter in the herbarium of the Academy agree well with those of the green ash, to which they have been referred by Nuttall and other botanists. It is nearly certain that De Candolle is right, because he has been able to see both Lamarek's and Michaux's specimens. The green ash grows occasionally along streams from Pennsylvania to Texas. I have frequently seen it on the Alabama River; also on the Red River in Louisiana, below Alexandria. It is quite common in Southern Texas, where a form of it collected by Berlandier has been described by De Candolle as *F. Berlandierii*, according to Torrey and Gray. Personal observation in Texas with one of Berlandier's specimens, kindly sent to me by Dr. Gray, convince me of the truth of their opinion.

Muhlenberg's herbarium, at the rooms of the American Philosophical Society in Philadelphia, contains a specimen of the green ash which has the serrated leaves and both sides of the same shade of green, which led Dr. Muhlenberg to call it *Fraxinus concolor*, as related by Michaux, who also states that it grows abundantly along the Susquehanna, near where Dr. Muhlenberg resided. Hence there is no difficulty in determining the true *F. viridis*, Mich., specimens of which in the herbarium of the Academy differ little from his figure of it in the Sylva. Therefore the reader may rest assured that the plates and descriptions in Michaux's Sylva of *Fraxinus americana*, *F. pubescens* and *F. viridis* are correct.

Since the time of Michaux, the American forest trees have rarely been carefully studied by botanists, because they are apt to look on the ground for new plants and flowers, and not up at the trees. Even Nuttall, in his travels, gave  
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them little attention; nor did he when journeying contemplate a Supplement to Michaux's Sylva, which was done at the request of Philadelphia publishers after he had ceased his American wanderings. Hence the volumes of Nuttall have neither the freshness and life of description, nor that fidelity to nature in the plates, which are so remarkable in those of Michaux, who travelled for the especial purpose of publishing a work on the trees of America.

The closet botanist cannot master the botany of trees as well as that of herbaceous plants, because of the latter he often has the whole, but of the tree he can at most possess in his herbarium but a mere fragment, which is far from showing all its important characteristics. He who has made trees his especial study can distinguish the different species even in midwinter, when many of them are destitute of leaves. I make these remarks to show why the two next described species of *Fraxinus*, which are prevalent both at the North and at the South, have been generally referred to one or the other of the three species before mentioned.

*Fraxinus albicans*, S. nov.—Foliolis 2—4-jugis sessilibus, aut breviter petiolatis, ovatis, aut ovato-lanceolatis, integris vel serratis, subtus glaucis, tarde utrinque glabris, paniculis laxo terminalibus seu axillaribus; samaris linearibus 12—18 lin. lon. emarginatis, basi subteretibus.

It is found from New England to Texas, being the largest of the American ash trees, sometimes attaining a diameter of between four and five feet. Its bark is furrowed and of a light grey; hence it is called the white ash in many places. Its petioles are grooved, and its buds are destitute of the red velvety pubescence peculiar to *F. americana*. I have not seen it in the vicinity of Philadelphia, nor is there any specimen of it collected in this neighborhood in the herbarium of the Academy. In the herbarium of Darlington, at West Chester, I saw specimens of it labelled *F. americana*, and it is probably thus called by other American botanists. The West Chester collection had no specimens of *F. americana* or *F. pubescens*.

Both *F. americana* and *F. albicans* being called white ash throughout the country have caused them to be confounded, especially where, as is often the case, they do not both grow in the same locality; but the fruit of the latter is only about half the size of the former, which, with the other distinctions enumerated, show that they are very different species.

*Fraxinus oblongocarpa*, s. nov.—Foliolis 2—4-jugis lanceolatis, vel ovato-lanceolatis, acuminatis, basi cuneatis, integerimis, vel parce serratis, utrinque viridis, junioribus subtus parum pubescentibus, breve petiolatis; samaris lineari-oblongis, obtusis vel emarginatis, basi subteretibus, et anguste alatis.

A small tree, thirty or forty feet high, growing along water courses from Pennsylvania to Texas. Its young branches and the footstalks of the leaves covered with a velvety pubescence. Fruit 18 lines to 2 inches in length and 2—3 lines wide, the terete part short in proportion and somewhat winged, leaflets 3—4 inches long. This is the *Fraxinus pubescens* described in Darlington's Flora Cestrica, but not of Michaux. It differs from *F. pubescens* in its terete petioles; its leaves are of a deeper green beneath, and both its leaves and branches are less pubescent when mature. Its samara are longer and nearly one-third less in width, nor are they mucronate, or as sharp pointed as in *F. pubescens*.

For those who have not Michaux's Sylva, the following brief descriptions of the white and red ash are given.

*Fraxinus americana* (Linn.)—Foliolis 3—4-jugis, breviter petiolatis, ovato-lanceolatis, integerrimis, acutis, subtus glaucis, petiolis teretibus; gemmis rufo-velutinis; samaris lineari-oblongis obtusis vel acutis, basi teretibus, subacutis.

Fruit 2—3 inches long, but generally about 2½ inches in length and 4—5 lines broad in the widest part; common petiole terete.

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*Fraxinus pubescens* (Walt.)—Foliolis lanceolato-ovatis, subserratis seu integerimis, acuminatis, subtus pubescentibus, petiolis junioribus ramisque tomentosis; samaris anguste lanceolatis, obtusis, mucronatis vel acutis, basi teretibus.

Fruit  $1\frac{1}{2}$ —2 inches long and 4—5 lines in width at the widest part; common petiole channelled above near the base.

*Fraxinus nigrescens*, s. nov.—Foliolis 2—4-jugis, lanceolatis vel ovato-lanceolatis, sessilibus, aut breve petiolatis, utrinque acutis vel abrupte acutis basi longe teretibus, acutis.

This is a common tree in the vicinity of Austin and in Middle Texas along water courses. It is generally small, but is sometimes 2—3 feet in diameter and 40—60 feet high. The bark of the stem and limbs is dark grey and furrowed; hence in many parts of the State it is called the "black ash." Its leaves are of a deep glossy green above and a paler green beneath, and in young leaves the midrib and veins are sparingly pubescent. The terminal leaflet is often much the largest, being sometimes 4—5 inches in diameter. Such specimens I obtained in Navarro County, and also on Caney River in Matagorda County. Its leaves are rarely if ever serrated. The samara are 12—15 lines long and 4—5 lines broad in the widest part; about one-half of the entire length is broadly winged, from whence the wings are gradually narrowed to the terete part. In midsummer the top of the fruit, extending nearly down half of the wings, is often curved. The common petiole is channelled above near its junction with the stem.

*Fraxinus tri-alata*, s. nov.—Foliolis 2—3-jugis, lanceolatis, vel obovatis, supra glabris, subtus parum pubescentibus, ad venas et parce glaucescentibus; samaris 2—3 alatis, obovatis, 6—8 lin. lon. obtusis, emarginatis, vel subacutis, basi anguste alatis, acutis.

A shrub or small tree, 15—20 feet high, growing on the banks of the Atacosa River in Western Texas. Samara in loose axillary or terminal panicles, about one-half of them 3-winged, and 2—3 lines broad in the widest portion; not terete below; the wings being attenuated as far as the pedicels; leaflets 12—18 lines long and 6—12 broad, branches smooth, and of a light grey color.

*Fraxinus pauciflora* Nutt. has been referred by Dr. Chapman, in his Flora of the Southern States, to *F. platycarpa*. Specimens of the former, collected by Dr. Baldwin, are in the herbarium of the Academy, and they differ from *F. platycarpa* in having the petioles grooved, leaves scarce half as large and of one-third less width, and much more acutely serrated, and the fruit of the two is widely different. I have not seen a tree of the *F. pauciflora*, but I well know *F. platycarpa*, which extends as far southwest as the Sabine River in Eastern Texas; and it certainly is very distinct from the Florida ash described by Nuttall, nor have I ever seen it assume any such form.

#### Descriptions of NEW PLANTS from Texas.—No. 2.

BY S. B. BUCKLEY.

##### POLEMONIACEÆ.

*Phlox macrantha*, s. n.—Pubescens, humilis 3—6 polycaris, ramosa, foliis lanceolatis, utrinque subacutis, alternis vel oppositis, calycibus parce canescenti-pilosis, segmentis lineari-elongatis, acuminatis, corollæ tubo glabro, laciniis lato-obovatis, apice subacutis, capsula elipsoidea glabra, semina alata.

Prairies north of Austin. March.

Stems diffusely branching from the root; leaves numerous, lanceolate and 1862.]

attenuate at each end, sparingly pubescent; flowers large, purple, disk of the corolla  $\frac{3}{4}$  to  $1\frac{1}{2}$  inches in diameter.

#### CONVOLVULACEÆ.

*Convolvulus* (*Ipomea*) *caddoensis*, s. n.—*Suffruticosus* glaber, caule tereti, ramosissimo erecto, foliis lineari-lanceolatis breve petiolatis apice acuminatis seu mucronatis basi attenuatis, pedunculis axillaribus unifloris, vel multifloris folio brevioribus, sepalis ovatis, obtusis, corolla rosea infundibuliformis 2—3-policaris, stylus elongatus inclusis filamentis duplo longiore, stigma bilobatum, capsula ovato-ellipsoidea, 2—4-sperma, semina ovoidea testa conica pubescente.

Northwestern Texas, near Caddo Peak. June.

A stout plant, 2—3 feet high, apparently an annual; leaves 2—3 inches long and 2—4 lines wide, tipped with a setaceous or mucronate point; petioles 3—4 lines long; peduncles 4 lines to 2 inches in length.

#### SOLANACEÆ.

*Solanum* (*Cryptocarpum*) *Sabea num*, s. n.—Herbaceum, ramis teretibus, aculeatis, fuscis, glanduloso-pilosis, foliis profunde pinnato-lobatis, segmentis ovatis, repando dentatis, dentibus mucronatis, petiolis et venis aculeatis, aculeis stramineis, glabris, rectis inæqualibus, racemis subterminalibus, 5—9-floris, corolla alba calyce fere duplo longiore, filamenta  $\frac{1}{2}$  lin. longa, antheræ lineari-oblongæ 6 lin. longæ, calycibus aculeatis baccam includentibus.

San Saba County.

Stem 1—2 feet high, with few branches; spines 2—8 lines long and irregularly placed; leaves, including the petioles, 4—9 inches in length, lower segments divided to the midrib and lobed, or with large teeth; sinuses of the upper lobes extend about midway to the midrib, aculea of the leaves few; petioles and veins glandular pubescent; calyx inclosing the fruit increases after the fall of the petals, and is about  $\frac{1}{4}$  covered with aculea.

*Solanum* (*Lasiocarpa*) *Linsecumii*, s. n.—Annuum, caule erecto, tereti, 4—6 policari ramoso, pubescente, foliis oblongo-ovatis, vel lanceolatis, basi attenuatis, breviter petiolatis, apice acutis, integris, utrinque puberulis stipulis linearibus vel lanceolatis, floribus axillaribus, pedunculis solitariis seu geminis, hirsutis, tarde refractis. calycibus campanulatis, hirsutissimis, 5-fidis, laciniis acutis, floribus campanulatis, corollæ 5-fidæ segmentis acutis, pubescentibus, antheris inclusis cordato-oblongis filamentis brevissimis stylo brevioribus, bacca 4 lin. diam. hirsuta.

Llano County, June.

Leaves 1—2 inches long; peduncles 4—12 lines in length; flowers 3—4 lines in diameter.

*Physalis* *Sabeana*, s. n.—Annuæ, prostrata, ramosissima, glabra, foliis petiolatis, lanceolato-ovatis, basi attenuatis apice subacutis, margine subrepando dentatis, dentibus lato-obtusis, corolla rotato-infundibuliforme cærulea calyce longiore, pedunculis axillaribus, filiformibus geminis, calycibus bacciferis, inflatis, ovatis, subangulatis, acutis.

San Saba County. June.

Branches very numerous, trailing 6—12 inches; leaves about an inch long and 4—8 lines wide, margins entire, or with 1—2 obtuse teeth on each side; petioles 6—12 lines long; peduncles in pairs, 4—8 lines in length; fruit globose, smooth, 3—4 lines in diameter.

*Nicotiana glandulosa*, s. n.—Pubescente-glandulosa, caule herbaceo, simplici vel parum ramoso 6—10-policari, foliis caulinis lato-spathulatis vel oblongis, obtusis, sessilibus vel subamplexicaulibus, radicalibus oblongo-obovatis breviter petiolatis; floribus terminalibus, breve pedicellatis, corollæ

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tubo subcylindrico apice parce inflato calyce fere duplo longiore, calyce profunde 5-fido, laciniis linearibus, subacutis.

Burnet County. April.

Flowers yellowish white, 6—8 lines long.

#### GENTIANACEÆ.

*Erythræa calycosa*, s. n.—Annua, caule erecto tetragono ramoso 6—10-policari, foliis acutis, inferioribus lanceolato-ovatis, calycibus 5-partitis, segmentis lineari-subulatis, margine membranaceis, corollæ tubo longioribus, corollæ roseæ segmentis oblongo-ovatis obtusis.

North of Fort Mason. June.

Leaves 8—12 lines long; segments of the calyx 6—8 lines in length; corolla subcampanulate, the top of the tube dilated and ribbed, filaments exserted, but not exceeding the segments of the corolla, which are 6—8 lines long.

*Sabbatia formosa*, s. n.—Caule tetragono erecto 8—12-policari, dichotomo-ramoso, ramulis unifloris, foliis lanceolatis vel ovatis, inferioribus obtusis aut submucronatis, calycis tubo breve obovato et carinato, laciniis linearibus, corolla fere duplo brevioribus, corollæ 5-partitæ roseæ, segmentis obtusis vel subacutis lato-obovatis, semina minutissima, testa verrucosa.

Llano County. June.

Stems leafy to the summit, the pairs of leaves being about an inch distant from each other; leaves 6—10 lines long.

#### OLEACEÆ.

*Forestiera autumnalis*, s. n.—Foliis minute serratis, ovatis subacutis breviter petiolatis supra glabriusculis, subtus pubescentibus ramulis glabris, junioribus pubescentibus, floret æstate, fructibus globosis cæruleis, maturiscentibus tarde in autumnum.

Eastern Texas and Western Louisiana. Flowers in August.

Its fruit is very abundant, glomerated in the axiles of the leaves and ripening in October. Shrub 6—10 feet high; petioles 3—4 lines long; leaves about 1½ inches in length, somewhat cuneate at the base. All the other known species of the genus flower before the expansion of the leaves.

#### NYCTAGINACEÆ.

*Abronia speciosa*, s. nov.—Caule erecto, vel subdecumbente, tereti, foliis cordatis, obtusis basi inæqualibus, petiolatis, pedunculis axillaribus, vel terminalibus, longissimis, involucris viridis 5—6-phyllis, segmentis pubescentibus lanceolatis acutissimis.

Near Fort Belknap. May.

Plant 1—2 feet high, branching from the root; stems bent at base, then erect, with few divaricate branches; peduncles 4—8 inches long; heads of flowers large and red; petioles of the lower leaves 1—2 inches in length, and of the upper leaves 4—6 lines long; leaves 1—3 inches long, and 6 lines to 2 inches in width; whole plant glandular puberulent, not viscid.

*Oxybaphus pauciflorus*, s. n.—Glabriusculus; caule erecto, simplici, foliis oppositis, petiolatis, oblongo-ovatis acutis, vel subobtusis, floribus axillaribus breve pedunculatis involucri segmentis obovatis, abrupte acutis, pubescentibus, semina oblonga quadrangulata, rugosa.

On the San Saba River, north of Fort Mason.

Stem 1—2 feet high, rarely if ever branched, and leafy to the summit; leaves 2—3 inches long and 1—2 inches broad; petioles 4—8 lines in length; peduncles 3—6 lines long and 1—2 flowered.

#### EUPHORBIACEÆ.

*Phyllanthus (Lepidanthus) ellipticus*, s. n.—Annuus glaber erecto divarico-  
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*cato-ramosus*, ramis gracilibus, foliis elliptico-oblongis, apice subacutis, breve petiolatis, supra viridibus, subtus glaucis, floribus axillaribus solitariis numerosis, dioicis, 5-sepalis, longe pedicellatis, fructus?

Western Texas. June.

$1\frac{1}{2}$ —2 feet high; leaves 6—9 lines in length and 4—5 lines broad; petioles 1—2 lines long; pedicles 4—5 lines in length; sepals oblong ovate.

#### URTICACEÆ.

*Morus microphylla*, s. n.—Arbuscula 15—20 pedalis, foliis petiolatis; cordato-ovatis vel trilobatis, serratis, dentibus mucronatis, utrinque glabresculis, venis et marginibus parce et minute ciliatis, stipulis parvis linearibus membranaceis, caducis.

Western Texas; growing in clumps.

Stems and branches smooth, with a light grey bark; fruit ripe last of May; black and sour, with little juice and deep sinuses between the achenia, which are little compressed; styles divaricate and obtuse; leaves generally entire, and  $1-1\frac{1}{2}$  inches in length and  $1-1\frac{1}{2}$  inches wide; the lobed leaves are about  $2\frac{1}{2}$  inches long, the middle lobe prolonged and acuminate. The preceding characteristics are constant, and no person seeing this mulberry in its native situations would call it a form of *Morus rubra*.

#### LILIACEÆ.

*Yucca longifolia*, s. nov.—Caule erecto 6—8 pedali, foliis ensiformi-lanceolatis, confertis, rigidis integris acuminatis pungentibus, inferioribus reflexis, paniculis magnis terminalibus; floribus campanulatis, sepalis ovatis acutis, bracteis ovato-lanceolatis acutis margine membranaceis, capsula oblongo-cylindracea utrinque obtusa.

Western Texas. Flowers in March.

Stems crowded with leaves to the summit, lower leaves reflexed, often, when dead, with their points in the ground. Leaves  $2\frac{1}{2}$ —3 feet in length, with curved margins; fruit 4—5 inches long, cylindrical and obtuse at each end.

*Yucca constricta*, s. n.—Foliis lineari-lanceolatis margine filamentosis acuminatis in apice caudicis confertissimis, caudex 12—18-pollicaris, scapus 4—6 pedalis, paniculis magnis, floribus numerosis longe pedunculatis, bracteis ovatis acutis margine membranaceis, sepalis ovato-oblongis, subobtusis, capsula subcylindracea in medio constricta.

Western Texas. June.

Leaves crowded at the top of the caudex, which is from a foot to eighteen inches in height; leaves 12—15 inches long and 4—6 lines broad. It differs from the *Y. angustifolia* of Pursh in its constricted capsule, shorter leaves and longer caudex. *Yucca angustifolia* is common in Northern Texas; its caudex scarcely rises above the surface of the ground, and its leaves are more than one-third longer than our species. The fruit of *Yucca rupicola* of Scheele, is conical, tapering to a sharp point, near which there is sometimes a slight constriction. The fruit of *Y. constricta* is nearly obtuse at both ends,  $1\frac{1}{2}$ — $2\frac{1}{2}$  inches long and constricted in the middle.

#### JUNCACEÆ.

*Juncus filipendulus*, s. nov.—Culmo erecto, gracili, 6—12-pollicari et 1—2-foliato, foliis planis numerosis ad radicem, rhizomate muto-fibrosa, anthela terminali, fasciculis 6—12-floris, bracteis ovatis, lato-membranaceis, acuminatis vel longe subulatis, perigonii phyllis 6, æqualibus lanceolatisve ovatis, lato-membranaceis, subulatis, trigona obtusaque capsula longioribus, stylo brevissimo, stigmatibus 3, fuscis tortis pubescentibus.

In the western part of Llano County, along streams in dense tufts, with weak, single stems, terminated by 1—4 subhemispherical heads of flowers,

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which, when later with mature fruit, are of a light straw color; seeds ovate, with reddish brown points; heads of flowers about 5 lines in diameter; radical leaves 3—5 inches long.

*Juncus diffusissimus*, s. n.—Culmo erecto 2—3 pedali, foliato, foliis oblongo linearibus acutis, septis transversis inconspicuis, vaginis compressis acutis 1—3-pollicaribus, anthela terminali decomposita et lato filamento-ramosissima, fasciculis 5—7-floris, foliis floralibus ovatis membranaceis acutis, sepalis æqualibus lineari-lanceolatis, acutis, margine membranaceis, capsula oblonga trigona subacuta, perigonio fere duplo longiore, semina ovoidea utrinque subobtusata.

Northwestern Texas.

Panicle widely diffused, some of its filiform branches being more than a foot in length; heads subhemispherical, yellowish brown and 1—2 inches apart from each other. Whole plant weak and not rigid; capsules 4 lines long, gradually attenuated to a blunt or subacute point, and nearly double the length of the sepals; seeds ovoid, tailless, subobtusate, yellowish brown, with the ends dark brown.

#### COMMELYNACEÆ.

*Tradescantia speciosa*, s. nov.—Caule erecto simplici vel subramoso, glabro, foliis ovatis vel ovato-lanceolatis, acutis margine ciliatis, subamplexicaulibus, radicalibus petiolatis, umbellis terminalibus, ad basin pilosis sessilibus, paucifloribus breve pedicellatis, sepalis lanceolatis subacutis margine membranaceis, petalis lato-ovatis roseis.

Corpus Christi. May.

Plant 4—6 inches high, smooth, excepting the margins of the leaves, the pedicels and the base of the calyx. Radical leaves, including the petioles, 3—4 inches long and 1 inch wide; petioles 6—12 lines in length; stem leaves 1—2 inches long and 1 inch broad; the upper pair of leaves inclosing the umbel about an inch long and nearly an inch in width, acute; flowers expanded 4—6 lines in diameter, rose colored; pedicels 1—3 lines in length.

#### CYPERACEÆ.

*Cyperus retroflexus*, n. s.—Rhizomate bulboso; culmis erectis triquetris 1½—2½-pedalibus basi foliatis; foliis 12—15-pollicaribus margine et carina glabrisculis; involucre 5—7-phyllo; foliis 2 inferioribus umbella longioribus; umbella 5—7-radiata; radiis inæqualibus, exterioribus 2—3-pollicaribus; spiculis congestis tarde reflexis teretibus acuminatis 2—3-floris basi bracteatis; bracteis ovatis albo-hyalinis obtusis; squamis oblongo-obovatis vel lanceolatis acutis lateralibus membranaceis; carinis viridicentibus; caryopsi elongata trigona 3 lin. longa, breve apiculata glabra; stylo 3-fido.

Northern Texas. June.

Spikes green; scales 3—4, the lower pair unequal, one being about one-third longer than the other, and clasping the middle of the spikelet, which is commonly 2-seeded; spikelets 3—4 lines long; terminal scale long, acuminate.

*Cyperus ruficomus*, n. s.—Culmis erectis triquetris 2—3-pedalibus basi foliatis; foliis culmo brevioribus; umbella 5—9-radiata; radiis inæqualibus 1—5-pollicaribus involucre 5—7-phyllo; phyllis linearibus planis inæqualibus, longioribus 7—9-pollicaribus; spiculis 7—9 lin. longis, remotiusculis 20—30; inferioribus 2—3-congestis et pedicellatis circum 20-squamatis; squamis ovatis acutis marginibus albo-rufescentibus carinis viridicentibus; caryopsi lineari trigona apice acuta.

San Saba County. June.

Spikelet subterete and little more than a line in diameter. The long leaves of the involucre 3—4 lines wide. A linear setaceous leaf 5—6 lines long at the base of three or four of the lower spikelets. Interior bracts none.

1862.]

*Cyperus Heermannii*, n. s.—Culmis erectis 2—3-pedalibus, trigonis; umbella 11—13 radiata; radiis inæqualibus 2-interioribus sessilibus; longioribus subæqualibus 7—8-policaribus; involucri 9—13 phyllo; phyllis inæqualibus, longioribus 9—12-policaribus; radiis 15—17-stachyis, basi confertis apice divergentibus 15—25-floris; squamis ovatis acutis lateralibus rufescentibus margine albescentibus; carinis viridescens; involucri phyllis numerosis linearibus, vel setaceis; longioribus 1—2-policaribus; achenio obtuso ellipsoideo et obtuso trigono stylo profunde trifido.

California. Dr. Heermann.

Spikelets densely aggregated in nearly the same plane, with numerous linear or setaceous leaves interspersed. Often the heads of spikes are proli-ferous, with a ray about an inch in length, crowned with spikelets.

*Chætocyperus (Eleocharis) membranaceus*, n. s.—Culmis filiformibus erectis, cespitosis, 2—3-policaribus planis; spica oblongo-ovata 4—12-squamata, acuta imbricata; squamis ovatis, acutis vel subobtusis lateralibus dense albo hyalinis dorsis stramineis; achenio lato-ovoideo nigro, subacute triangulari et abrupte in tuberculum angustum erosum rostrato; setis nullis.

Llano County. Grows in small tufts.

Spikes greyish white 3—4 lines long, achenia quite as broad as long, dull black, not shining. A few of the scales are tinged on the back with brownish red, but most of the backs are straw colored and not keeled; the back of the lower scale is green.

*Eleocharis cylindrica*, n. s.—Culmis planiusculis filiformibus 9—12-policaribus; spica cylindrica subacuta 4—7 lin. longa; squamis ovatis vel ovato-lanceolatis acutis inferioribus obtusis rufescentibus; margine albo-hyalinis carinis stramineis; achenio parvo ovoideo obtuse triangulari glabro tuberculo magno subconico apiculato; setis 3—6 caducis nucula brevioribus.

Northern Texas. June.

Spikes 1—2 lines in diameter. Stems below immersed in water. Nuts pale yellow, small; tubercle large in proportion, contracted at the base and shortly apiculated.

*Eleocharis microformis*, n. s.—Culmis setaceis cespitosis erectis 1—2-policaribus, planiusculis; spicis ovatis obtusis vel subacutis 10—12-squamatis; squamis ovatis acutis vel subobtusis, rufescentibus; carinis viridescens; achenio glabro nitido lato obovato pyriformi; setis 6 nuculam æquantibus; tuberculo lato applanato breve apiculato.

Northern Texas. June.

Mature achenia black and shining, crowned with a broad white tubercle, with a short point in the centre. Scales reddish brown, with green keels.

*Eleocharis acutisquamata*, n. s.—Culmis striato-sulcatis erectis filiformibus 10—15-policaribus; spica oblongo-ovata acuta 15—40-squamata; squamis ovato-lanceolatis, acutis rufescentibus apice membranaceis; achenio obovato pyriformi et minute reticulato; tuberculo breve conico apiculato; setis nullis; spica 4 lin. longa.

San Saba County. May and June.

Rhizoma large and creeping; achenia pale yellow, biconvex tubercles brown.

#### On the Uniformity of Relative Characters between Allied Species of European and American Trees.

BY THOMAS MEEHAN.

To whatever principles the origin of species may be owing, the following observations tend to show that their respective differences are the result of one unvarying law.

Noticing that European willows, oaks and other trees retained their green [Jan.



leaves in the autumn much longer than closely allied American species growing near them, and that this could not be owing to immediate climatic influences, as *Gleditschia triacanthos*, *Robinia pseudacacia*, and other American trees, with no European representatives, possessed the same characters, I was led to believe it was rather the result of inherent specific peculiarities, which further investigation tended to confirm.

It will be seen from the subjoined table that on any positive difference being ascertained to exist between an American and a closely allied European species, the relative differences between all other closely allied species of the same differing geographical distribution are of the same character and nature.

For instance, the European Plane (*Platanus orientalis*) may be distinguished by a compactness of growth when compared with the diffuse habit of the American species, and the same compactness and diffuseness will be found to prevail in all the respective European and American species of other genera.

The nut of the European chestnut (*Castanea vesca*) is characterized by large size; the American (*C. Americana*) is much smaller, and the seeds of all allied European and American species bear the same relative proportions; and so of other characters that I have compared, and which I may enumerate as follows:—

1st. *Color and persistency of the leaves.*—In which the American species change to some brilliant hue, and fall comparatively early, while the European co-species fade black, and are retained to a later period of the season.

2d. *Outline of the leaves.*—In which the American species have the leaves less lobed, less deeply toothed or serrated, less in width in proportion to their length, and less petiolate than the European species.

3d. *Size of the seeds.*—In which the American are smaller than the European.

4th. *Habit of growth.*—In which the American is more diffuse, has much fewer branchlets, and more and more vigorous main branches, and the outline more irregular and informal than European trees.

5th. *Size of the buds.*—In which the American have smaller ones than the European, and usually set at wider spaces between the nodes.

The observations finally made were taken at Germantown, Pa., during the first week in November, 1861.

*European Species.*

*Larix Europæa.*  
*Quercus robur.*  
 “ *cerris.*  
*Betula alba.*  
*Populus tremula.*  
 “ *dilatata.*  
*Morus alba.*  
*Euonymus Europæus.*  
*Spiræa salicifolia.*  
*Berberis vulgaris.*  
*Carpinus betulus.*  
*Cornus sanguinea.*  
*Ulmus campestris.*  
*Corylus avellana.*  
*Alnus glutinosa.*  
*Castanea vesca.*  
*Pyrus malus.*  
*Tilia Europæa.*  
*Ulmus montana.*  
*Fraxinus excelsior.*  
*Cerasus padus.*  
 “ *mahaleb.*  
*Fagus sylvatica.*

*American species.*

*Larix Americana.*  
*Quercus alba.*  
 “ *macrocarpa.*  
*Betula populifolia.*  
*Populus grandidentata.*  
 “ *Caroliniana.*  
*Morus rubra.*  
*Euonymus atropurpureus.*  
*Spiræa carpinifolia.*  
*Berberis Canadensis.*  
*Carpinus Americanus.*  
*Cornus sericea.*  
*Ulmus Americana.*  
*Corylus Americana.*  
*Alnus serrulata.*  
*Castanea Americana.*  
*Pyrus coronaria.*  
*Tilia Americana.*  
*Ulmus fulva.*  
*Fraxinus acuminata.*  
*Cerasus Virginiana.*  
 “ *serotina.*  
*Fagus ferruginea.*

*European species.*

*Cercis siliquastrum.*  
*Celtis australis.*  
*Platanus orientalis.*  
*Acer platanoides.*  
*Juglans regia.*  
*Crataegus oxyacantha.*

*American species.*

*Cercis Canadensis.*  
*Celtis occidentalis.*  
*Platanus occidentalis.*  
*Acer saccharinum.*  
*Juglans nigra.*  
*Crataegus cordata.*

In the *first* of the points to which attention has been directed, the only exception appears to be in *Larix Europæa*, which drops its leaves at near the same time as the American; and, unlike all the other species named, exhibits in fading the same tinted leaves.

In *point 2.* *Fagus ferruginea* has a more strongly toothed margin than the European *F. sylvatica*; but it is also worthy of note that the leaves of the English species are more coriaceous than the American, which may have checked the prolongation of the nerves forming the teeth in the latter species. If there is any difference in the consistency of the leaves, it is usually in favor of the American species.

In 3. *Quercus cerris* has smaller acorns than *C. macrocarpa*, but it is the most distantly allied species brought into comparison.

In 4. I know of no exceptions.

In 5. In some few instances the buds of European species appear to be no larger than the American, and in still fewer instances seem smaller; but the rule holds good so generally as to form a striking and prevailing character.

It is proper to remark that the observations were taken from allied species that I have been able to find growing in proximity to each other, and in as similar circumstances as possible. This is very important, as, to a limited extent, circumstances have an influence in the variation of characters. For instance, *Quercus alba*, when growing in the full light and unsurrounded by other trees, has its leaves much more deeply sinuated than when growing in a mass with others. Lack of attention to this fact would make standard botanical works in some instances seem to oppose the conclusions I have arrived at. As an example of this, Michaux figures *Fagus ferruginea* with larger fruit than *F. sylvatica*, and the leaves of *Juglans regia* as less serrulate than those of *J. nigra*, neither of which agrees with my experience of plants grown near each other in this climate, and is probably, if not altogether, an error in drawing, to be accounted for by the supposition that the sketches were made from specimens growing under widely diverging circumstances.

The species employed in the comparisons are not in all cases the nearest that might be had. *Pyrus baccata*, for instance, would be a better match for *P. coronaria* than *P. malus*, but they were the best my facilities afforded me. Some allied trees could not be compared in all points, and were therefore left from the list. *Æsculus*, for instance, had shed its leaves at the date given,—too early for comparison in persistency of foliage; but in points 2, 3, 4 and 5 the differences between *Æ. hippocastanum*, on the European, and *Æ. flava*, on the American side, agree with other species of the other genera named.

The observations are perhaps too limited, in the absence of more extensive examinations of other characters and other plants, to establish the fact that, whatever may be the principle governing the origin of species,—whether it be by “progressive development,” “natural selection of physiological advantages,” or by “special and continuous acts of creation,”—it is in conformity with one regular and uniform law; but their tendency is so evidently in that direction, that I submit the facts for more general investigation, in the belief that it will prove a novel and interesting branch of study in Botanical Science.

[Jan.

Notice of a New Species of *HEMILEPIDOTUS*, and Remarks on the Group (*TEMNISTIAE*) of which it is a member.

BY THEODORE GILL.

In the family of Cottoids there exist three genera which quite closely resemble each and have a rather peculiar physiognomy, but at the same time differ so decidedly from each other, and are distinguished by characters of such previously acknowledged importance, that their close mutual affinity has been overlooked; and the respective genera have been referred to the neighborhood of quite dissimilar groups.\* The best and largest known of these genera is *Hemilepidotus* of Cuvier; the other two are *Temnistia* of Richardson and *Scorpenichthys* of Girard. For the group thus composed, the name of *Temnistia* is preferable, as it describes the most peculiar character of the group. Although *Hemilepidotus* is the chief genus, its name is too restrictive to be modified for the appellation of the group.

The *Temnistia* are distinguished by the development of the first dorsal fin, which is more than half as long as the second, composed of about eleven spines, and with the anterior spines rather shorter and more or less separated by a notch or incision from the following. The supramaxillary bones, snout, supra-orbital region and the forehead and preorbital bones are furnished with cutaneous tags or barbels.

The three genera are chiefly distinguished by the following differential characters.

*TEMNISTIA* Richardson.

Abdomen nearly hemispherical and naked. Pectinated scales cover the rest of the trunk. Second dorsal and anal fins with undivided rays.

*HEMILEPIDOTUS* Cuvier.

Scales in two longitudinal bands on each side, one dorsal and one lateral.

*SCORPENICHTHYS* Girard.

Body naked and smooth. V. I. 5.

Five species, inclusive of that here described, are now known to belong to the group. All of them are peculiar to the western coast of North America or the Arctic Seas; the typical species of *Hemilepidotus*, as well as the single known *Temnistia*, are both found in the Northern waters. The existence of *Temnistia* has been quite forgotten by the recent systematic writers, although its rank as a valid genus cannot be challenged.

*HEMILEPIDOTUS GIBBSII* Gill.

The form and proportions are nearly identical with those of *H. spinosus* (Girard.) The crown, the region above the preoperculum and operculum, and the interocular space, are granulated, but without spines. There are four equidistant short flaps in a transverse row behind the interorbital area, four papillose barbels on the margin of each preorbital bone, and another on the suborbital above the end of the supramaxillary; from the centre of the latter a larger compressed flap springs. On the chin are four small flaps. A flap also exists near the anterior angle of the upper cleft of the branchial aperture.

\*I embrace this opportunity to state that the genus *Triglopsis* of Girard is most closely allied to my *Oncocottus*, of which the *Cottus quadricornis* of Europe is the type, and differs chiefly in the absence of the "horns" or claviform tubercles and in its fresh water habitat, &c. The entire family of Cottoids indeed requires a careful revision. Dr. Günther has been quite unsuccessful in his distribution of the species, and has regarded as doubtful, species which belong to peculiar genera that have been clearly and distinctly characterized, while genera and species whose claims to that rank are much more questionable have been admitted.

1  
D. XI. 2, 16, 2. A. 14 —. C. 4, 5, 4, 3. P. 16. V. I. 4.  
1

The *abdomen* is *spotted*. The preopercular, interopercular and suborbital regions, the membrane connecting the maxillary bones and the lower surface of the head, are covered with large dark brown dots. The fins are more or less distinctly banded or spotted; the ventrals whitish.

Specimens of this species were obtained by Dr. Kennerly, the naturalist of the North-Western Boundary Survey, and are also found at San Francisco, a large specimen being in the same lot containing the true *Hemilepidotus spinosus*, and confounded with it by Dr. Girard. From that species it differs in the number and arrangement of the cutaneous tags as well as by color.

I have dedicated the species to my friend, Mr. George Gibbs, who rendered much valuable assistance to the naturalist of the Survey. A detailed description will be given in the Report on the Ichthyology of the Western Coast.

### On the Subfamily of ARGENTININÆ.

BY THEODORE GILL.

In the "Catalogue of the Fishes of the Eastern Coast of North America," the family of Salmonoids is divided, with Prince Bonaparte, into two subfamilies,—the Salmoninæ and Argentininæ,—but with the very important modification of the exclusion from the latter, as well as from the family itself, of the genus *Microstoma*. With Bonaparte also *Osmerus* is retained among the Salmoninæ, while *Mallotus* is placed in the subfamily of Argentininæ. The great error involved in this arrangement was subsequently discovered, but I unfortunately forgot to correct it in the Catalogue. The only character which thus separates the two subfamilies is the development of the teeth,—a character of secondary value. The two subfamilies are very distinct from each other, but distinguished chiefly by the modifications of the intestinal canal.

The Salmoninæ have the stomach nearly or quite siphonal, and the pyloric cæca are numerous.

The Argentininæ have the stomach decidedly cæcal, and the cæca are generally five in number, and surround the pyloric extremity of the stomach.

Dr. Kner, in his excellent contribution on the form of the stomach and the development of the pyloric cæca, has even suggested that *Osmerus* and its allies may belong to a different family; and it certainly appears quite probable that such is the case. The position of the Argentininæ, as a subfamily of the Salmonoids, is therefore provisional.

The Argentininæ, as now characterized, are divisible among two distinct groups; one has the normal salmonoid position of the dorsal fin, or, in other words, it is subcentral, and above or nearly above the ventrals. This group embraces all the common northern or European and American species.

Another group, represented by a single species, is distinguished by the posterior insertion of the dorsal and its position above the anus; the species is an inhabitant of Australasian seas, and has been described under the name of *Argentina retropinna*, by Sir John Richardson. The specific name may be accepted as a generic appellation, while the species can be called in honor of its learned describer, *Retropinna richardsonii*.

A species of the true Argentine group also is the type of a distinct genus nearly allied to Argentinæ, with which it agrees in the number of branchiostegal rays, but the mouth is larger, the dentition different and the ventral fins more advanced. Its type is the *Argentina pretiosa* of Girard, or *Osmerus elongatus* of Ayres. It may be named *Mesopus*, in allusion to the position of the ventral fins.

The following synopsis exhibits the relations and differential characters of the several genera:—

[Jan.

- I. Dorsal subcentral, above or nearly above the ventrals.....ARGENTINÆ.  
 A. Branchiostegal rays 8. Mouth rather large. Ventrals under the front or in advance of dorsal.  
     Scales of the male villose or pointed, in a lateral band. Pectoral and ventrals much developed. ....Mallotus.  
     Scales alike and simple in both sexes. Pectorals and ventrals moderate.....Osmerus.  
 AA. Branchiostegal rays 6. Mouth small; maxillar ceasing under front of eyes. Ventrals nearly under middle of dorsal.....Hypomesus.  
 AAA. Branchiostegal rays 6. Mouth very small; maxillars not extending to eyes. Ventrals inserted under rear of or behind the dorsal.  
     Scales cycloid. ....Argentina.  
     Scales with exposed surface spinigerous.....Silus.  
 II. Dorsal far behind, above anus.....RETROPINNÆ.  
     Branchiostegal rays 6. Scales cycloid.....Retropinna.

The genus *Thaleichthys*, of Girard, has not been adopted, it appearing to be, as Dr. Ayres has already shown, identical with *Osmerus*. The latter gentleman has remarked, "that the very species which the describer takes as the type of *Thaleichthys*, has occasionally teeth on the palatines well developed; and one specimen in my possession shows even denticulations on the maxillaries."

There is a very considerable analogical resemblance between the group of Argentinæ and the Salmonine genus *Argyrosomus* of Agassiz,—a resemblance more especially manifested between the genus *Hypomesus* and the American *Argyrosomus albus* (*Coregonus albus*, Les.) and the *A. albulus* (*Coregonus albulus*, Val.) of Northern Europe. The likeness, however, appears simply to be one of analogy, and not indicative of close affinity.

#### Appendix to the Synopsis of the Subfamily of PERCINÆ.

BY THEODORE GILL.

Since the publication of the "Synopsis of the Subfamily of Percinæ," we have become acquainted with two quite distinct generic types which are now referred to their places in the system. This appendix will consequently perfect to date the synopsis, and exhibits the condition of our present knowledge of the Percinæ, with the exception, perhaps, of the relations of the *Labrax lyini* of Basilewski. That species does not appear to belong to *Labrax*, but rather to an unnamed genus, but the description is too defective to admit of its proper classification.

#### Genus CHORISTISTUM Gill.

*Liopropoma?* sp. *Poey*, Memorias sobre la Historia Natural de la Isla de Cuba vol. ii.

Body fusiform, with the caudal peduncle high and compressed. Head rather elongated, conic in profile and acute in front, but with the outline slightly curved. Lower jaw protuberant. Teeth villiform on the jaws, vomer and palatine bones. Preoperculum entire. Operculum armed with two spines. Scales on the whole body, except the muzzle. Dorsal fins entirely separated; the first with five spines diminishing from the second; the second dorsal with a single spine. Anal armed with three graduated spines, and with the soft portion elevated backwards. Caudal subtruncated. Lateral line anteriorly arched.

*Type.* *Chorististum rubrum*, Gill.

*Syn.* *Liopropoma?* *rubre*, *Poey*. Memorias sobre la Historia Natural de la Isla de Cuba. Tomo ii., p. 1862.]

This genus is represented by a single species, and is distinguished from *Liopropoma* chiefly by the modification of the dorsal fin, but differs also by other less important peculiarities. The name of *Chorististium* has been bestowed on it in allusion to the separation of the second dorsal from the first,\* on account of the atrophy of the antecedent spines of the former which occur in *Liopropoma*.

Genus SINIPERCA Gill.

*Perca Basilewski*, Nouveaux Memoires de la Société Impériale des Naturalistes de Moscou. Tome x., p. 217. 1855.

Non *Perca*, Linn.

Body oblong and compressed, covered with small scales. Lateral line little arched in front. Head mostly scaleless, oblong, with the profile slightly incurved to the eyes, and with the snout conic and slightly convex before eyes. Eyes small, entirely in the anterior half of the head. Mouth rather large, the supramaxillary bones continued under or behind the eyes. Lower jaw prominent. Teeth villiform on the jaws, vomer and palatine bones. Preoperculum serrated behind, beneath with three or four spines or lobes. Operculum terminating in a spine. Branchiostegal rays seven. Dorsal fins connected at base; the first arched, with twelve spines; the second short and quadrate. Anal with three spines, the second of which is short or moderate; the soft part corresponding to the second dorsal. Caudal entire. Pectoral fins rounded behind.

Type. *Siniperca chua-tsi*, Gill.

Syn. *Perca chua-tsi*, *Basilewski*, op. cit., tome x., p. 218, tab. 1, fig. 1.

This is a very distinct and peculiar genus, its physiognomy recalling to mind the *Lates calcarifer* more than any other fish, but it widely differs from *Lates* in the development of the first dorsal fin, the almost or quite naked head, the small size of the scales on the trunk and the slight armature of the opercular bones. It is composed of only two known species, the *Perca chua-tsi* and *P. chuan-tsi* of Basilewski, both of which are inhabitants of the Chinese rivers. In allusion to this restriction of habitat to the Chinese Empire, the name of *Siniperca* may be given. Dr. Basilewski has very well formulated the characters of the genus, but he has unfortunately employed for it the name of *Perca*; the latter must of course be retained for that to which it was originally given, and it then becomes necessary to rename the Chinese fishes.

Note on the SCIÆNOIDS of California.

BY THEODORE GILL.

Dr. Ayres has recently described, in the "Proceedings of the California Academy of Natural Sciences," two new species of Sciænoids, for one of which he has framed a new genus, (*Seriphus*,) and the other has been referred to *Johnius*. Dr. Ayres has also expressed his belief in the close affinity of *Seriphus* and *Johnius*. On perusing his description, and after an examination of his outline figures, I am convinced that *Seriphus* is most closely allied to that as yet unnamed genus of which the *Ancylodon parvipinnis* of Cuvier and Valenciennes is the type, while the *Johnius nobilis* belongs to one nearly allied to the weak fishes (*Cynoscion*) of the Eastern American coast, and is congeneric with Cuvier's *Otolithus æquidens* of the Cape of Good Hope. The two species of California are consequently not only generically distinct, but they appear to me to represent two subfamilies, equally distinct from each other and from the Sciæninæ.†

\* *Χοριστός*, separate and *ἰστίον*, sail.

† It may be here remarked that the genus *Camarina* of Ayres is not at all related to the Pomacentroids, but is synonymous with the genus *Girella* of Gray and Günther. Dr. Ayres has stated that the "genus, though resembling in general features some species of *Pomacentrus*, presents a new grouping of generic characters."

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Five species of Sciænoids are now known as inhabitants of the western coast of the United States; they represent apparently three groups or subfamilies.

The SCLENINÆ or CORVININÆ are restricted to those species of the family having the normal or nearly the normal number ( $\frac{10}{14}$ ) of vertebræ, that of the caudal being sometimes increased. The snout is more or less protuberant, and the lower jaws generally received within the upper. The lower pharyngeal bones are separated; the upper triple on each side.

Three of the Californian species belong to this group.

1. RHINOSCION SATURNUS Gill.  
Amblodon saturnus Girard.
2. UMBRINA UNDULATUS Girard.  
Menticirrhus undulatus Gill.
3. GENYONEMUS LINEATUS Gill.  
Leiostomus lineatus Ayres.

The second species was formerly referred to *Menticirrhus*, but as I am now acquainted with a true *Umbrina* from Lower California, I prefer to retain Girard's species in the latter genus. The description of Girard, although very unsatisfactory, rather tends to confirm the propriety of such restoration.

The following synopsis of the *Umbrinæ* of Cuvier shows the principal distinctions of the several genera.

- I. Dorsal spines ten.  
Head oblong and declivous above; caudal equal.....*Umbrina*.  
Head rather elongated; caudal unequally lobed; the upper pointed, the lower convex.....*Menticirrhus*.
- II. Dorsal spines thirteen.  
Head rather short and blunt .....*Cirrimens*.\*

The second subfamily or group is that of the OTOLITHINÆ, which, I have discovered since the publication of the notice of the North American Sciænoids, is distinguished by the reversed proportions of the numbers of the vertebræ.† The body is fusiform, and the lower jaw is prominent or at least even with the upper.

To this belongs the following species:—

4. ATRACTOSCION NOBILIS Gill.  
*Johnius nobilis* Ayres.

The following synopsis exhibits the characters of *Atractoscion* compared with the other genera of Otolithinæ.

- A. Height less than one-fourth of length. (Vertebræ about  $\frac{14}{10}$ .).....OTOLITHINÆ.
- B. Teeth regularly attenuated and pointed.  
Eyes very large, the diameter longer than the snout.

\* The type of this genus is the *Umbrina ophiocephalus* of Jernyns.

† By this character the Otolithinæ are distinguished from the LARIMINÆ, which has nearly the normal number and proportion of the vertebræ ( $\frac{10-11}{15}$ ). Possibly *Odontoscion*, as Gunther supposes, may be most nearly allied to this group, but it appears more nearly connected to the Otolithinæ. The Lariminæ have, then, two genera very distinct from each other, and recognizable by the following characters:—  
Second dorsal much longer than the first. (= 1, 24–30.) *L. breviceps* Cuv. Larimus.  
Second dorsal as short or shorter than first. (= 1, 13.) *L. auritus* Cuv. Brachydeuterus.

- Teeth in external row large.....Odontoscion.\*  
 Eyes moderate, the diameter less than the snout.  
 Teeth in 1—3 rows.  
 Anal fin I.—II. 7—13.  
 Canine teeth of lower jaw large .....Otolithus.†  
 Canine teeth in lower jaw obsolete.  
 Pseudobranchiæ developed.....Cynoscion.‡  
 Pseudobranchiæ obsolete .....Apseudobranchus.§  
 Anal fin I. 15—16.....Archoscion.||  
 Teeth cardiform or pluriserial .....Atractoscion.¶  
 BB. Teeth above in front (2) and beneath on sides large and  
 arrow-shaped.....Ancyrodon.\*\*

The third group is composed of two genera, and may be called ISOPISTHINÆ.  
 The only species of the Californian is that named by Ayres.

#### 5. SERIPHUS POLITUS Ayres.

The following are the characters of the group and genera:—

- A. Dorsal fins quite remote; second dorsal and anal subequal,  
 oblong.....ISOPISTHINÆ.  
 Scales small and cycloid. Canine teeth above in front and  
 below on sides very large and lanceolate.....Isopisthus.  
 Scales large, strongly ciliated. Teeth distinct, in one or  
 two rows.....Seriphus.

The discovery of representatives of such rare types on that coast which has already furnished so remarkable a number of peculiar forms, is a discovery of much interest.

I have, in my treatise on the North American Sciænoid genera, alluded to the external differences between the Corvininæ and Otolithinæ, but, unable to find other satisfactory characters, declined at that time to consider them as distinct subfamilies. It was after an examination of Dr. Günther's work that my attention was arrested by the coincidence between the proportions of the abdominal and caudal vertebræ and the external form, and I cannot but believe that the value that has been now given to the groups is merited by their importance. To Dr. Günther we are indebted for having first assigned to the family of Sciænoids its true limits. He appears to have retained such, and such only, as are genuine members of the family. Some, as *Isopisthus* and *Seriphus*, seem indeed to have some relation to the carangoid Scombroids, such as *Lactarius*, but the affinity is probably remote. The wide separation above proposed between *Isopisthus* and *Ancyrodon* does not appear to be unnatural.

The resignation of R. E. Griffith as Librarian was read and accepted.

The following was read and adopted:

*Resolved*, That the Committee on the Library, in conjunction with the Librarian, be authorized to employ an assistant for one year, at a salary not to exceed twenty-five dollars per month.

The Auditors reported that they had examined the Treasurer's annual report and had found it correct.

\*Type. *Corvina dentex* Cuv. et Val. †Type. *Otolithus ruber* Cuv. et Val.

‡*Otolithus regalis* Cuv.

§*Otolithus toe-roë* Cuv. et Val.

|| *Otolithus analis* Jenyns.

¶*Otolithus æquidens* Cuv. et Val.

\*\**Ancyrodon jaculidens* Cuv. et Val.

Pursuant to the By-Laws, an election of members of the Standing Committees for 1862 was held; and a Librarian was also elected, as follows:

*ETHNOLOGY.*

J. A. MEIGS,  
S. S. HALDEMAN,  
I. I. HAYES.

*BOTANY.*

E. DURAND,  
JOSEPH CARSON,  
AUBREY H. SMITH.

*COMP. ANAT. & GEN. ZOOLOGY.*

J. LEIDY,  
J. M. CORSE,  
J. H. SLACK.

*GEOLOGY.*

ISAAC LEA,  
CHARLES E. SMITH,  
J. P. LESLEY.

*MAMMALOLOGY.*

J. H. SLACK,  
JOHN CASSIN,  
J. L. LE CONTE.

*MINERALOGY.*

WM. S. VAUX,  
J. C. TRAUTWINE,  
T. D. RAND.

*ORNITHOLOGY.*

JOHN CASSIN,  
S. W. WOODHOUSE,  
J. H. SLACK.

*PALÆONTOLOGY.*

JOSEPH LEIDY,  
T. A. CONRAD,  
J. L. LE CONTE.

*HERPETOLOGY & ICHTHYOLOGY.*

E. D. COPE,  
R. BRIDGES,  
J. C. MORRIS.

*PHYSICS.*

B. HOWARD RAND,  
WM. M. UHLER,  
R. E. ROGERS.

*CONCHOLOGY.*

T. A. CONRAD,  
W. G. BINNEY,  
G. W. TRYON, JR.

*LIBRARY.*

WM. S. VAUX,  
JOSEPH LEIDY,  
JOSEPH JEANES.

*ENTOMOLOGY AND CRUSTACEA.*

R. BRIDGES,  
SAMUEL LEWIS,  
E. T. CRESSON.

*PROCEEDINGS.*

ROBERT BRIDGES,  
JOSEPH LEIDY,  
WM. S. VAUX,  
JOHN CASSIN,  
THOMAS STEWARDSON.

*LIBRARIAN.*

J. DICKINSON SERGEANT.

*February 4th.*

Dr. LEIDY in the Chair.

Twenty-three members present.

The following were presented for publication :

Descriptions of certain species of Lepidoptera, by W. H. Edwards.

Description of a new Cardium from the Pleistocene of Hudson's Bay, by Wm. Stimpson.

Dr. Fisher stated that on the 24th of last December, 24 minutes past 4, P. M., at Budd's Ferry, Md., he had observed a brilliant meteor in the southwest, about  $20^{\circ}$  above the horizon. Its path subtended an arc of 25 to  $30^{\circ}$ , and its size appeared to be about that of the full moon when in the zenith.

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*February 11th.*

Dr. LE CONTE in the Chair.

Twelve members present.

The following were presented for publication :

Monograph of the species of Sphærium, by Temple Prime.

Synopsis of the species of Holcosus and Ameiva, with diagnoses of new West Indian and South American Colubridæ, by E. D. Cope.

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*February 18th.*

Vice President BRIDGES in the Chair.

Twenty members present.

The following were presented for publication :

Synopsis of the Mordellidæ of the United States ; Note on the species of Calosoma, &c. ; Note on the Classification of Cerambycidæ, &c. By John L. Le Conte, M. D.

Note on Quercus Heterophylla ; Descriptions of Plants By S. B. Buckley.

Monograph of the species of Trogosita, &c., by G. H. Horn, M. D.

Additions to the Nomenclature of North American Lepidoptera, by Aug. R. Grote.

Mr. Vaux, on behalf of the Committee on Proceedings, laid on the table the No. for last December.

Dr. Bridges, on behalf of the Publication Committee, announced the publication, on the 11th inst., of Vol. V. pt. 1 of the Journal.

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*February 25th.*

Mr. LEA, President, in the Chair.

Nineteen members present.

The following were ordered to be printed in the Proceedings :

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Descriptions of new CRETACEOUS FOSSILS from Nebraska Territory, collected by the Expedition sent out by the Government under the command of Lieut. John Mullan, U. S. Topographical Engineers, for the location and construction of a Wagon Road from the sources of the Missouri to the Pacific Ocean.\*

BY F. B. MEEK AND F. V. HAYDEN.

The collections containing the fossils described in this paper, were obtained along the Missouri River at various localities between Fort Benton and points 140 to 150 miles below the Fort. The new forms here for the first time made known, are all labelled "Chippewa Point," which is some twenty odd miles below Fort Benton. There are also in the collection from this locality, and apparently from the same rock, some fine specimens of our *Inoceramus wanbonatus* and *I. fragilis*, Hall and Meek. The presence of the latter species, and the affinities of several of the new forms, indicate that these fossils all come from No. 2 of the Nebraska Cretaceous series, which is known to be extensively developed in that region: fragments of one or two of the new species at least, have certainly been found in that horizon at other places. As we have no section of the strata exposed at this locality, however, we are without the means of knowing whether or not these fossils all came from the one bed. Indeed, some of them being quite peculiar, and very unlike anything hitherto known in our Nebraska series at other localities, it is barely possible there may be a member here of the Cretaceous not previously recognized elsewhere in this region.

There are also in the collection from the same place as the above, a number of good specimens of *Atrypa reticularis*; they are labelled "Chippewa Point, 300 feet above the level of the river." These are of Devonian or Upper Silurian age, and were doubtless broken from boulders, or other erratic masses, brought by drift agencies from some distant northern locality, and of course have no connection with the geology of this immediate vicinity.

At another locality, ninety miles below Fort Benton, a specimen of our *Tancredia Americana*, and a few other bivalves, were obtained, though we do not know whether they were found *in situ* or loose. They evidently belong to the same beds occurring at the mouth of Judith River, farther up, which we have elsewhere referred with doubt to the Dakota Group, (No. 1) of the Nebraska Cretaceous series. That this bed is Cretaceous, is proved by the occurrence in it of *Baculites*, as well as by the affinities of its other fossils, excepting the *Tancredia*, which would alone point to a lower horizon. Its exact position in the Cretaceous series still remains doubtful.

The collection also contains from other places 125 to 150 miles below Fort Benton, specimens of *Ostrea subtrigonalis*, Evans and Shumard, and of the following species elsewhere described by us:—*Corbicula* [*Cyrena*] *cytheriformis*, *Corbula permodata*, *Vivipara Conradi* and *V. trochiformis*; all of which belong to the Fort Union Group, (brackish water and lower Tertiary deposits) of that region. Some of these were probably obtained from loose masses. Good specimens of *Baculites compressus*, Say, were likewise collected near one of these latter localities.

Figures and more extended descriptions of the new species here indicated are to be prepared by us for publication in Lieut. Mullan's final Report.

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\*The fossils described in this paper were collected by Mr. John Pearsall, who acted as naturalist of Lieut. Mullan's expedition.

## CEPHALOPODA.

## Genus SCAPHITES, Parkinson.

## SCAPHITES VENTRICOSTUS.

Shell ventricose, attaining a rather large size, oval-subglobose in form, broadly rounded on the dorsum. Umbilicus very small, deep, and showing scarcely any part of the inner whorls. Volutions about three to three and a half, increasing rather rapidly in size, particularly in breadth, nearly twice as wide transversely as from the dorsal to the ventral side; all regularly rounded on each side and deeply embracing within; last one deflected from the regular curve of the others so as to become slightly disconnected at the aperture, which is transversely reniform or lunate. Surface ornamented with numerous small, rather regular costæ, some forty-five to fifty-five of which may be counted around the dorsum of each turn, where they are of uniform size, excepting their gradual and uniform enlargement with the whorls. On the outer, or last volution, only every fifth or sixth one of the costæ extends across to the umbilical margin; the intermediate ones becoming obsolete on the sides, where those extending entirely across become larger, more prominent and more angular than on the dorsum.

The septa are each provided with five deeply-divided principal lobes. The dorsal lobe is longer than wide, and has on each side of its very slender body three main branches, the two terminal of which are slightly larger than the next pair above, and each provided with three or four small unequal subdivisions on the outer side. The dorsal saddle is as large as the dorsal lobe, extremely narrow at its base and profoundly divided at its extremity into two unequal branches, of which the one on the dorsal side is larger than the other, and distinctly tripartite, each of its subdivisions being deeply sinuous and obtusely digitate. The other main branch is very narrow, and provided with several short, obtusely rounded, irregular lateral divisions. The superior lateral lobe is as wide as the dorsal lobe, but shorter, and ornamented with two large, nearly equal bifurcating terminal branches, the lateral subdivisions of which are bifid and more or less digitate, while the other two are each provided with from five to seven digitations. The lateral saddle is much smaller than the dorsal saddle, very narrow at its base, and consists above of two equal trilobate terminal branches. The inferior lateral lobe is little more than one-third as large as the superior, and very similarly divided, excepting that its branches are proportionally shorter. The ventral lobe is very small and armed with three or four short, simple divisions.

Length, 3.13 inches; height, 2.65 inches; breadth or convexity, 1.90 inch.

In its external ornamentation, this shell is much like a species described by us from near the Black Hills, under the name of *S. Warreni*, (Proc. Acad. Nat. Sci. Phila., May, 1860, p. 177.) It differs, however, remarkably in size and form, being nearly twenty times as large, and proportionally much more ventricose, while its volutions increase much more rapidly in size. Its umbilicus is also proportionally smaller and its body whorl not deflected so far from the coil of the inner turns. As we have not yet had an opportunity to see the septa of *S. Warreni*, we have no means of knowing how nearly these forms may agree in their internal structure.

*Locality and position.*—Chippewa Point, near Fort Benton, on the Upper Missouri; Fort Benton Group of the Nebraska Cretaceous series.

## SCAPHITES VERMIFORMIS.

Shell attaining a medium size, oval subdiscoidal in form. Umbilicus very small. Volutions increasing gradually in size, rounded on the dorsum and sides, and deeply embracing within; all a little broader transversely than from the dorsal to the ventral side; last one deflected from the regular curve of the others, so as to become slightly disconnected at the aperture, which is trans-

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versely subreniform, or a little oval, with a somewhat sinuous inner margin. Surface ornamented by numerous straight costæ, which are small and nearly regular on the inner volutions, but become more irregular and larger on the sides of the body whorl, where they support around each dorso-lateral region, a row of prominent nodes so disposed as to alternate on opposite sides of the shell.

On the dorsum the costæ are of uniform size, with the exception of their regular enlargement with the whorls. The nodes are directed out at right angles to the plane of the shell, and, like the costæ, become again smaller and more closely arranged towards the aperture. Some of the costæ bifurcate at the nodes on the body whorl, but their number is also increased by the intercalation of others between. Where they bifurcate at any of the nodes on one side, the two divisions crossing over the dorsum from the point of bifurcation, never both intersect a node on the opposite side, but, in most cases, one of them, and sometimes both, terminate between two of the nodes on the other side. In crossing over the dorsum, near the aperture, they all curve a little forward, but on other parts of the shell they pass nearly or quite straight across.

The septate portion of the only specimen of this species in the collection being highly crystalline, the sutures of its septa cannot be very clearly traced out. We can see, however, that the dorsal lobe is a little longer than wide. It has a rather narrow body, and is provided with three branches on each side, the upper pair of which are small and nearly simple, while the next pair are longer and bifid, and the terminal pair, which are a little larger than the second, are each ornamented by three small, pointed branches or digitations on the outer side. The superior lateral lobe is somewhat irregularly tripartite, the lateral divisions being bifid and sharply digitate, while the terminal, which is longer than the others and not exactly central, has about five pointed digitations, or sharp, nearly or quite simple branchlets. The lateral saddle is deeply divided at the extremity into two nearly equal branches. The inferior lateral saddle is not more than about one-third as large as the superior, nearly as long as wide and regularly tripartite, while the others have about four digitations each, and show a slight disposition to bifurcate.

Length, 2.10 inches; height, 1.76 inch; greatest breadth measuring to the extremities of the nodes on opposite sides, 1.25 inches; do. between the nodes, 1 inch.

This species is related to *S. hippocrepis* of Dekay, sp. (= *Ammonites hippocrepis*, Dekay, *Ac. N. Y. Lyceum*, vol. ii. pl. v. fig. 5,) but differs in having its body whorl less extended away from the coil of inner volutions, and in being higher in proportion to its length. Its nodes are also larger and much more prominent; but the most marked difference between these two forms is in their septa, the dorsal lobe of that under consideration being proportionally much narrower and provided with three instead of two branches on each side; while its lateral lobes are distinctly tripartite instead of bifid.

It is also allied to *S. Texanus*, Roemer, (*Kreid. von Tex.*, tab. 1, fig. 4,) though its septa differ as widely from those of that shell as from *S. hippocrepis*.

Its smaller size, less ventricose form, narrower whorls, and distinct nodes, will at once distinguish it from the last described species, with which it was found associated. Its septa also differ in the tripartite character of its lateral lobes, which is an unusual feature in this genus.

*Locality and position.*—Same as last.

### Genus AMMONITES, Bruguiere.

#### AMMONITES MULLANANUS.

Shell compressed-subglobose; rounded on the dorsum. Umbilicus small, deep and acutely conical,—between one-third and one-half as wide as the [1862.]

breadth of the outer whorl from the dorsal to the ventral side, showing about one-third of each inner volution. Whorls increasing rapidly in size, particularly at right angles to the plane of the shell,—sloping on each side from near the umbilicus (with a slightly convex outline) towards the dorsum, and rounding abruptly into the umbilicus on the ventral side; each of those within deeply embraced by the succeeding turn. Aperture transversely reniform or subulate. Surface ornamented with rather small, regular, rounded costæ, which pass nearly straight across the sides of the whorls, and arch slightly forward in crossing over the dorsum. On the dorsal side, (where they are of uniform size,) from thirty-six to forty of the costæ may be counted to every turn. Each of those commencing at the umbilicus is there usually a little enlarged, especially on the larger whorls, so as to form a small, subnodose prominence. Beyond these they all (particularly on the inner whorls) bifurcate regularly once, near the middle of each side, and on the larger turns others are also intercalated between, so as to make the number on the dorsal side five or six times as great as at the umbilicus.

The septa are rather crowded and provided with variously branched and deeply sinuous lobes and saddles. The dorsal lobe is about one-fourth longer than wide, nearly obovate in form, and ornamented with three principal branches on each side, the two terminal of which are larger than the others and each provided on the outer side with two or three more or less digitate lateral branchlets, while the inner parallel margins are merely sharply serrated. The dorsal saddle is of about the same size as the dorsal lobe, a little oblique, nearly oblong in form, and divided at the extremity into two tripartite and obtusely digitate branches, of which the one on the dorsal side is larger than the other; below these it is provided on each side with two alternating lateral branches with sinuous margins. The superior lateral lobe is narrower and shorter than the dorsal lobe, and provided with two principal branches on each side, the two terminal of which are much larger than the others, and of unequal size,—the one on the right or dorsal side being the larger. Both of these terminal branches are distinctly bipartite, the subdivisions being ornamented with several branchlets and smaller digitations. The lateral saddle is about half as wide and near two-thirds as long as the dorsal saddle, more or less oblique and rather deeply divided at the extremity into two subequal, bifurcating and obtusely digitate terminal branches. The inferior lateral lobe is as long as the lateral saddle, but a little narrower, and ornamented with three variously digitate terminal branches, the middle one of which is longer than the others, a little oblique and not exactly central. The ventral lobe is small, being less than half as long, and scarcely two-thirds as wide, as the inferior lateral lobe, and provided with three nearly equal, spreading, digitate, terminal branches. Between the ventral lobe and the umbilical margin there are two small auxiliary lobes, the first of which has two or three digitations on each side; while the second is nearly simple, or but slightly sinuous on the margins.

In the number and arrangement of the lobes and saddles of its septa, as well as in their mode of branching, this species agrees very nearly with *A. Halli*, (Meek and Hayden, *Proceed. Acad. Nat. Sci. Phila.*, March, 1856, p. 70.) It has, however, one more lateral branch on each side of its dorsal lobe, and one less on each side of its superior lateral lobe, than *A. Halli*; while all the divisions of its lobes and saddles are more spreading. Although so closely allied in their internal characters, these two shells present marked differences in form, as well as in their external markings, the species now under consideration being much more ventricose and more coarsely ribbed than *A. Halli*.

It agrees much more nearly in form with *A. Barnstoni*, Meek, (Prof. Hinds' Report, Assiniboine and Saskatchewan Expl. Expedition, pl. 11, figs. 1 and 2,) from far up north, on Mackenzie's River; but differs in having a smaller and

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more acutely conical umbilicus, and less broadly rounded dorsum. Its costæ are also more rounded, and it presents well marked differences in its septa.

The only specimen of this species we have yet seen consists entirely of septate whorls, the non-septate outer portion having been broken away. It measures in its greatest diameter 4 inches, and 2.57 inches in breadth at the widest part of the outer whorl.

Named in honor of Lieut. John Mullan, U. S. Top. Engrs., in charge of the Expedition for the location and construction of the Pacific Wagon Road.

*Locality and position.*—Same as preceding.

### Genus NAUTILUS, Breynius.

#### NAUTILUS ELEGANS, var. NEBRASCENSIS.

*Nautilus elegans*, Sowerby, 1816. Min. Conch., pl. 116.

*Nautilus elegans*, Mantell, 1822. Geol. Sussex, t. xx. fig.

*Nautilus elegans*, D'Orbigny, 1840. Palæont. Franc. Ter. Cret., t. i. pl. 19.

*Nautilus elegans*, Sharpe, 1853. Foss. Mal. Chalk, pt. 1, Ceph. pl. 3, fig. 3, and pl. 4, fig. 1. Palæontographical Society.

Shell globose, broadly rounded over the dorsum and sides; umbilicus entirely closed; volutions increasing rapidly in size, considerably wider transversely than from the dorsal to the ventral side; aperture transversely reniform or subulate, being deeply sinuous on the inner side for the reception of the preceding turn; margins of the septa rather abruptly arched forward near the umbilicus, and slightly backwards on the dorsal side, deeply concave on the outer side; siphuncle located about its own breadth outside of the middle of each septum. Surface of the body whorl ornamented by regular, flattened, transverse costæ about five times as broad as the grooves between. In crossing over the dorsum, these costæ all arch gracefully and deeply backwards parallel to the broad dorsal sinus of the lip. On the inner whorls, the costæ become obsolete or are only represented by rather distinct lines of growth.

Length or greatest diameter, 3.90 inches; height, 2.82 inches; breadth, 3.40 inches.

This shell agrees almost exactly, in form and surface markings, with Mr. Sharpe's figures of Sowerby's species, to which we have referred it, and only differs in having its siphuncle a little more nearly central and its umbilicus closed, apparently at all ages. According to Mr. Sharpe, the umbilicus of *N. elegans* is closed in the young shell, but becomes a little open in the outer whorl of large specimens. He also states that its siphuncle is located about half way between the middle and the dorsal side of the septa, though in his figure on plate 4 of his Monograph cited at the head of this description, it is represented somewhat nearer the middle. Such small differences, however, we can scarcely regard as being of specific importance, but, if fuller comparisons should prove our shell to be distinct, it can retain the name of *Nebrascensis*.

It is worthy of note that D'Orbigny's figures cited above represent a rather distinctly less ventricose form, with a more narrowly rounded dorsum than our Nebraska shell, or those figured by Mr. Sharpe. He also shows a distinct longitudinal line on the middle of the dorsum (of an internal cast) not seen on our specimen, nor on those figured in Mr. Sharpe's Monograph.

Dr. Shumard has described, in vol. i. p. 590 of the Transactions of the St. Louis Academy of Sciences, a similar species from the cretaceous rocks of Texas. As he mentions, however, that the siphuncle of the Texas shell is situated between the middle and the ventral side of the septa, and that the height of its aperture is greater than its breadth, he doubtless has a distinct species from *N. elegans*. So far as we know, this is the first time Sowerby's species has been even doubtfully identified in America.

*Locality and position.*—Same as preceding.

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## LAMELLIBRANCHIATA.

## Genus INOCERAMUS, Sowerby.

## INOCERAMUS UNDABUNDUS.

Shell (left valve) obliquely rhombic-subovate, gibbous, anterior side very short, obliquely truncated from the beak above, and rounding into the long antero-basal margin; base very prominent, and abruptly rounded a little behind the middle, from which point its margin ascends obliquely forward with a gently convex outline; posterior side broadly rounded or subtruncate; dorsal outline sloping from the beaks at an angle of about  $90^{\circ}$ ; hinge apparently short; beak moderately prominent, incurved, and directed a little towards the front; umbonal axis ranging at an angle of about  $70^{\circ}$  with the hinge line; surface ornamented by regular, distinct, concentric undulations, which are (on the cast) subangular, and separated by shallow rounded depressions; shell structure coarsely fibrous near the hinge. (Right valve unknown.)

Height from the most prominent part of the base to the hinge, 3 inches; length at right angles to height, 3 inches; convexity, 1.84 inches.

The peculiar obliquely rhombic outline, rather gibbous form, and regular undulations of this shell, will readily distinguish it from any other species known to us. It is true, both the following species have the corresponding valve more gibbous than this, but in those the greatest convexity is in the umbonal region, while in this it is near the middle of the valve. In all other respects they are remarkably unlike.

*Locality and position.*—Chippewa Point, near Fort Benton, on the Missouri River, from beds supposed to hold the position of Fort Benton Group of the Nebraska Cretaceous section.

## INOCERAMUS EXOGYROIDES.

Shell large; left valve subcircular, its height being a little greater than its length from the anterior to the posterior side, very gibbous; buccal and anal margins rounded, and forming with the base about three-fourths of a circle; cardinal border somewhat arched; beak large, elevated, gibbous, distinctly involuted and directed obliquely forward, so as to bring its point near the anterior margin; surface of cast smooth, or marked by obscure concentric folds. (Right valve unknown.)

Length from anterior to posterior margin, 5 inches; height, 5.50 inches; convexity near 3 inches.

We have not yet seen the right valve of this species, but judging from the gibbous character and incurved beak of the left, it will probably be found to be much more compressed, so as to make the shell very distinctly inequivalve. The laterally curved beak and general form of the left valve give it much the appearance of some species of *Exogyra*, when viewed on the inner side. Its aperture is transversely oval, the height being to the length about as four to five. Remaining portions of the shell about the hinge show it to have been rather thick and distinctly fibrous.

This species differs from an analogous form described by us from the same position? (and from near the same locality) under the name of *I. umbonatus*, in being much more depressed, and in having its beak considerably less elevated, as well as directed much more obliquely forward. In *I. umbonatus* (some fine specimens of which were brought in with the form under consideration) the umbo of the left valve rises near one-half the entire height of the shell above the hinge, while in the species we are here describing it extends less than one-third the height of the shell above. The length of the valve from the anterior to the posterior side is distinctly greater in proportion to its height than in *I. umbonatus*, while the corresponding valve of the latter shell is much more gibbous. We have before us a series of specimens belonging to each of these forms, and find no difficulty whatever in separating them.

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A careful examination of much better specimens of *I. umbonatus*, in the collections now before us, than that first described by us, shows that form to be even more closely allied to *I. involutus* of Sowerby than we had at first supposed. As Sowerby's species holds a position, however, in the Upper Chalk, and ours comes mingled with Lower Chalk types, it is probable a comparison of perfect specimens of each would result in the discovery of constant differences.

*Locality and position.*—Same as last?

#### INOCERAMUS TENUIROSTRATUS.

Left valve very gibbous, subquadrilateral in outline; anterior side truncated almost immediately in front of the beak, and rounding into the base below; ventral margin semielliptical in outline; posterior side rounded, or sometimes subtruncate above; hinge straight, comparatively long, and rather finely crenulated, there being about five crenulations in the space of 0.20 inch; beak very gibbous, pointed, slender, prominent, and distinctly incurved,—directed obliquely forward so as to bring its point nearly over the anterior margin; surface (of internal cast) smooth over the gibbous umbonal region, but having a few small and very obscure concentric undulations below the middle. (Right valve unknown, but probably compressed.)

Length, 2.10 inches; height from base to hinge, 1.82 inches; height from base to top of umbo, 2.13 inches; convexity, (left valve only,) 0.90 inch.

This shell has a longer hinge and a more transverse form than any other species known to us, having so prominent, slender, and incurved a beak. It differs remarkably from the last, in the slenderness of its beak and less regularly ventricose character of its left valve. Its umbonal region is perhaps more gibbous than that of the last, though this gibbosity is more local and abrupt.

*Locality and position.*—Same as last.

#### Genus VENILIA, Morton.

##### VENILIA MORTONI.

Shell transversely oblong, or subrhombic in outline, gibbous, thick and strong; base nearly straight, but rounding up in front; dorsal margin parallel to the base, excepting behind, where it rounds into the anal margin; anterior side truncated immediately in front of the beaks; posterior margin truncated a little obliquely; postero-basal extremity abruptly rounded or subangular; beaks located directly over the anterior margin, directed obliquely forward, and rather distinctly incurved at the points, as in *Isocardia*; posterior umbonal slopes forming a prominent oblique ridge from each beak to the postero-basal extremity; lunule and escutcheon impressed, but without distinctly defined margins; surface marked with strong lines and more or less distinct concentric ridges of growth, which latter assume a regular arrangement on the umbones.

Length, 1.66 inches; height, 1.40 inches; breadth or convexity, 1.17 inches.

This species is allied to *Venilia Conradi* of Morton, (Synop. Org. Rem. pl. 8, fig. 1–2,) but differs, if Dr. Morton's figures are correctly drawn, in being proportionally longer transversely, more nearly oblong in form, and in having its posterior margin more distinctly truncated, while its antero-ventral region is less prominently rounded. Its dorsal margin is also more nearly horizontal, and rounds less regularly into the truncated anal border.

The genus *Venilia* was proposed by Dr. Morton, in 1834, for the reception of a rather peculiar shell, which D'Orbigny afterwards referred to *Cyprina*. We agree, however, with those authors who regard it as clearly distinct from the typical forms of *Cyprina*, though it may not be generically distinct from a few forms referred by some to that group. We have not had an opportunity 1862.]

to see Dr. Morton's original specimen, but, judging from his figures and a carefully drawn sketch of its hinge sent us by Mr. Gabb, it seems to us more nearly allied to *Cypricardia* of Lamarek than to *Cyprina*.

The only question in regard to the propriety of retaining Dr. Morton's name arises from the fact that it had been previously (1829) applied by Duponchel to a group of *lepidopterous* insects. If Duponchel's genus is a good one, we think Morton's name for the group of shells to which the species under consideration belongs should be changed, although we are aware many naturalists are inclined to admit the use of the same generic names in different departments of Natural History.

*Locality and position*.—Same as preceding.

#### Genus PHOLADOMYA, Sowerby.

##### PHOLADOMYA PAPHRACEA.

Shell rather under medium size, extremely thin and fragile, transversely subovate in outline, moderately convex in the anterior and umbonal regions, cuneate and a little gaping behind; outline of base regularly semiovate, its most prominent part being somewhat in advance of the middle; anterior side short and rounded; posterior margin more narrowly rounded; hinge margin straight, long, not inflected so as to form a distinct escutcheon; beaks moderately gibbous, rising little above the hinge, incurved and located near the anterior extremity of the shell, but not terminal. Surface ornamented by about twelve small radiating costæ, which are interrupted by numerous small, regularly arranged concentric ridges. The radiating costæ are divided by the concentric ridges, so as to present the appearance of rows of minute nodes placed upon the latter. The surface marking are all distinctly impressed upon the internal cast.

Length, 1.16 inches; height, 0.76 inch; breadth or convexity, 0.55 inch.

This species seems to be closely allied to *Pholadomya occidentalis* of Morton, (Synopsis Org. Rem. pl. viii. fig. 3,) but is much smaller, and differs in having numerous regular concentric ridges, separated by furrows that completely divide the radiating costæ, which are less numerous and more regularly arranged than on Morton's species.

It also resembles *P. ovulum* of Agassiz, (Etud. Crit. sur les Moll. Foss. tab. 3b, fig. 1—6,) an Oolitic species, but has a longer and straighter hinge margin, and differs in being destitute of a distinctly defined depression along the dorsal margin. Its concentric ridges likewise appear to differ in being more regular and distinct.

*Locality and position*.—Same as preceding.

#### Monograph of the Species of SPHÆRIUM of North and South America.

BY TEMPLE PRIME.

(Continued from page 409, Dec., 1861.)

##### 15. *Sph. triangulare*, Say.

*Cyclas triangularis*, Say, New Harm. Dissem. 356, 1829.

Animal not observed. Shell transversely oval, nearly equilateral, rather full, anterior margin slightly distended, rounded, posterior somewhat abrupt, nasal rounded; beaks large, full, prominent; lines of growth regular, epidermis brownish; hinge margin narrow, curved; cardinal teeth very distinct, assuming the shape of the letter V reversed; lateral teeth prominent.

Long. 9-16; lat. 7-16; diam. 4-16 inches.

*Hab.* N. America, in Mexico. (Cabinet Acad. Nat. Sci. Philada.)

The specimens from which I have prepared this description were presented to the Academy of Natural Sciences of Philadelphia by Mrs. Say, as the *Cyclas*

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triangularis, Say; they may or may not be true representatives of Say's species. In many points they answer his description of the *C. triangularis*, but at the same time I am not able to reconcile their shape, which is not more triangular than that of any other species, with the name he has applied to the species. Moreover, they bear a very strong resemblance to one of our Northern Sphærium, the *Sph. solidulum*; they differ from it, however, in being less heavily and more regularly striated, and in having more prominent beaks.

b.—Species with protuberant or calyculate beaks.

16. *Sph. elevatum*, Hald.

*Cyclas elevata*, Hald., Acad. Nat. Sci. Phila., Proc., i. 53, 1841.

*C. pallida*, De Charp., MSS. 1851.

Animal not observed.



Shell ovate, orbicular, nearly spherical, cavity large, equilateral, margins well rounded; beaks central, slightly inclined towards the anterior, lapping over the outline of the shell, large, tumid, approximate, calyculate, prominent; hinge margin slightly curved; cardinal teeth united, prominent; lateral ones elongated; large, valves very strong, interior bluish; surface smooth, striation light, irregular; color brownish olive, greatly varied by zones of a lighter shade, a zone of bright yellow bordering the inferior and part of the lateral margins.

Long. 9-16; lat. 8-16; diam. 5-16 inches.

Hab. N. America, at New Orleans, La., and in Florida and Alabama. (Cabinets Acad. Nat. Sci. Philada., and Prime.)

Remarkable for its transversely spherical shape, which renders it distinct from all other species of this genus. It is much more solid than the generality of calyculate species, the valves being as strong as those of any of the larger species of the preceding group.

The *Cyclas pallida*, the young of this species, is more delicate than the adult; it is a little less transversely spherical, the striæ are lighter, and the color is bright yellow.

Prof. Haldeman's original specimen of the *Cyclas elevata*, from which this description was prepared, and which is now in the cabinet of the Academy of Natural Sciences, though very perfect in appearance, comprised but a single valve.

This species seems to be very rare. I have never met with any other specimens but the one in the cabinet of the Academy and those I have in mine,—two specimens of the *Cyclas pallida*, derived from De Charpentier himself, and a single valve from Florida.

17. *Sph. partumium*, Say.

*Cyclas partumia*, Say, Acad. Nat. Sci. Phila., II. 2, 380, 1822.

*C. cornea*, var. 2, Lam., An. s. vert. v. 558, 1818.

*C. orbicularia*, Barrat, Amer. II. xlviii. 276, 1845.

*C. mirabilis*, Prime, Bost. Proc. iv. 157, 1851.

*C. cœrulea* " loc. sub. cit. iv. 161, 1851.

*C. eburæa*, Anthony, " " " iv. 279, 1852.

Animal usually white, in some varieties pink, syphonal tubes pink. Shell rounded-oval, thin, fragile, pellucid, somewhat inflated, nearly equilateral; anterior margin very slightly distended, rounded; posterior slightly abrupt; basal rounded; beaks central, calyculate, approximate at apex; striæ so delicate as hardly to be visible; epidermis glossy, of a light greenish horn color, with at times a zone of a different shade on the basal margin; valves delicate, moderately convex, interior light blue; hinge margin nearly straight, passing 1862.]

by a regular curve into the anterior margin, but curving suddenly behind so as to form an obtuse angle, causing the posterior side to appear broader, thus giving the shell a somewhat rhombiform appearance; cardinal teeth strong, assuming the shape of the letter V reversed; lateral teeth very much elongated.

The young shell is more compressed than the adult; it is usually light yellow.

Long. 8-16; lat. 7-16; diam. 5-16 inches.

*Hab.* N. America, in the States of Maine, Vermont, Massachusetts, New York, New Jersey, Pennsylvania, Ohio, S. Carolina, Georgia, Mississippi, Alabama and Arkansas. (Cabinets Acad. Nat. Sci. Phila., Boston Soc. Nat. Hist., Garden of Plants at Paris, Agassiz, Jay and Prime.)

This species varies much according to the localities where it is found, which accounts in part for the number of names it has received. The *Cyclas orbicularia*, of which I have authentic specimens from Mr. Barrat, is a genuine *Sph. partumium*, without even any local modifications of shape. The *Cyclas mirabilis*, from Georgia, is a small form of this species, and the *Cyclas cœrulea* differs from the type in being a little less inflated. The *Cyclas eburnea*, from Arkansas, varies from the Northern *Sph. partumium* in being more compressed and a little more elevated. I do not think, however, taking the difference of localities into consideration, that these are characters sufficient to warrant retaining the *Cyclas eburnea* as a distinct species. I had an opportunity while in Paris to assure myself that the variety No. 2 of *Cyclas cornea* was a true *Sph. partumium*.

This species is not only very widely distributed, but where it is found, it occurs in large numbers. The only one of our Northern species to which it bears much resemblance is the *Sph. truncatum*, and that is only in general outline; the *Sph. partumium* is much more inflated and transversely more broad.

#### 18. *Sph. Jayanum*, Prime.

*Cyclas Jayensis*, Prime, Bost. Proc. iv. 157, 1851.

Animal not observed. Shell rhombic, nearly equilateral, moderately convex, thin, fragile, somewhat translucent, drawn up to an angle towards the hinge margin; anterior and posterior margins very abrupt, inferior very slightly curved; beaks central, calyculate, approximate at apex; hinge margin considerably shorter than the basal margin, slightly curved; cardinal teeth distinct in the shape of the letter V reversed; lateral teeth elongated; valves delicate, interior light blue; striæ hardly visible; epidermis glossy, light greenish horn color, with at times a zone of bright yellow on the inferior margin.

Long. 8-16; lat. 7-16; diam. 3-16 inches.

*Hab.* N. America, in the region of Lake Superior? (Cabinets Agassiz, Jay, Garden of Plants in Paris, and Prime.)

This attractive and rare species is easily distinguished by its elevated shape and by its abrupt lateral margins, which give it a somewhat triangular appearance. It is related to the *Sph. Ryckholtii* of Europe, from which it differs, however, in being more inflated, its beaks are less prominent, the shell is more elevated, and its anterior margin is abrupt, whereas in *Sph. Ryckholtii* it is distended and angular.

#### 19. *Sph. subtransversum*, Prime, Proc. Zool. xxviii. 322, 1860.

Animal not observed. Shell small, transversely oblong, equilateral, translucent, fragile, compressed; beaks central, large, calyculate; striæ very delicate; epidermis greenish yellow.

Long. 3-10; lat. 2-10; diam. 1-10 inches.

*Hab.* N. America, at Tabasco in Mexico. (Cabinet Cuming.)

The only specimen I have seen of this species was sent to me for description by Mr. Cuming.

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20. *Sph. argentinum*, D'Orbigny.

*Cyclas argentina*, D'Orb., Mag. de Zool. 1835. Voy. en Amer. Méri-  
568, pl. 83, f. 5—7, 1844.

Animal not observed. Shell oval, small, translucent, compressed; anterior side short, somewhat angular, posterior side distended and truncated at the end; beaks calyculate; striæ delicate; epidermis greenish brown; valves slight, interior bluish; cardinal teeth united, lateral teeth hardly visible.

Long. 5-16; lat. 4-16 inches.

*Hab.* S. America, at Montevideo at the base of the Cerro. (Cabinet British Museum.)

It has not been my good fortune to meet with this species. M. D'Orbigny says it bears some resemblance to the *Cyclas caliculata*, meaning thereby, I presume, the shell now known to European conchologists under the name of *Sph. lacustre*, Férussac.

21. *Sph. tenuis*, Prime.

*Cyclas tenuis*, Prime, Bost. Proc. iv. 161, 1851.

Animal not observed. Shell small, transversely oblong, pellucid, moderately full, subequilateral; anterior and basal margins rounded, posterior margin subabrupt; beaks nearly central, not prominent, calyculate; striations very fine and regular, hardly perceptible; epidermis glossy, light straw color; valves slight, interior straw color; hinge margin short, narrow, nearly straight; cardinal teeth very diminutive, lateral teeth small, elongated.

Long. 3-16; lat. 2-16; diam. 1-16 inches.

*Hab.* N. America, in the Androscoggin, Maine. (Cabinet Prime.)

This species, the smallest one known to inhabit the United States, was discovered some years since by Mr. Girard, from whom I obtained my specimens, the only ones I have met with. It may possibly be the young of some species, but if so, it would be very difficult to say which; setting aside its diminutive size, it appears to have all the characteristics of a mature shell. In outline it seems to be allied to the *Sph. transversum*; it is, however, more inflated, less elongated, and its margins are more rounded. At first sight, it might readily be mistaken for a *Pisidium*.

22. *Sph. transversum*, Say.

*Cyclas transversa*, Say, New Harm. Dissem. 2, 356, 1829.

*C. detruncata*, Prime, Bost. Proc. iv. 155, 1851.

*C. gracile*, " loc. sub. cit. iv. 156, 1851.

*C. constricta*, Anthony, " " " iv. 274, 1852.

Animal white, syphonal tubes pink, foot white. Shell transversely oblong, elongated, subinequilateral, translucent; anterior side narrow; anterior margin rounded, posterior margin subtruncate, basal very much curved; beaks placed somewhat on the anterior side, large, calyculate, very much raised above the outline of the shell; striæ very delicate; epidermis greenish yellow, of a darker shade at times on the region of beaks; valves slight, interior bluish; hinge margin very nearly straight, narrow; cardinal teeth compressed, in the shape of the letter V reversed, and very much expanded; lateral teeth slightly elongated.

Long. 10-16; lat. 7-16; diam. 4-16 inches.

*Hab.* N. America, in the States of New York, Pennsylvania, Ohio, Kentucky and Arkansas. (Cabinets Jay and Prime.)

This large and delicate species is remarkable for its very transverse shape and for the narrowness of the anterior extremity as compared to the posterior. The form of the shell recalls that of many of the small species from the West Indies and South America. It is found in considerable abundance.

The *Cyclas detruncata* does not differ sufficiently from the type to constitute even a variety. The *Cyclas gracilis* is a large variety of *Sph. transversum*. 1862.]

versum, it is a little more inflated and of a darker color. The *Cyclas constricta* is nothing more than a deformed specimen of Say's species, having a perpendicular furrow up the centre of each valve, caused by some accident occurring to the shell during its growth.

23. *Sph. Bahiense*, Spix.

*Cyclas Bahiensis*, Spix, Tert. Braz. 32, pl. xxv. f. 5, 6, 1827.

*C. maculata*, Anton, (non Morelet,) Wieg. Archiv, 284, 1837.

*Pisum maculatum*, Desh., Brit. Mus. Cat. 283, 1854.

*P. Bahiense* " loc. sub. cit. 284, 1854.

*Musculium Bahiense*, Adams, rec. gen. ii. 451, 1858.

*M. maculatum*, " loc. sub. cit. ii. 451, 1858.

Animal not observed. Shell very small, rounded-oval, inflated, inequilateral; anterior margin narrow, curved; posterior margin broad, subtruncate; inferior margin curved; beaks inclined towards the anterior, large, prominent, calyculate; valves slight, interior dark yellow, irregularly mottled with dark reddish spots; lines of growth very fine; epidermis yellowish brown, with irregular spots of dark purple; hinge margin very narrow, nearly straight; cardinal teeth small; lateral teeth comparatively strong, the posterior one much the longer.

Long. 5-32; lat. 2-16; diam. 3-32 inches.

*Hab.* S. America, at Bahia in Brazil. (Cabinets Jay, Prime and others.)

This, the smallest species of *Sphærium*, has the peculiar appearance characteristic of the West Indian and South American shells of this genus. It does not seem to be uncommon. Some authors, led away by its diminutive size, have committed the error, as may be seen by the above synonymy, of placing it under the head of *Pisidium*. I have never seen the *Cyclas maculata* of Anton, (non Morelet,) but have every reason to believe, from the description given of it, that it does not differ materially from this species. In outline it is somewhat similar to the *Sph. Barbadosense*; it is, however, much smaller, less inflated, and the beaks are much more raised. Compared to the *Sph. meridionale*, Nobis, and *Sph. maculatum*, Morelet, it is smaller, more inflated, and the margins are more rounded.

24. *Sph. Barbadosense*, Prime, Proc. Acad. Nat. Sci. Phila., 1861.

Animal not observed. Shell small, rounded-oval, ventricose, subequilateral, delicate; anterior side a little the shorter and narrower; margins generally rounded; beaks slightly inclined towards the anterior, nearly central, small, calyculate, approximate at apex, at times eroded; striae coarse for the size of the shell, though not very distinct; epidermis dark greenish-brown; valves slight, very convex; cardinal teeth very small; lateral teeth strong, very much drawn up and shorter than they usually are in other species.

Long.  $\frac{1}{4}$ ; lat. 1-5; diam. 5-32 inches.

*Hab.* Barbadoes, West Indies. (Cabinet Prime.)

I have but one specimen of this species, which seems to be closely allied to the *Sph. Bahiense* of Brazil; it is, however, much larger, more globose, and its beaks are not as much raised.

25. *Sph. modioliforme*, Anton.

*Cyclas modioliformis*, Anton, Wieg. Archiv, 284, 1837.

*Pisidium diaphanum*, Hald., Proc. Acad. Nat. Sci. Phila., i. 53, 1841.

*Pisum modioliforme*, Deshayes, Brit. Mus. Cat. 283, 1854.

*Pisidium Moquiniana*, Bourgt., Amen. i. 61, pl. 3, f. 13—17, 1855.

*Cyclas Moquiniana*, Gassies, Pisid. S. O. f. 9, 1855.

*C. striatella*, Ferussac, Museum of Paris.

*C. littoralis* " Collect. Michaud.

*C. Venezuelensis*, Prime, Museum at Leyden.

*Musculium modioliforme*, Adams, rec. gen. ii. 451, 1858.

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Animal not observed. Shell small, ovate-oblong, moderately inflated, inequilateral, translucent; anterior and basal margins rounded, posterior somewhat distended and subtruncate; beaks inclined towards the anterior, prominent, calyculate; valves slight, convex; epidermis dark yellow, irregularly spotted with a darker color; striæ hardly visible; teeth very small; hinge margin somewhat curved, very narrow.

Long. 5-16; lat. 3-16; diam. 5-32 inches.

*Hab.* S. America, in Brazil and Venezuela. (Cabinets Acad. Nat. Sci. Phila., Bourguignat, Gassies, Museum of Paris, Michaud, and Museum at Leyden.)

The specimen from which this description was prepared—the original shell from which Mr. Haldeman described the *Pisid. diaphanum*—is in the Cabinet of the Academy of Natural Sciences of Philadelphia. It was discovered in the interior of a large *Ampullaria* from Brazil. I have never seen the *Cyclas modioliformis* or the *Pisid. Moquinianum*, but judging from their descriptions and from the figure of the latter, I have little doubt but that they belong to the same species. I have had occasion to examine the *Cyclas striatella*, *littoralis* and *Venezuelensis* personally.

The *Sph. modioliforme* seems to be rare. It bears some resemblance to the *Sph. meridionale*, but it differs from it in being more inflated and of a lighter color.

## 26. *Sph. meridionale*, Prime, Proc. Acad. Nat. Sci. Phila., 1861.

Animal not observed. Shell small, transversely-oblong, compressed, delicate, inequilateral; anterior side narrow, shorter; anterior margin somewhat angular, posterior subabrupt, basal slightly rounded; beaks inclined towards the anterior, small, calyculate, approximate at apex; valves slight, compressed, striæ very regular and delicate, hardly perceptible; epidermis yellowish brown, irregularly mottled with large blotches of a much darker color; hinge margin very slightly rounded, narrow, much shorter than the basal margin; cardinal teeth diminutive; lateral teeth slight, the posterior tooth much the more elongated.

Long.  $\frac{1}{2}$ ; lat. 1-5; diam. 2-16 inches.

*Hab.* N. America, at Panama. (Cabinet Prime.)

This species, of which I have never seen but one specimen, is easily distinguished by its very inequilateral and compressed shape. Compared to the *Sph. maculatum*, it is larger, its posterior margin is less abrupt, and its lateral teeth are larger.

## 27. *Sph. maculatum*, Morelet.

*Cyclas maculata*, Morelet, Test. nov. Insul. Cub., etc., pt. 2d, 25, 1851.

Animal not observed. Shell small, transversely-oblong, rhombic, elongated, inequilateral, compressed, delicate; anterior side much the narrower, slightly rounded; posterior side very broad; posterior margin abrupt, forming a straight line from the hinge to the base of the shell; inferior margin nearly straight; valves slight, very little convex; beaks small, calyculate, inclined towards the anterior side; striæ not perceptible; epidermis dark yellowish-brown, irregularly mottled with spots of a much darker color; hinge margin nearly straight; cardinal teeth very small; lateral teeth strong, elongated.

Long. 4-16; lat. 3-16; diam. 2-16 inches.

*Hab.* N. America, in Yucatan. (Cabinets Morelet, Jay and Prime.)

A rare species; the only specimens I have met with were kindly presented to me by the original describer. It is easily distinguished from all other species of *Sphærium* by the very great disproportion which exists between the lateral margins.

28. *Sph. Veatleyi*, C. B. Adams.*Cyclas Veatleyi*, C. B. Adams, Contrib. Conch. 44, 1849.*Pisidium* " Petit, Il. Conch. ii. 421, 1851.*Pisum* " Desh., Brit. Mus. Cat. 283, 1854.*Musculium* " Adams, rec. gen. ii. 452, 1858.

Animal not observed. Shell small, transversely elongated, inequilateral, compressed; anterior and inferior margins rounded; posterior margin subtruncate; beaks situated towards the anterior side and inclined in that direction, small, prominent, calyculate; valves slight, interior irregularly spotted with dark blotches; striae regular, coarse for the size of the shell; epidermis horn color with a tinge of brown; hinge margin nearly straight; cardinal teeth small but distinct, placed in the shape of the letter V reversed; lateral teeth well developed, elongated.

Long. 3-16; lat. 2-16; diam. 1-16 inches.

*Hab.* N. America, in the Island of Jamaica. (Cabinets Jay and Prime.)

This rare species, of which I received specimens from the late Prof. Adams, is somewhat allied to the *Sph. Portoricense*; it is, however, smaller, more delicate, more elongated, the valves are less full, the beaks less large, and the hinge in every way more slight.

29. *Sph. Portoricense*, Prime, Proc. Acad. Nat. Sci. Phila., 1861.

Animal not observed. Shell small, transversely elongated, rhombic, equilateral, slightly compressed; margins generally straight, in especial the posterior margin; beaks central, slightly inclined towards the anterior side, calyculate, approximate at apex; striae regular, quite heavy considering the size of the shell; epidermis light brownish-yellow; cardinal teeth strong; lateral teeth strong, very much drawn up; valves solid, very little convex; the interior, and at times the exterior, irregularly spotted with a few dots of very dark color.

Long.  $\frac{1}{4}$ ; lat. 1-5; diam.  $\frac{1}{8}$  inches.

*Hab.* Portorico, West Indies. (Cabinets Swift and Prime.)

The specimens from which this description were prepared were kindly furnished to me by Mr. Swift of St. Thomas. In proportion to its size this species is quite robust. It is different from the generality of the West Indian and South American *Sphaeria* by its sulcations, which are regular and deep. In shape and appearance it recalls the young of *Sph. sulcatum*. It is allied to *Sph. Veatleyi* in outline, but otherwise it is different, in being heavier and of a larger size.

30. *Sph. securis*, Prime.

*Cyclas securis*, Prime, Bost. Proc. iv. 160, 1851. Ann. N. Y. Lyceum, v. 218, pl. vi. 1851.

*C. cardissa*, Prime, Bost. Proc. iv. 160, 1851.

*C. crocea*, Lewis, loc. sub. cit. v. 25, 1854.

Animal pinkish, syphons of the same color. Shell rhombic-orbicular, ventricose, subequilateral, both sides of very nearly the same length; anterior margin a little curved; posterior margin abrupt, forming an obtuse angle with the hinge margin; basal margin much longer than the superior margin, rounded; beaks large, calyculate, slightly inclined towards the anterior, very approximate at apex; valves slight, very convex, especially in the region of the umbones; striae delicate, regular, hardly perceptible; epidermis glossy in some cases, very variable in color, but generally of a greenish-horn, at times of a brilliant yellow or straw color; hinge margin curved, narrow; cardinal teeth very small, united at base; lateral teeth slight, elongated, very narrow.

Long. 6-16; lat. 5-16; diam. 4-16 inches.

*Hab.* N. America, in the States of Massachusetts, Vermont, Pennsylvania and New York. (Cabinets Jay, Lewis and Prime.)

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Found plentifully at Cambridge, Mass. I cannot see differences sufficient between the *Sph. securis* and the *Cyclas cardissa* to separate them; the *Cyclas cardissa* is more globose, transversely shorter, more elevated, but still intermediate forms uniting the two are so frequent that it is not possible that they should form distinct species.

The *Cyclas crocea*, Lewis, is a young of this species.

Compared to the *Sph. sphaericum*, the *Sph. securis* is more equilateral, the beaks are less tumid and less inclined, the sides are less rounded, and the hinge margin is less curved.

31. *Sph. rosaceum*, Prime.

*Cyclas rosacea*, Prime, Bost. Proc. iv. 155, 1851.

Animal not observed. Shell small, rounded-oval, fragile, translucent, sub-equilateral, somewhat compressed, margins generally rounded; beaks nearly central, slightly inclined towards the anterior, calyculate, approximate at apex; valves very slight, a little convex in the region of the umbones; striae regular, hardly visible; epidermis shiny, reddish-brown; hinge margin nearly straight, delicate, narrow; cardinal teeth nearly obsolete, lateral teeth slight, elongated.

Long. 4-16; lat. 3-16; diam. 5-32 inches.

*Hab.* N. America, in the Schuylkill River. (Cabinet Prime.)

This species, which is very rare, the only specimens known to me being those in my collection, is not very liable to be confounded with others. Compared to the *Sph. occidentale*, it is less full, the beaks are more prominent and are calyculate.

32. *Sph. sphaericum*, Anthony.

*Cyclas sphaerica*, Anthony, Bost. Proc. iv. 275, 1852.

Animal not observed. Shell globose, subequilateral, transversely oval; anterior side narrow, distended, rounded; inferior margin rounded; posterior margin subabrupt; beaks inclined towards the anterior, large, prominent, calyculate; valves slight, very convex, interior blue; striae fine and regular; epidermis greenish; hinge margin much curved; cardinal teeth strong, united at base and disposed in the shape of the letter V reversed; lateral teeth prominent, very distinct, rather short.

Long. 5-16; lat. 9-32; diam. 3-16 inches.

*Hab.* N. America, in the Black River, Ohio. (Cabinets Anthony and Prime.)

Very rare; I have never seen any specimens of this species but those in Mr. Anthony's collection and in mine. Compared to the *Sph. rosaceum*, it is less equilateral, more inflated and the margins are less rounded.

33. *Sph. truncatum*, Linsley.

*Cyclas calyculata*, C. B. Adams, Amer. Il., xi. 277, 1841.

" *truncata*, Linsley, Amer. Il., N. Ser., vi. 234, f. 3, 1848.

" *pellucida*, Prime, Boston Proc., iv. 277, 1852.

Animal not observed. Shell rhombic-orbicular, lenticular, thin, pellucid, very slightly inflated, subequilateral; anterior side narrower; anterior margin rounded; posterior margin nearly a straight line; basal somewhat curved; beaks central, calyculate, approximate at apex; striae very delicate; epidermis glossy, light greenish horn color; valves slight, very little convex; interior light blue; hinge margin very nearly straight; very narrow; cardinal teeth diminutive, united at base; lateral teeth slight, narrow, not much elongated.

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Long. 6-16; lat. 5-16; diam. 5-32 inches.

*Hab.* N. America, in the States of Maine, Vermont, Massachusetts, Connecticut, New York and Ohio. (Cabinets Linsley, Gould and Prime.)

The specimens from which this description was prepared, the same ones from which Dr. Gould described the original *Cyclas truncata*, are precisely similar to those the late Prof. Adams sent to me labelled *Cyclas calyculata*, from Vermont, and which I described, in 1852, under the name of *Cyclas pellucida*. This species is undoubtedly very closely allied to the *Sph. lacustre*, Férussac (*Cyclas calyculata* of authors) of Europe, but still the differences are patent enough to authorize its being retained as distinct. Compared to the *Sph. parturium*, the *Sph. truncatum* is less inflated, transversely less broad, the posterior margin is more abrupt and the hinge slighter. The young, more tumid than the adult, is of a lemon yellow. Found not uncommonly.

34. *Sph. lenticula*, Gould.

*Lucina lenticula*, Gould, Bost. Proc., iii. 256, 1850.

*Cyclas lenticula*, Gould, Atlas Explor. Exped., pl. 36, f. 528.

Animal not observed. Shell rhombic-orbicular, lenticular, thin, pellucid, very slightly inflated, nearly equilateral; anterior side narrower; anterior margin curved; posterior margin abrupt, inferior rounded; beaks central, calyculate, approximate at apex; striae hardly visible; epidermis glossy, light greenish horn color; valves delicate, a little convex towards the region of the umbones; interior light blue; hinge margin nearly straight, narrow; cardinal teeth hardly visible, united at base; lateral teeth slight, narrow, not much elongated.

Long. 7-16; lat. 6-16; diam. 3-16 inches.

(Cabinets Gould, Anthony and Prime.)

*Hab.* N. America, in Carson River, California.

This species, of which I obtained specimens from Dr. Gould, is so similar in nearly every respect to the *Sph. truncatum*, that it is very difficult to tell them apart. The valves of the *Sph. lenticula* are perhaps a little more convex as they approach the region of the beaks, and the hinge margin a little more curved and less narrow. The young shell is of the same color as the adult, whereas, with *Sph. truncatum*, the young is of a lighter color.

*Fossil Species.*

35. *Sph. recticardiale*, Meek and Hayden, Ac. N. S. Phil., Proc., 176, 1860.

Shell of medium size, transversely subelliptical, rather compressed, very thin; anterior side rounded; base forming a regular semielliptic curve; posterior extremity obliquely subtruncate above and rather narrowly rounded below; cardinal margin long and straight; beaks very small, compressed and projecting but slightly above the hinge, located nearly half way between the middle and the anterior end; surface marked by moderately distinct, irregular lines of growth.

Long. 0.55; lat. 0.36; diam. 0.24 inch.

*Hab.* Near the mouth of Grand River, on the Upper Missouri, Nebraska, U. S. of America. Tertiary Formation.

36. *Sph. planum*, Meek and Hayden, Ac. N. S. Phil., Proc., 175, 1860.

Shell rather small, broad oval or subcircular, much compressed; extremities more or less regularly rounded, the posterior margin being sometimes faintly subtruncate; base semioval in outline; cardinal margin rounding gradually from near the middle; beaks very small, compressed, and scarcely extending beyond the hinge margin, nearly central; surface marked by fine, irregular, obscure concentric striae.

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Long. 0.38; lat. 0.32; diam. 0.08 inch.

*Hab.* Near the mouth of Grand River, on the Upper Missouri, Nebraska, U. S. of America. Tertiary formation.

37. *Sph. formosum*, Meek and Hayden.

*Cyclas formosa*, M. & H., Ac. N. S. Phil., Proc., 115, 1856.

" *fragilis*, M. & H., loc. sub. cit., 115, 1856.

Shell small, oval, oblique, scarcely ventricose; cardinal margin straight; buccal end rounded; anal extremity obliquely truncate; basal margin semi-elliptical or broadly rounded; beaks obtuse, tumid, rising somewhat above the hinge, nearly touching, placed a little in advance of the middle; surface ornamented by very fine, regular, distinct, concentric wrinkles.

Long. .17; lat. .08; diam. .14 inch.

*Hab.* Three miles above Fort Union, Nebraska, U. S. of America. Tertiary Formation.

38. *Sph. subellipticum*, Meek and Hayden.

*Cyclas subelliptica*, M. & H., Ac. N. S. Phil. Proc., 115, 1856.

Shell small, elliptical-ovate, somewhat ventricose, thin and fragile; posterior end narrower than the anterior, both narrowly rounded; base semi-elliptical or semioval; cardinal border apparently rounding gradually to both extremities; beaks not much elevated, pointed, incurved, not oblique, located near the middle; surface indistinctly marked with lines of growth.

Long. .24; lat. .14 inch.

*Hab.* Three miles above Fort Union, Nebraska, U. S. of America. Tertiary Formation.

"The beaks are so near the middle, and curved so nearly at right angles to the longitudinal diameter of the shell, that it is not easy to determine, especially from the examination of mutilated specimens, which is the posterior or which the anterior end. As we have only seen imperfect specimens, we are not sure the surface markings are indistinct on unworn shells."—M. & H.

The following shells, known under the name of *Cyclas*, must be excluded from the list of American species of *Sphærium*, in some cases because they have been improperly placed in this genus, and in others, because no description has been published:—

*Cyclas aequalis*, Rafinesque, is *Pisid. Virginicum*.

" *altilis*, Anthony, is *Pisid. compressum*.

" *Americana*, Christof. and Jan. Undescribed.

" *Caroliniana*, Bos., is *Cyrena Caroliniensis*.

" *Chilensis*, D'Orbigny, is *Pisid. Chilense*.

" *clandestina*, Da Costa, is a marine shell.

" *densata*, D'Orbigny, (fossil,) is *Cyrena densata*.

" *dubia*, Say, is *Pisid. Virginicum*.

" *fluviatilis*, Bosc, is a *Corbicula*.

" *Fontaineii*, D'Orbigny, is *Cyrena Fontaineii*.

" *hammalis*, Rafn., is a *Corbicula*.

" *limosa*, D'Orbigny, is *Corbicula limosa*.

" *maritima*, D'Orbigny, is *Cyrena Cubensis*.

" *minor*, C. B. Adams, is *Pisid. abditum*.

" *nitida*, Adams & Mighl., is *Pisid. Adamsi*.

" *ovata*, Lewis. Undescribed.

" *Paranensis*, D'Orbigny, is *Corbicula Paranensis*.

" *pygmaea*, C. B. Adams, is *Pisid. Jamaicense*.

" *variegata*, D'Orbigny, is *Corbicula limosa*.

" *Virginica*, Férussac, is *Pisid. Virginicum*.

**Note on the Classification of CERAMBYCIDÆ, with descriptions of new species.**

BY JOHN L. LE CONTE, M. D.

Since the publication of my essay on the Classification of our Cerambycidæ, in the Journal of the Academy, many species have been added to the literature of our fauna; and in restudying the material in my collection, I have noticed some characters not yet employed, which seem to render the definition and classification of the tribes more perfect. The general features of the arrangement proposed by me in the essay above mentioned have been adopted in many of the works recently published, but the results have not been improved by any important changes of system or characters.

A very excellent application of the system to the Cerambycidæ of the entire globe has been made by Mr. James Thomson in his work entitled "Essai d'une Classification de la Famille des Cerambycides;" the order of arrangement adopted by him is different from that used in my paper; commencing with the highest form, the Lamiidæ, he ends with the Prionidæ. The arrangement is probably more convenient than mine, but it is impossible to preserve even the most important affinities in a linear form. The tables given both by him and myself exhibit perfectly the relations of the larger divisions to each other and to other families.

The important character to which I wish to call attention in the present note is the granulation of the eyes. In certain tribes (e. g. Clytus) the lenses are exceedingly small, in others (e. g. Elaphidion) they are much larger; in the former case the eyes are said to be finely, and in the latter, coarsely granulated. This character is also observed in the Lamiidæ, and in both instances serves to define well marked tribes with greater ease and distinctness than any other character which has been observed.

Using this observation, to perfect our tables of tribes, (or groups, as I previously called them,) we obtain the following result.

LAMIIDÆ.

- I. Humeri rounded, wings wanting; (anterior coxal cavities closed, either rounded or angulated; eyes somewhat coarsely granulated:)—*Monilema*, &c. *Michthysoma*.
- II. Humeri distinct:—
  - A. Eyes coarsely granulated:
    - a. Anterior coxal cavities rounded, closed:—*Acanthoderus*, *Ædilis*, &c.; *Liopus*, *Leptostylus*, *Dectes*, &c.
    - b. Anterior coxal cavities angulated, closed:—*Pogonocherus*, *Eupogonius*, &c.; *Oncideres*, *Mesosa*, &c.; *Monohammus*, *Goës*, &c.; *Ptychodes*, *Dorcaschema*, &c.
  - B. Eyes finely granulated:
    - a. Anterior coxal cavities angulated, closed behind.  
Front large, flat, frontal suture concave:—*Saperda*.  
Front convex, frontal suture straight:—*Tetraopes*, *Oberea*, &c.
    - b. Anterior coxal cavities open behind:—*Dysphaga*.

CERAMBYCIDÆ.

No change is proposed in the Lepturini or Spondyliini; the eyes are finely granulated in all of our genera except *Centrodera Lec*. The remainder of the subfamily may be arranged thus:—

- I. Anterior coxal cavities angulated, closed behind; (eyes finely granulated):—*Heliomanes*, *Stenopterus*.
- II. Anterior coxal cavities rounded; maxillæ elongated, maxillary palpi short; (eyes finely granulated.)
  - Anterior coxal cavities closed behind:—*Callichroma*.
  - Anterior coxal cavities open behind:—*Rhopalophorus*.

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- III. Anterior coxal cavities rounded, open behind; maxillæ short, labial palpi normal.
- A. Eyes coarsely granulated:—*Distenia*, *Eburia*, &c.; *Elaphidion*, &c.: *Ibidion*.
- B. Eyes finely granulated:  
Front short, oblique:  
Femora slender, clavate:—*Ancylocera*.  
Femora not clavate:—*Arhopalus*, *Stenosphenus*, *Mannophorus*, &c.;  
*Megaderus*, *Dendrobias*, *Trachyderes*, *Stenaspis*, &c.; *Tylosis*, *Crossidius*, &c.  
Front large, quadrate, vertical:  
Femora not clavate:—*Tragidion*, *Purpuricen*.  
Femora very clavate:—*Clytus*, *Euderes*.
- IV. Anterior coxal cavities angulated, open behind; maxillæ short, palpi normal.
- A. Anterior coxæ not transverse, eyes coarsely granulated:  
Femora slender at base, suddenly clavate:—*Obrium*, &c.  
Femora gradually clavate:—*Sclerocerus*, *Dryobius*, *Gracilia*, *Smodicum*, *Atimia*, *Opsimus*.
- B. Anterior coxæ transverse:  
*a.* Eyes finely granulated:  
Femora not clavate:—*Rosalia*.  
Femora slender at base, almost suddenly clavate:—*Callidium*, &c.  
Femora gradually but strongly thickened:—*Tetropium*, *Asemum*.  
*b.* Eyes coarsely granulated:—*Criocephalus*.

*Description of new species.*

1. *Ædilis obliquus*, elongatus, cinereo-pubescens, nigro-variegatus, elytris costis tribus nigro-tesselatis parum elevatis, fasciisque duabus obliquis nigris ornatis, profunde minus parce punctatis. Long. .45—.53.

Kansas, New Mexico, Arizona and California. Of the same shape as our Eastern *Æ. obsoletus*, but readily distinguished by the less distant punctures of the elytra and the three elevated costæ; the 3d, 4th and 5th joints of the antennæ are clothed beneath with dense, short, very fine hair, as in *Æ. obsoletus*.

2. *Dectes texanus*, elongatus, niger, dense cinereo-pubescens, thorace latitudine fere longiore, spina haud divergente, lineam lateris recte continue. Long. .31.

Texas, one specimen. This species resembles *D. spinosus*, (*Lamia spinosa* Say,) but is more slender, and the lateral spines near the base of the thorax do not diverge from the straight line of the sides.

I erroneously described the anterior coxal cavities of *D. spinosus* as being open behind; they are in reality closed, though much more narrowly than is usual in this tribe. Thomson (loc. cit. 14) seems to have considered this insect as *Heteromis cinerea* Lec., (*Juglandis* Hald.,) which belongs to a very different genus, allied to *Dorcaschema*.

3. *Liopus regularis*, elongatus, depressus, niger, pube cinerea brevissima dense vestitus, thorace maculis rotundatis 4 quadratim positiss, elytris utrinque 2, 2, 1, 1 rotundatis nigerrimis ornatis; antennis, ore, femoribusque fulvis, his apice nigris; elytris parce subtiliter punctatis apice rotundatis, thorace spina laterali valde divergente. Long. .27.

Ohio; Mr. Ulke. This beautiful species is of the same form as *L. symmetricus*, but the lateral spine of the thorax is longer and more diverging.

4. *Pogonocherus nubilus*, nigro-piceus, nitidus, pube brevi densa cinerea irregulariter adpersus, thorace latitudine sesqui brevior, confertim punctato. 1862.]

lateribus spina acuta armatis, elytris antice sat dense grosse punctatis, apice rotundatis; antennis annulatis, corpore paulo longioribus. Long. .35.

Northern New York, on bass-wood; Mr. Ashton. This species differs in appearance from the others of the genus, and resembles in form a small *Graphisurus*; but the anterior coxal cavities are very distinctly angulated externally.

5. *Monohammus oculatus*, niger, pube brevi pallida parce irroratus, thorace confertim rugoso et punctato, latitudine paulo brevior, spina laterali acuta, elytris rude punctatis, macula rotundata atra utrinque pone medium ornatis. Long. .42.

Racine, Wisconsin; Dr. J. P. Kirtland. A very distinct and beautiful little species. The antennæ are nearly twice as long as the body.

6. *Monohammus marmoratus*, *Lamia marmorata* Randall; *Monohammus fautor* Lec.

This synonym is determined by reference to the original specimen.

7. *Tetrops jucunda*, elongata, nigra, nitida, pube erecta nigra longa vestita, capite thoraceque coccineis, hoc latitudine longiore parce punctulato, antice posticeque vage transversim impresso, macula dorsali ovali nigra ornato, elytris grosse subseriatim punctatis; pedibus totis nigris. Long. .33.

Middle States. Larger than *T. monostigma*, and easily known by the black legs.

8. *Leptura rufibasis*, elongata, nigra, subtiliter cinereo-pubescentibus, capite thoraceque confertissime punctatis, hoc latitudine longiore, antrorsum sensim angustato, lateribus modice rotundatis, cinereo-pruinosis, angulis posticis parvis acutis, elytris fere parallelis apice rotundatis, antice fortiter, postice subtilius punctatis, antennis fuscis articulo 1mo rufo, pedibus rufis, tarsis nigris; tibiis posticis femorumque apice nonnunquam nigris. Long. .25—.30.

Hudson's Bay Territory, about Methy Lake; Mr. R. Kennicott. Of the same size and form as *L. subargenta Kirby*, but differs by the red color of the legs and base of antennæ. In one specimen the hind tibiæ and the outer fourth of the hind thighs are black; in all the others seen the thighs and tibiæ are entirely red, and the tarsi alone dark.

9. *Leptura saucia*, elongata nigra, capite thoraceque dense punctulatis fulvo pubescentibus, hoc fulvo, macula magna dorsali nigricante, latitudine paulo brevior, convexo, antrorsum angustato, angulis posticis parvis acutis, elytris parallelis fortiter postice subtilius punctatis, breviter griseo-pubescentibus, apice rotundatis; antennis pedibusque nigris, femoribus anticis, mediorumque basi rufo-testaceis. Long. .25.

Middle States. Allied to *L. ruficollis Say*, but, besides the differences in color, the thorax is more finely and densely punctulate than in that species.

10. *Leptura ruficeps*, elongata nigra, parce griseo-pubescentibus, capite obscure sanguineo, thoraceque dense punctulatis, hoc latitudine paulo longiore, antrorsum angustato, lateribus late rotundatis, angulis posticis parvis acutis, elytris parallelis, fortiter, postice subtilius punctatis, apice rotundatis; antennis nigris, pedibus anticis rufis, posterioribus nigris, femoribus mediis basi rufis. Long. .27.

One specimen, upper Georgia. This species belongs to the same division as the two preceding. The front tibiæ and tarsi are slightly fuscous.

11. *Centrodera sublineata*, fusca, sordide pubescens, thorace confertim punctato, linea angusta dorsali lævi, antice posticeque constricto, apice angustiore, lateribus medio obtuse angulatis, elytris thorace sesqui latioribus, parallelis apice rotundatis, sat dense punctatis, sulcis obsoletis magis pubescentibus notatis; antennis corpore longioribus, articulis 3 et 4 conjunctis 5to haud longioribus. Long .45—.53.

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Middle and Western States. Centrodera is readily distinguished among our Lepturide genera by the large coarsely granulated eyes. This species differs from the other two by the lateral tubercle of the thorax not being acute, and by the 3d and 4th joints of the antennæ being shorter.

12. *Toxotus Schaumi* Lec.

The males of this species are frequently reddish yellow, with only the elytra and antennæ black; the first joint of the antennæ is yellow and the tarsi are fuscous.

PYROTRICHUS. (Lepturini.)

*Corpus elongatum* lineare; caput longe pone oculos subito constrictum, fronte brevi verticali; oculi valde emarginati, subtiliter granulati; palpi articulo ultimo modice dilatato, campanulato. Thorax tuberculo acuto laterali armatus; elytra elongata parallela, præcipue postice fortiter marginata. Antennæ (maris) crassiusculæ, corpore paulo breviores, articulis 3io et 4to conjunctis 5to haud longioribus. Pedes mediocres, postici paulo longiores, tibiis calcaribus ad apicem sitis, tarsis posticis articulo 1mo sequentes duos æquante.

This genus is allied to *Encyclops*, but differs in the proportion of the joints of the antennæ, and also by the deeply emarginate eyes.

13. *P. vitticollis*, niger, opacus, capite scutello vittisque tribus thoracis læte fulvo-pubescentibus; elytris rude punctatis, thorace parum latioribus, margine postice et ad apicem reflexo. Long. .48.

California; Mr. Ulke. In each of the large punctures of the elytra is contained a very minute brown hair; the tip is feebly truncate.

14. *Elaphidion subpubescens*, elongatum lineare, pube parca pallida vestitum, testaceum, capite thoraceque fuscis, hoc cylindrico, latitudine longiore, rude sat dense punctatum, elytris parce antice fortiter punctatis, apice truncatis bispinosis; femoribus muticis, antennis articulis 3—5 spina brevi apicali armatis. Long. .65.

New Jersey; Mr. P. R. Uhler. Very different from our other species, and still more slender than *E. parallelum*.

15. *Heterachthes nobilis*, elongatus piceus, nitidus, pilis pallidis erectis parce vestitus, thorace latitudine sesqui longiore rude rugose punctato, antice posticeque transversim impresso, elytris parce fortiter punctatis, fascia transverse ad suturam interrupta ante medium, alteraque communi antice angulata pone medium pallidis ornatis. Long. .50.

Texas. Resembles in appearance *H. 4-maculatus*, but very different by its sculpture and the very distinct chevron-shaped band of the elytra.

16. *Stenosphenus lugens*, niger, thorace latitudine sublongiore, antrosum angustato, lateribus rotundatis, nitido lævi, elytris vitta suturali angusta, alterisque utrinque duabus fere confluentibus punctatis et parce pubescentibus apice bispinosis. Long. .50.

Texas. Narrower than *S. notatus*; the elytra have the punctures arranged in three longitudinal bands; a narrow one at the suture, and two almost confluent on the disc; from the punctures proceed coarse pale hairs; the intervening spaces are smooth and glabrous. The spines of the antennæ are as in *S. notatus*. The feet are entirely black.

OXOPLUS.

*Corpus elongatum*, haud convexum subtiliter parce pubescens, grosse punctatum; mandibulæ apice late emarginatæ; antennæ sexus utriusque 11-articulatæ; oculi subtiliter granulati; thorax transversus, lateribus spina acuta armatus, dorso vix callosus; elytra apice subtruncata haud spinosa.

A new genus, allied to *Tylosis*, but differing by the antennæ having eleven  
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joints, and by the lateral spine of the thorax. The species are red and black in color, and resemble in appearance *Purpuricen*, which they replace in the interior regions of the continent.

17. *Oxoplus coralinus* late coccineus, capite antennis pedibus metathoracis lateribus plagaque maxima communi elytrorum postica nigris; elytris fortiter sat dense punctatis. Long. .70—.80.

New Mexico; Mr. Ulke. The large common spot of the elytra extends from the middle to the tip along the suture, but the red along the margin reaches to within one-fifth of the tip.

18. *Oxoplus cruentus*, coccineus, capite antennis pedibus scutello elytris que nigris, his confertissime punctatis basi margineque laterali fere ad apicem coccineis. Long. .85.

Cape San Lucas; Mr. Xantus. Resembles the preceding, but the lateral spine of the thorax is larger; the elytra are more densely and finely punctured, and the black extends to within one-seventh of the base.

19. *Oxoplus marginatus*, subtus fusco-coccineus, supra niger, opacus, pube brevi helva sericea vestitus, thorace spinis rufo-tinctis, elytris confertissime punctatis basi margineque laterali fere ad apicem coccineis. Long. .95.

Cape San Lucas; Mr. Xantus. Differs from the preceding not only in color, but by the very obvious pubescence and by the punctures of the elytra towards the base being larger.

20. *Clytus approximatus*, ferrugineo-fuscus, subtiliter pubescens, thorace latitudine longiore, ovali, confertissime granulato-punctato, ad medium carinulis transversis armato, altera utrinque prope basin; elytris apice oblique truncatis, fascia recta mox ante medium, altera obliqua approximata ad suturam angulata, tertia latiore ad dodrantem, scutelloque flavo-pubescentibus; femoribus posticis abdomine longioribus, vix spinosis. Long. .33—.45.

Kansas; Mr. Ulke. Allied in form and sculpture to *C. erythrocephalus*; the second elytral band commences on the side behind the middle, runs obliquely forwards nearly to the suture, when it is suddenly angulated and reaches the suture; the point of the angle approaches closely to the first band; body beneath banded with yellow hair.

21. *Clytus horridus*, linearis, fusco-piceus, cinereo-pubescent, thorace latitudine fere sesqui longiore, subcylindrico, dorso carinulis acutis 6, alteraque utrinque ante basin armato, minus subtiliter granulato, granulis punctigeris; elytris apice oblique truncatis, basi, fascia angusta sæpe interrupta vel obsoleta ante medium, altera angulata mox pone medium, tertiaque obliqua ad dodrantem albo-pubescentibus, femoribus posticis maris abdomine longioribus, femina brevioribus. Long. .30—.40.

Middle States. The middle band makes an acute angle on each elytron, the apex being directed towards the base. The suture is more or less clothed with white pubescence; beneath a white spot is seen each side of the metasternum. This species belongs near *C. leucozonus*.

22. *Pteroplatus? floridanus*, niger opacus, supra rude punctatus, thorace fulvo, vittis 3 nigris, dorsali latiore, latitudine brevior, rotundato, parum convexo; elytris thorace paulo latioribus, sutura margine costisque utrinque 3 elevatis, his postice obsoletis; basi margineque externo late fulvo; antennis corpore duplo brevioribus, haud cristatis, articulo 5to 4to longiore, 11mo simpliciter, apice subacuto. Long. .37.

Florida; Mr. Edward Norton. The anterior coxæ are not transverse, and their cavities are very slightly angulated externally, about as much so as in *Atimia*.

23. *Asemum asperum* Lec. has the eyes prominent, and coarsely granulated

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as in *Criocephalus*, but much more emarginate than in the other species of that genus. In the latter respect, however, *C. australis* (*Asemum australe* Lec.) is an intermediate form.

24. *Prionus innotuus*, rufo-piceus, nitidus, thorace modice punctato, latitudine triplo brevior, angulis omnibus valde rotundatis, lateribus rotundatis, paulo undulatis, elytris thorace fere sesqui brevioribus, latitudine vix sesqui longioribus, sat fortiter punctatis, apice singulatim rotundatis; antennis (♀) 13-articulatis. Long. .90.

New Mexico; Mr. Ulke. More robust in form than any other species known to me; the eyes are of the same size as in *P. integer* Lec.

### Synopsis of the MORDELLIDÆ of the United States.

BY JOHN L. LE CONTE, M. D.

In investigating the numerous species of this family contained in our fauna, I have recognized other genera, in addition to those noted by me in the Smithsonian Contributions, in my paper on the Coleoptera of Kansas and New Mexico. I have also become convinced that the genus *Sphalera* established upon *Mordella melæna* Germ., is not tenable, the relative proportion of the outer joints of the antennæ being a specific rather than a generic character.

With these changes, our genera may be arranged in two tribes, as follows:

- A. Abdomen without anal prolongation; claws not cleft; hind coxæ moderate.....ANASPINI.
  - Anterior and middle tarsi with 4th joint equal to 3d;
    - Antennæ long, scarcely thickened externally.....DICLIDIA.
    - Antennæ shorter, last five joints broader ..... PENTARIA.
  - Anterior and middle tarsi with 4th joint very small.....ANASPIS.
- B. Abdomen, with the last dorsal segment prolonged, conical; claws cleft and pectinate; hind coxæ very large.....MORDELLINI.
  - a. Hind tibiæ with a small subapical ridge; eyes finely granulated;
    - Scutellum emarginate behind, eyes not reaching the occiput.....TOMOXIA.
    - Scutellum triangular, eyes reaching the occiput;
      - Anal style emarginate, last joint of maxillary palpi very transverse, securiform.....GLIPA.
      - Anal style entire, last joint of maxillary palpi triangular or slightly securiform.....MORDELLA.
  - b. Hind tibiæ and tarsi with oblique ridges on the outer face; eyes coarsely granulated;
    - Hind tibiæ without subapical ridge.....GLIPODES.
    - Hind tibiæ with the subapical ridge distinct.....MORDELLISTENA.

#### Tribe 1. ANASPINI.

The hind coxæ are somewhat larger in *Anaspis* than in the other two genera, and are shaped as in *Mordella*, though by no means as largely developed as in that genus. The characters of the tribe are:—

Hind coxæ not or but slightly dilated; tibiæ slender, claws not cleft nor serrate; last dorsal segment not prolonged; 6th ventral segment not visible in *Anaspis*, visible in *Pentaria* and *Diclidia*; eyes oval, narrowly emarginate; antennæ inserted very near the eyes, not serrate. Body transversely strigate, pubescent. The species are found on plants.

#### DICLIDIA.

The only species known to me is *Anaspis laetula* Lec., which differs 1862.]

from *Pentaria* by the antennæ, which are long and slender, very slightly thickened externally, by the form of the mesosternum, as well as by the sexual characters.

Scutellum rounded triangular, last dorsal segment not prolonged, sixth ventral visible; hind tibiæ slender, without ridges; fourth joint of anterior and middle tarsi emarginate, not smaller than the third; claws dilated at base. Hind coxæ small. Mesosternum compressed, much elevated. Eyes coarsely granulated, with a small emargination; antennæ long and slender, slightly thickened externally, not serrate; third and fourth joints each equal to the first and second together, fifth and sixth a little shorter. Palpi?

In the male the fifth ventral segment is broadly emarginate, and from the tip of the abdomen proceed two long triangular appendages, truncate at the apex. The sculpture is of fine transverse lines.

Yellow; scutellar cloud and two posterior bands of elytra black, venter fuscous, .12. Texas. 1. *laetula* Lec.

#### PENTARIA Muls.

Scutellum rounded triangular; last dorsal segment of abdomen not prolonged; sixth ventral segment visible; hind tibiæ without ridges, more slender than in *Anaspis*; third joint of anterior and middle tarsi not lobed, fourth equal to the third, and emarginate; claws dilated at base. Hind coxæ smaller than in *Anaspis*. Eyes coarsely granulated with a small emargination; antennæ with the joints 4—6 short, 7—11 thickened, not serrate; last joint of maxillary palpi triangular, acute at tip.

Notwithstanding the visible sixth ventral segment, the present genus is so closely allied to *Anaspis* that it would be unnatural to place it anywhere but in this family. The reduction in size of the hind coxæ and the slender hind tibiæ indicate a relationship with *Scaptia*.

The species are small, narrow, finely pubescent insects, living upon flowers; the sculpture consists of very fine, transverse lines as in *Anaspis*.

I have not discovered any external sexual characters.

Body fuscous; head, thorax, feet and base of antennæ testaceous; elytra black, with a large spot before the middle, extending nearly to the suture, and a broad band near the tip, yellow, .14. Middle States. *Anaspis trifasciata* Mels. 1. *trifasciata* Lec.

Body entirely fuscous or piceous, legs and base of antennæ paler, .11—.13. Texas and New Mexico. 2. *fuscula*.

Body very narrow, yellow, with a broad fuscous band on the elytra at the middle, .09. Tejon, California. 3. *nubila* Lec.

#### ANASPIS Latr.

Scutellum rounded triangular, last dorsal segment not prolonged; sixth ventral not visible; hind tibiæ slightly thickened, without ridges; fourth joint of anterior and middle tarsi very small, received upon the third joint, which is slightly lobed; claws dilated at base. Hind coxæ flat, moderate in size. Mesosternum not compressed, finely carinate. Eyes coarsely granulated, with a small emargination; antennæ slightly thickened externally, not serrate; last joint of maxillary palpi rounded internally, pointed at tip.

In the male two long, slender appendages are seen proceeding from between the fourth and fifth ventral segments; the fourth and fifth, and sometimes the others, are longitudinally excavated.

The genus *Anthobates* Lec. (Agassiz's Lake Superior, 231) was established on false observations; the type of it, *Anaspis trifasciata* Mels. cannot be placed in the present genus, but must be referred to *Pentaria* Muls., the generic name under which the characters were first properly exposed.

Body entirely black; transverse striæ exceedingly fine:

Thorax twice as wide as long; base of antennæ, palpi and front legs tes-

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taceous, '13—'15. L. Superior and Hudson's Bay Terr. ♂ with the ventral segments broadly channeled. *Hallomenus niger* Hald. . . . . 1. *nigra* Lec.

Thorax one-half wider than long, mouth and base of antennæ very dark testaceous, '11—'15. California. . . . . 2. *atra* Lec.

Head, thorax and body black; elytra brownish yellow:

Thorax scarcely wider than long, '15. Cala. and Sitka. *A. luteipennis* Lec. . . . . 3. *sericea* Mann.

Thorax one-half wider than long, '12—'14. Georgia and Minnesota. . . . . 4. *flavipennis* Hal.

Thorax and elytra brownish yellow:

Thorax one-half wider than long; head yellow; antennæ and abdomen usually fuscous, sometimes yellow, '12—'15. Southern, Middle and Western States, Canada, Sitka. *A. pallescens* Mann.; *ventralis* Mels.; *filiformis* Lec. . . . . 5. *rufa* Say.

Thorax one-half wider than long, head black, antennæ and body fuscous, the former pale at the base, '10—'13. Washington Territory. . . . . 6. *nigriceps* Lec.

Thorax nearly twice as wide as long; entirely uniform yellowish brown, more robust than the preceding, '05. Colorado Desert. . . . . 7. *pusio* Lec.

Thorax yellow, elytra and body black:

Thorax a little wider than long, anterior and middle thighs partly testaceous; transverse lines of elytra more distinct than usual, '12. San Diego, Cala. . . . . 8. *collaris* Lec.

## Tribe II. MORDELLINI.

Hind coxæ very large and flat, metasternum short; hind tibiæ dilated; claws cleft to the base, with the upper portion strongly pectinate; last dorsal segment conical, prolonged, sixth ventral not visible. Eyes oval, emarginate, antennæ more or less serrate, inserted in front of the eyes under a frontal margin. Body pubescent, very finely punctulate.

### TOMOXIA Costa.

The species of this genus are cuneiform, of a blackish color, varied with irregularly diffused gray pubescence; the scutellum is emarginate behind, the anal style is short and obtuse; the hind tibiæ and tarsi without ridges, except the short subapical one of the former; the eyes are finely granulated, the antennæ tolerably strongly serrate, and the last joint of the palpi is more or less elongate, triangular and moderately thick, with the extremity hollowed out.

The species are found running on the bark of trees which are partly dead; three are known to me,—

§ A. Last joint of maxillary palpi long triangular; base of thorax rounded at the middle.

Elytra with broad lines not extending behind the middle; a posterior fascia composed of spots and the apical margin cinereous; of the dark markings a rhomboidal spot each side near the base is most characteristic, '38—'5. Middle and Western States. . . . . 1. *bidentata* (Say.)

§ B. Last joint of maxillary palpi securiform; base of thorax subemarginate at the middle.

Elytra with narrow lines and subapical fascia cinereous, dark markings all narrow, '21—'32. Middle States. . . . . 2. *lineella*.

Elytra with a broad basal fascia including each side a round dark spot, transverse spot behind the middle, apex, suture and margin cinereous, '19. Western States. . . . . 3. *inclusa*.

## GLIPA Lec.

The only species known to me is narrow and cuneiform; the scutellum is rounded triangular, the anal style is short and subemarginate; the hind tibiae and tarsi are without ridges, except the short, subapical one of the former; the eyes are very finely granulated, the antennae tolerably strongly serrate, and the last joint of the maxillary palpi very broadly securiform and moderately thick, with the extremity hollowed out.

Black, varied with cinereous hair, elytra with a narrow subbasal band oblique inwards, and a broad one oblique outwards, brown pubescent, connected along the suture and margined with cinereous pubescence, '35—'48. Middle and Western States. *Mordella hilaris* Lay. . . 1. *hilaris* Lec.

## MORDELLA Linn.

The species of this genus are cuneiform; the scutellum is triangular; the anal style generally long and slender; the hind tibiae and tarsi are without ridges, except the short, subapical one of the former; the eyes are finely granulated, the antennae are more or less serrate; the last joint of the maxillary palpi long triangular, very obliquely truncate, except in the male of *M. oculata*, where it is broad and securiform, with the under surface clothed with erect hairs, moderately thick and hollowed out at the extremity; *Sphalerella* Lec. founded upon *M. melana* Germ. is not sufficiently distinct.

The species are found on flowers.

## § A. Anal style short truncate, antennae broadly serrate.

Piceous, covered with sericeous brown hair, elytra with a double cinereous spot each side, behind the middle, '25—'30. Kansas. 1. *4-punctata* Lec.\*

Dull black; thorax, pygidium and elytra sprinkled with small rounded spots of a silvery pubescence, elytra with a narrow, interrupted band behind the middle, composed of confluent spots, '13. Northern States.

2. *borealis*.

## § B. Anal style long slender.

## A. Last joint of maxillary palpi scalene triangular.

## a. Pubescence above dark, without conspicuous markings:

Deep black, finely pubescent, base of thorax broadly rounded at the middle, '2—'33. Middle, Southern and Western States. 3. *melana* Germ.

Above dull black, scutellum cinereous, beneath with fine grayish pubescence, sides of breast and anterior margin of ventral segments clothed with nearly white pubescence, '16—'23. N. Y., Canada, Ga., Oregon, California. *M. atrata* Mels. . . . . 4. *scutellaris* Fabr.

Black, pubescence above brownish black, with single cinereous hairs intermixed, beneath dull black, '12—'17. Southern and Western States.

5. *irrorata*.

## b. Pubescence above black, with orange-colored spots:

Occipital margin, base of thorax, with two short projections each side, irregular spot surrounding the humerus, and a lunate spot near the tip of the elytra clothed with bright orange-colored pubescence, '30. Florida.

6. *inflammata*.

Head grayish pubescent, thorax with reticulated lines of grayish yellow hair, elytra with a curved basal spot, a narrow oblique one behind the humerus, a rounded subsutural one at the middle, and a reniform spot one-fourth from the tip, more or less fulvous pubescent, beneath spotted with cinereous pubescence, '24—'28. Middle and Southern States. . . 7. *octopunctata* Fabr.

\* *Anaspis 4-punctata* Say, Journ. Acad. Nat. Sci., 3, 276.



c. Pubescence above black, varied with cinereous pubescent markings :

a. Antennæ and front legs black ; markings small, irregular.

Thorax cinereous pubescent, with large black spots ; elytra with small cinereous markings, more or less confluent ; beneath varied with cinereous and black, '12—'17. Atlantic to Kansas ; La. to Winnipeg.

8. *marginata* Mels.

Thorax cinereous pubescent, with large black spots ; elytra with small cinereous markings, confluent into narrow lines ; beneath varied with cinereous and black, '14—'17. Middle and Western States, Canada.

9. *lineata* Mels.

b. Antennæ and front legs testaceous ; markings irregular :

Thorax and elytra speckled with small, rounded, unequal, cinereous spots, interrupted band behind, the middle of the elytra and tip cinereous ; beneath varied with cinereous and black, '15. . . . . 10. *serval* Say.

B. Last joint of maxillary palpi broad, securiform.

(Antennæ and front legs testaceous, markings large.)

Elytra with a large basal band including each side a round black spot, and an interrupted band behind the middle cinereous ; beneath varied with cinereous ; (maxillary palpi of male larger than in the female, with the under surface of the joints clothed with erect hairs,) '23—'26. Middle, Southern and Western States. . . . . 11. *oculata* Say.

Elytra with an oblique band running from the humerus almost to the suture, a transverse spot behind the middle, and the entire suture cinereous ; beneath varied with cinereous, (♂ unknown,) '20. Kansas.

12. *insulata* Lec.

C. Last joint of maxillary palpi almost an isocles triangle.

a. Body entirely black, robust, elytra with broad cinereous pubescent bands, thorax cinereous pubescent with large black spots.

Elytra with a broad basal band including on each side two spots, and two oblique undulated bands of cinereous hair, '12—'14. Middle and Western States. . . . . 13. *triloba* Lec.\*

Elytra with a broad basal band including each side a very large black spot, band just behind the middle and tip cinereous, '11. Middle and Western States. . . . . 14. *undulata* Mels.

b. Head, thorax and elytra partly yellow, the latter with transverse bands.

Black, antennæ, feet, middle of pectus and occiput yellow, thorax yellow with a very large triangular black spot occupying the whole of the apex, and extending nearly to the base, elytra with an oblique humeral vitta connected with a band before the middle, another band behind the middle, the apex and margin and suture behind the second band yellow, '09—'12. Middle, Southern and Western States. Varies with the elytra marked with only two transverse yellow bands. . . . . 15. *discoides* Mels.

GLIPODES Lec.

The species of this genus are cuneiform, narrow, fuscous and covered with a dense sericeous brown pubescence. The scutellum is rounded triangular, the anal style is moderately long ; the hind tibiæ have no subapical ridge, (which exists in all the other genera,) but are carinate along the dorsal line, and furnished with a long oblique ridge on the outer surface, which is connected with the dorsal ridge near the tip ; the first joint of the hind tarsi has two oblique ridges. The eyes are coarsely granulated ; the antennæ are feebly

\* *Anaspis triloba* Say, Journ. Acad., 3, 276.

serrate. The last joint of the maxillary palpi is scalene triangular in form, and in the male of *G. sericans* is covered on the under surface with a dense brush of fine short hair; in the same sex there is at the base of the last joint an external *articulated* bifurcated appendage, the branches of which are as long as the joint; no vestige of this is seen in the female; the last joint of the labial palpi of both sexes of *G. sericans* is triangular and broadly emarginate at tip; in *G. helva* the same joint is bell-shaped and truncate at tip.

§ A. Labial palpi with the last joint emarginate.

Cuneiform elongate, fuscous, densely clothed with sericeous brown pubescence, '30. Middle, Southern and Western States. (♂ as above described.)  
*Mordella sericans* Mels. . . . . 1. *sericans* (Lec.)

B. Labial palpi with the last joint truncate.

Almost linear, fuscous, densely clothed with sericeous brown pubescence,  
'18. Georgia. . . . . 2. *helva*.

MORDELLISTENA Costa.

Scutellum rounded triangular; anal style long and slender; hind tibiae with a subapical, short, transverse ridge, and from one to five oblique ridges on the outer face; hind tarsi with several oblique ridges. Eyes coarsely granulated; antennæ feebly serrate; last joint of maxillary palpi triangular.

The numerous species of this genus are small, frequently elegantly colored insects living upon flowers; they are either linear or slightly cuneiform. Divisions are easily formed by regarding the ridges of the hind tibiae and tarsi, which scarcely vary in the same species. Species of similar color, e. g. *M. lutea*, *vapida*, *tosta*, *ustulata*, *nubila* and *ambusta*, which are all of a yellowish brown color, are easily distinguished by reference to the hind tibiae and tarsi. When the previously described species have been referred to *Mordella*, I have placed the authority in parenthesis, to save the space of a double reference.

§ A. Hind tibiae and first joint of hind tarsi each with a single short oblique ridge near the tip:

Body narrow, parallel; black, elytra with two orange bands, the first near the base and interrupted by the suture, the second one-fourth from the tip; head, antennæ, feet (except the hind femora) and anus reddish testaceous, '09. Southern States; thorax sometimes black, sometimes rufous.

1. *bicinctella*.

§ B. Hind tibiae with two oblique ridges on the outer face.

a. Ridges converging above; first joint of tarsi with two, second with one oblique ridge; body slender, slightly cuneiform, uniform brownish yellow:

Ridges of hind tibiae long, very strongly marked, '13. Pennsylvania.

2. *arida*.

" " shorter, less strongly marked, '11—'13. Pa., Ga.

3. *lutea* (Mels.)

b. Ridges parallel, equal:

a. First joint of hind tarsi with two, second with one oblique ridge:

Elytra black, with two transverse yellow bands, the anterior one interrupted at the suture and thus composed of two triangular spots, the apices being towards the base; body narrow, nearly parallel;

—body black, head rufous, thorax black, basal margin and sides dark yellow, feet and abdomen tinged with testaceous, '09—'11. Middle, Western and Southern States. . . . . 4. *trifasciata* (Say.)

—body yellow, thorax yellow, abdomen and hind tibiae and tarsi varied with black, '11. Middle and Southern States. . . . . 5. *lepidula*.

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Above pale, large frontal spot, discoidal spot and anterior angles of thorax, suture and sides of elytra blackish; feet and hind coxæ pale, metasternum and abdomen blackish, '12. Middle States. . . . . 6. *limbalis* (Mels.)  
 Entirely luteous, '09. Pennsylvania. . . . . 7. *vapida*.  
 Entirely black, pubescence grayish sericeous, '09—'11. California.

8. *vilis* (Lec.)

b. First and second joints of hind tarsi each with two oblique ridges:

Narrow, parallel; body yellow; head behind the antennæ blackish; thorax with the front half yellow, with a medial cloud; hind half black; elytra black, with a large, elongate basal spot; margin and suture, behind the middle, yellow, '12. Western States. . . . . 9. *decorella*.

c. First joint of hind tarsi with three, second with two oblique ridges; body narrow, slightly cuneate:

Reddish yellow, base of thorax and elytra black, the latter with a large triangular basal spot on each, yellow suture and margin behind the middle narrowly yellow, '14. Middle and Southern States. . . . . 10. *ornata* (Mels.)

Black, head and humeral spot of elytra reddish yellow; anterior feet yellow, hind feet black, varied with testaceous, '09. Middle and Northern States.

11. *militaris*.

Black, elytra with an orange yellow oblong humeral spot, '16. Middle and Western States. . . . . 12. *scapularis* (Say.)

Blackish, densely clothed with grayish sericeous hair; head and thorax reddish yellow, the latter black at the base; feet testaceous, '12—'17. Colorado Desert, California. . . . . 13. *comata* (Lec.)

Pale yellowish brown, slightly cuneate, hind tibiae with a very faint trace of a 3d ridge, '12. Georgia. . . . . 14. *tosta*.

Black, linear, pubescence fine and dark; head before the eyes, anterior part of thorax, front and middle thighs ferruginous; antennæ piceous, '11—'13. Middle States. . . . . 15. *piceornis*.

Black, linear, pubescence brown sericeous; head before the eyes and thorax ferruginous, the latter with a linear dorsal cloud, '11. New York.

16. *cervicalis*.

Black, linear, pubescence brownish gray, hind tibiae with a very faint trace of a 3d ridge, '09—'11. . . . . 17. *aspersa* (Mels.)\*

d. First joint of hind tarsi with three, second with one oblique ridge; body narrow, almost parallel:

Head, thorax and feet reddish yellow; elytra fuscous, with the humeri and apical margin reddish yellow; abdomen, sternum and hind coxæ and femora blackish; incisures of hind feet blackish, '09. Illinois.

18. *fulvicollis* (Mels.)

c. Ridges parallel, the anterior one extending almost across the outer face of the tibiae.

a. First joint of hind tarsi with two, second with one oblique ridge; elytra black, with two yellow bands precisely as in species 4 and 5.

Head, thorax and feet yellow, thorax with a narrow dorsal cloud; elytra black, with two yellow bands, the anterior one interrupted by the suture; trunk blackish, '10. Georgia. . . . . 19. *amica*.

b. First joint of hind tarsi with three, second with two oblique ridges.

Black covered with cinereous pubescence; elytra with two broad bands, and the apex black pubescent, '08. S. Carolina. . . . . 20. *infima*.

\* The pubescence of this species is described by Dr. Melsheimer (Pr. Ac., 2, 314) as being mottled, but the type furnished by him, on being carefully cleaned and remounted, shows a uniformly diffused covering of brownish gray hair.

Elytra yellow, with the base, tip, suture and large oblong marginal spot black;

—head, thorax and body black; antennæ and legs yellow, '09. Middle States. 21. *andreae*.

—head, thorax and body yellow; abdomen blackish, '10. Georgia. 22. *grammica*.

Elytra ferruginous, with the suture and margin blackish;

—black, mouth and anterior feet testaceous; hind tibiæ and tarsi testaceous, with incisures black; anus piceous, '09. Georgia. 23. *ancilla*.

—black, head and part of thorax reddish yellow, anterior feet yellow, hind tibiæ and tarsi testaceous, with incisures black, '10—'12. Middle and Southern States. 24. *varians*.

—ferruginous, black limb of elytra very narrow; abdomen, and sometimes hind coxæ and pectus blackish, '9—'11. Middle and Southern States. 25. *ustulata*.

Elytra without distinct markings; pubescence brownish gray;

Piceous, head, thorax and anterior legs ferruginous; humeri with an indefinite ferruginous spot; anus rufo-piceous, '09—'11. Middle and Southern States. 26. *semiusta*.

Piceous, head, apical margin of thorax and anterior legs ferruginous; anus rufo-piceous, '09. S. Carolina. 27. *impatiens*.

Entirely blackish piceous, '09. Middle and Southern States. 28. *nigricans* (*Mels.*)

Blackish piceous; head ferruginous; antennæ, anterior feet, middle tibiæ and tarsi, base of hind tibiæ and tarsi, and margin of abdomen testaceous; first joint of hind tarsi with a rudiment of 4th ridge, '12. Middle and Southern States. 29. *ruficeps*.

Ferruginous; sides of pectus and elytra darker; hind tibiæ with a rudiment of a 3d, first joint of tarsi with a rudiment of a 4th ridge, '13. San Diego, California. 30. *nubila* (*Lec.*)

#### § C. Hind tibiæ with three short, oblique, parallel ridges.

a. First joint of hind tarsi with three, second with two oblique ridges; elytra not banded.

Black, linear, elytra with numerous rounded spots of ashy sericeous pubescence, '09—'11. Middle, South. and West. States. 31. *pustulata* (*Mels.*)\*

Black, linear, elytra with lines of brownish gray pubescence, confluent behind, '12. Kentucky. 32. *convicta*.

Nearly linear, ferruginous; elytra black, with the suture and margin narrowly ferruginous; base ferruginous, broader at the humeri, '19. Pa., Ky. 33. *fuscipennis* (*Mels.*)

Slightly cuneate; beneath ferruginous; abdomen and sides of breast dusky, above black; mouth, anterior narrow interrupted band of thorax, large triangular basal spot of each elytra, and suture and margin behind the middle yellow, '15. Lake Superior. 34. *pectoralis* (*Lec.*)

Nearly linear, entirely black, pubescence brownish gray, '11—'15. Lake Superior and Minnesota. 35. *morula*.

Nearly linear, fusco-ferruginous, pubescence brown sericeous, ridges of hind tibiæ longer and more oblique than usual, '12—'15. Southern States. 36. *ambusta*.

b. First joint of hind tarsi with four, second with two oblique ridges; elytra not banded.

Slightly cuneate, piceous, covered with brown sericeous pubescence, '12—'15. Middle, Southern and Western States. 37. *unicolor*.

Slightly cuneate, very black, pubescence fine and dark, mouth and anterior half of thorax ferruginous, '13. Middle States. 38. *marginalis* (*Say*.)

\* In one specimen I observed a rudiment of a fourth tibial ridge.

Slightly cuneate, black, covered with dense brown pubescence; head, front legs and anterior half of thorax reddish yellow, '11—'12. Kansas.

39. *divisa* Lec.\*

c. Elytra with bands of sericeous pubescence; hind tibiae with a rudiment of a 4th ridge; first joint of tarsi with three, second with two ridges.

Black, more robust than usual, pubescence brownish, thorax with three large black spots, elytra gray sericeous, with a subbasal spot each side, and two transverse bands black, '09. Middle and Southern States.

40. *pubescens* (Fabr.)

Fusco-luteous, slender, thorax with three badly defined basal clouds, elytra with narrow limb and two very oblique bands yellowish sericeous, '12. Middle and Southern States.

41. *liturata* (Mels.)

Black, slender, sides of thorax and legs piceo-testaceous; elytra with very narrow limb, and two oblique bands prolonged backwards near the suture, connected by a line near the margin, and apex paler sericeous, '14. Pa.

42. *bihamata* (Mels.)

Black, mouth, antennae, front and middle legs and thorax ferruginous, the latter with a large dorsal, less pubescent black spot, elytra with a very narrow limb, apex and two nearly transverse bands connected by a submarginal line pale sericeous, '11—'14. Middle and Southern States. Varies with head and thorax black, anterior thighs piceous.

43. *hebraica*.

Reddish dark testaceous, elytra dark fuscous, with a very narrow sutural line, an oblique band from the humerus nearly to the suture, a transverse band behind the middle reaching neither suture nor margin, and an entire transverse band near the tip pale sericeous; (first joint of hind tarsi with a narrow rudiment of a fourth ridge,) '12. Middle and Western States.

44. *leporina*.

§ D. Hind tibiae with four oblique ridges besides the subapical one.

a. First joint of hind tarsi with three, second with two oblique ridges.

Fusco-testaceous, subcuneate, pubescence fulvous, sericeous, '18. Pa.

45. *fuscata* (Mels.)

b. First joint of hind tarsi with three, second with two, third with two, all the ridges very strongly marked.

Ferruginous, elytra black, with the humeri indistinctly ferruginous, and the suture and lateral margin narrowly pale sericeous, '23. Pa.

46. *pityptera*.

c. First joint of hind tarsi with five, second with four, third with three small oblique ridges.

Very slender, entirely black, pubescence fine and dark, '23. Ga.

47. *angusta*.

§ E. Hind tibiae with five or six very small, oblique ridges.

a. Head ferruginous; elytra with a ferruginous stripe from the humerus to within one-fifth of the apex; body black; anterior legs ferruginous.

Thorax ferruginous, with the anterior part black, '17. Pa.

48. *attenuata* (Say.)

Thorax entirely black, '20. Pa.

49. *vittigera*.

b. Head black; elytra not vittate.

Black, pubescence sericeous brown; elytra blackish, with a long basal spot on each, an undulated band behind the middle, suture and tip paler sericeous, '14—'17. Middle and Southern States.

50. *discolor* (Mels.)

Black, pubescence grayish sericeous, slightly mottled, '16. Kansas.

51. *aemula* Lec.†

*Species unknown to me.*

*Mordella nigripennis* Fabr., Ent. Syst. Suppl. 127; Syst. El. 2, 123.

\* Coleopt. of Kansas and Eastern New Mexico, (Smiths. Contr.) 17.

† Coleopt. of Kansas and New Mexico, (Smiths. Contr.) 16.

Notes on the Species of *CALOSOMA* inhabiting the United States.

BY JOHN L. LECONTE, M. D.

The difference in the anterior tarsi of the males of certain species of *Calosoma* was first observed and made known by Schaum, (Ins. Deutschl. 1, 111,) and a grouping of the species was proposed according as the 4th joint was clothed beneath with a brush of hairs, like the preceding joints, or smooth and naked, as in the majority of the species. An attentive study of the sexual characters of those species represented in my collection has shown me that the number of divisions must be increased, in order that the species may be naturally grouped.

I would arrange our species as follows:—

- Anterior tarsi of the male with the 4th joint hairy beneath :  
 Thorax with sides broadly flattened behind, (body elongate)..... I.  
 Thorax narrowed behind, sides not flattened..... II.  
 Anterior tarsi of the male with the 4th joint glabrous beneath :  
 3d joint of anterior tarsi ♂ glabrous beneath ; thorax trisinate behind... III.  
 3d joint of anterior tarsi ♂ hairy beneath :  
 Thorax truncate behind..... IV.  
 Thorax emarginate behind :  
 Body winged..... V.  
 Body without wings..... VI.

## GROUP I.

The species of this group are remarkable for the long narrow body ; the 5th and following joints of the antennæ are cylindrical and nearly equally pubescent ; the thorax is rounded at the sides, very slightly emarginate at the base, which is not narrowed, but broad and flattened each side ; the joints 1—3 of the anterior tarsi of the male are clothed beneath with a brush of hair ; the 4th joint is hairy for a small space at the middle, and strongly spinous at the sides.

Our species are : 1. *C. externum* Say, (*longipenne* Dej.) ; 2. *C. macrum* Lec., and

3. *C. protractum*, elongatum, nigrum, subnitidum, thorace latitudine duplo brevior, basi vix emarginato, subsinuato ; margine incrassato, basi et lateribus punctato, his postice late modice reflexis, elytris thorace paulo latioribus, parallelis, subtiliter seriatim punctatis. Long. .95—1.05.

Arizona ; Dr. Irwine, U. S. A.

## GROUP II.

The species of this group have the 5th and following joints of the antennæ cylindrical, nearly equally hairy ; the thorax is comparatively small, much narrowed behind, with the base slightly rounded ; the elytra are deeply striate and ovate, being gradually widened from the base ; the joints 1—4 of the anterior tarsi of the male are covered beneath with a dense brush of hair, the first, however, being glabrous at the base ; the 4th is very slightly spinous at the sides. Our species are :

4. *C. scrutator* Fabr. The middle tibiæ in the male are curved and both they and the hind tibiæ are furnished with a dense brush of hairs on the inner face near the tip. The species is found from Newfoundland to the point of Lower California.

5. *C. Willcoxi* Lec. Middle tibiæ of the male straight and not hairy.

6. *C. frigidum* Kirby. Middle tibiæ of the male slightly curved, and somewhat, though not densely, hairy on the inner face.

## GROUP III.

The single species constituting this group has the outer joints of the antennæ cylindrical and equally pubescent ; the thorax is narrowed behind and mode-

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rately bisinuate at base; the elytra are striate and ovate, but longer than in the preceding group; the first joint of the anterior tarsi of the male is hairy beneath only for a small portion near the anterior margin; the 2d joint has the usual brush of hair; the 3d and 4th joints are entirely without hair.

7. *C. Sayi Dej.* The middle tibiæ of the male are very much curved, prolonged at tip on the inner face, and armed along the inner margin with several small distant teeth.

#### GROUP IV.

In this group are several species of a black color, with feeble or obsolete elytral striæ; the outer joints of the antennæ are cylindrical and equally punctured; the thorax is narrowed behind, sometimes angulated at the sides, with the base not at all emarginate, but truncate or slightly rounded; the joints 1—3 of the anterior tarsi of the male are clothed beneath with a dense brush of hair, the 4th is naked; nothing peculiar is seen in the form of the middle tibiæ of the male. All the species inhabit the plains of the central part of the continent.

8. *C. prominens Lec. (angulatum|| Lec.)*; 9. *C. lugubre Lec.*

10. *C. carbonatum*, nigrum, subnitidum, thorace latitudine duplo brevior antice posticeque angustato, lateribus medio obtuse subangulatis; disco confertim subtiliter intricato-rugoso, lateribus parce punctatis, basi fere recte truncato, elytris subovatis, convexis, thorace latoribus, striis haud impressis subtiliter punctatis, foveisque obsoletis serie triplici impressis. Long. 1.00.

New Mexico and Upper Texas.

11. *C. triste Lec.*; 12. *C. obsoletum Say, (luxatum† Dej.)*

#### GROUP V.

The species here placed have the outer joints of the antennæ nearly cylindrical but less punctured on the sides; the thorax is more or less narrowed behind, and the base is distinctly emarginate; the joints 1—3 of the anterior tarsi of the male are clothed beneath with a dense brush of hairs, and the 4th is glabrous; the middle tibiæ of the male present no important characters. There is much difference in the sculpture of the elytra, the striæ being obliterated in *C. semilæve*, deep in *calidum*, confused in *tepidum*, badly defined in *cancellatum*, which has besides three rows of catenated elevations. All the species are found on the Pacific coast; *C. calidum* extends entirely across the continent from ocean to ocean.

13. *C. semilæve Lec.*; 14. *C. calidum Fabr. (var. lepidum Lec.)*; 15. *C. tepidum Lec.*

16. *C. cancellatum Esch. (var. ænescens Lec.)*

#### GROUP VI.

In this group are placed species without wings, and generally of robust form; the outer joints of the antennæ are somewhat compressed and very conspicuously less punctured on the flattened sides, except in *C. discors*, in which the antennæ resemble those of the preceding group; the thorax is narrowed behind, and the base is very obviously emarginate; the joints 1—3 of the anterior tarsi of the male are clothed beneath with a dense brush of hairs, and the 4th is glabrous; nothing remarkable is seen in the middle tibiæ of the male.

Four forms of elytral sculpture are seen.

a. Elytra with rows of close set punctures, the intervals each with a row of more distant punctures. 17. *C. discors Lec.*

b. Elytra with confused punctures and three rows of catenated elevations. 18. *C. moniliatum Lec.* 19. *C. laqueatum Lec.*

c. Elytra with confused punctures and three rows of faint foveæ. 20. *C. Wilkesii Lec.*

d. Elytra with fine striæ, the intervals crossed by transverse lines producing an imbricated appearance. 21. *C. luxatum Say. (C. striatulum Lec. and C. Zimmermanni Lec. are varieties, or rather races, of this species.)*

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Descriptions of certain species of DIURNAL LEPIDOPTERA found within the limits of the United States and British America.—No. 2.

BY WM. H. EDWARDS.

- |  |                                       |
|--|---------------------------------------|
| 1. <i>Argynnis Atlantis</i> , nov. sp. | 5. <i>Chionobas taygete</i> , Hubner. |
| 2. <i>Thecla acadica</i> , nov. sp.    | 6. <i>Pamphila verna</i> , nov. sp.   |
| 3. " <i>læta</i> , nov. sp.            | 7. " <i>rurea</i> , nov. sp.          |
| 4. <i>Lycæna neglecta</i> , nov. sp.   | 8. <i>Hesperia vialis</i> , nov. sp.  |

*ARGYNNIS ATLANTIS*, nov. sp.

Male. Expands 2 to 2½ inches.

Upper side of both wings uniform fulvous, less bright than *Aphrodite* or *Cybele*, dusky near base and on costal margin of primaries; both wings have a broad black hind margin, sometimes enclosing an interrupted fulvous line next anal angle of secondaries; preceding this band and connected with it on primaries, a series of black crescents, the one next the inner angle geminate, enclosing round fulvous spots which are smallest next apex; anterior to these a transverse row of round black spots, an abbreviated black band running obliquely back from the costa, and a zigzag band across the middle of the wing; within the cell three transverse, wavy black bars, the second continued nearly to the submedian nervure, and a fourth bar on the arc, dilated at its lower extremity and there enclosing a dusky space.

Secondaries have a series of black crescents, not resting on the marginal border as in primaries, the one next the anal angle geminate, a transverse row of small round black spots, and across the middle of the wing a zigzag band ending within the abdominal margin; in the cell a black band bent like a horse-shoe; fringe yellowish white, black, with a little fulvous at the intersection of the nervures.

Under side: hind margin of both wings dark brown; disk and inner margin of primaries reddish tawny, costa and apex light buff; the black markings of upper side repeated, but more delicate; five silver triangles within the marginal crescents next apex, and preceding these on the costa two rounded silver spots on a dark brown ground.

Secondaries dark red brown, more or less mottled with drab, except the space between the two outer rows of silver spots, which is bright buff and immaculate; upon the border of hind margin seven triangular silver spots, edged below with black, and above with red brown preceded by another series of seven rounded or oval, the middle one smallest, all edged above with black; between these and the base are ten silver spots of various sizes and forms, the largest divided by the discal arc; all these, except the two anterior, edged above with black; edge of costa next base and whole abdominal margin broadly silvered; thorax and abdomen above black, covered with fulvous hairs, thorax below reddish grey, abdomen buff; palpi grey, tipped with fulvous; antennæ black above, fulvous below; club velvet black, tipped with fulvous.

Female. Expands 2½ to 2¾ inches.

Color above less bright than the male, inclining to tawny; the black margin very heavy, and the marginal spots next apex of primaries buff, nearly white; usually a black spot next base of secondaries; under side of primaries bright fulvous; in other respects as in the male.

This species seems to be limited to the mountainous districts of the Northern States and to parts of British America. In the Catskill Mountains, near the Mountain House, I found it abundant the past season, (1861.) I have received it from the White Mountains, from Williamstown, Mass., and from Lake Winnipeg, by Mr. S. H. Scudder, and by Mr. Drexler from near Hudson's Bay. The specimens from the White Mountains and Hudson's Bay

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are diminutive in size. There is also a specimen in the cabinet of the late Dr. Harris, at Cambridge, Mass., taken by Prof. Agassiz on the north side of Lake Superior.

In the markings of its surface *Atlantis* bears a close resemblance to *Cybele* and *Aphrodite*, to *Adippe* and *Aglaia* of Europe, and to *Zerene* and *Astarte* of California. It especially resembles the three last-named species in the zigzag band which crosses the disk of secondaries, but which in *Aphrodite* takes the form of a belt of small crescents, separated by wide spaces. It is, moreover, readily distinguished from *Aphrodite* by its duller color, broad black margin to both wings and color of secondaries below. It also differs sensibly in the shape of the primaries, the margins meeting at the inner angle more obtusely, the outer angle being more acute and the breadth of the wing from the inner angle to middle of costa much less. The antennæ are shorter by one eighth of an inch.

Of the three species, *Cybele* is Southern, and in the vicinity of Newburgh, N. Y., is found but little more abundantly than *Aphrodite*. In the Catskills the latter abounds and *Cybele* is rare, much less common than *Atlantis*. From Connecticut, Massachusetts and Canada, I have seen no *Cybele*, though doubtless it is occasionally found in those districts. The prevailing Northern species is *Aphrodite*.

*THECLA ACADICA*, nov. sp.

Male. Expands 1·2 inch.

Size and form of *Falacer*. Color above dark brown, costal edge of primaries rufous; in the disk a smooth oval spot; secondaries have a single tail, from the base of which a bluish white line extends along the margin to the anal angle; the space next above this line is sprinkled slightly with fulvous scales making an indistinct broad band, which ends beyond the tail in a clear fulvous spot; fringe of both wings brown, next before the tail white, beyond it black, through which runs a white line, and at the angle black.

Under side dark grey, with a pearly lustre; on primaries a short discal bar, edged with white; beyond this, a bent transverse row of black spots, each edged with white, the one next the costa minute, the next three round, fourth and fifth oval, and sixth double; within and along the margin a row of elongated, pale fulvous spots obsolete towards the apex, narrowly bordered within by black, on which rests a line of bluish white.

Secondaries have a long discal streak, a transverse row of black spots and streaks, each edged with white, the six from the costa nearly round, the next long and bent toward the anal angle, the last a streak running up the abdominal margin and bent upward at right angles near its inner extremity; hind margin edged with white and bordered by a bright red band, divided by the nervures into spots, arched above and edged with black, on which is a line of bluish white; this band extends some distance up the abdominal margin, and encloses on the hind margin, near anal angle, a large rounded space sprinkled with blue atoms; the three red spots next outer angle partly obsolete.

Taken near London, C. W., by Mr. W. Saunders.

*THECLA LETA*, nov. sp.

Expands 9-10 inch.

Upper side of primaries black, of secondaries blackish brown; near base of primaries a few scales of metallic blue; costal edge red; next the anal angle of secondaries a broad band of metallic blue scales, many of which are replaced by black, extends half way along the hind margin; beyond the band a fine line of these scales follows the margin to the outer angle; anal angle edged with red; fringe grey.

Under side of secondaries and apex and costal margin of primaries slate blue, with a green tinge; costal edge of primaries red; disk smoke color; beyond the cell, on costal margin, a transverse, abbreviated series of fine red

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spots, edged posteriorly with white, the last two obscured by the smoky hue of the disk.

Secondaries have two series of red spots parallel to the hind margin; those of the exterior small, and towards the outer angle minute, each more or less surrounded by a delicate white border, in which are a few black scales; the inner series crosses the middle of the wing, is slightly irregular, the spots large, brighter red and crescent-shaped, bordered posteriorly with white, in which are a few black scales; edge of the wing at the anal angle and at the intersection of the adjoining nervures red; thorax and abdomen above black, beneath white.

Taken near London, C. W., by Mr. W. Saunders.

*LYCÆNA NEGLECTA*, nov. sp.

Expands 1.1 inch.

Male. Upper side of primaries delicate azure blue, paler in the disk and silvery on costal margin; secondaries greyish blue, with a broad azure margin; a black line edges the hind margin of both wings, expanding towards apex of primaries into a border, and running a little way along the costal margin; fringe of primaries white, cut with black by the nervures; of secondaries, sometimes barred with black, but usually wholly white.

Under side pure white, or white with a bluish tinge; primaries with a dark discal streak and a transverse series of six black streaks set obliquely; secondaries have a discal streak, three points near base and eight points or streaks crossing the disk in a tortuous line; both wings bordered by confluent spots, forming a crenated band, each spot enclosing a darker point.

Female. Upper side of both wings of a deeper and more metallic blue; primaries have a broad fuscous hind margin; in some cases this color extends along the costal margin to the base, where it is sprinkled with blue; a faint discal streak; hind margin of secondaries bordered by a row of small fuscous spots.

Under side dark grey, sprinkled with blue at the base of both wings; the fuscous spots disposed as in the male, but larger and coarser.

Variety *a*. Upper side wholly fuscous.

Massachusetts, New York, Wisconsin, Lake Winnipeg.

There are three species of *Lycæna* in North America that much resemble each other, viz.:—*Lucia* of Kirby, *Pseudargiolus* of Boisduval, and a third hitherto confounded with the later, which I described as *Neglecta*. *Pseudargiolus* resembles *Argiolus* of Europe in form, size and color above, and was considered by Abbott and Smith as identical with it. Both wings are wholly violet blue with a pinkish tinge; the under side is greyish white, and the hind margins are bordered by a broad, serrated band, the teeth of which are separated almost to their bases. This band appears as if stamped on the wing. The color of *Neglecta* is azure blue on primaries, of secondaries grey blue, with an azure margin; the under side is pure white or bluish white, and the marginal band is confluent and serrated. *Lucia* is uniform light silvery blue above and cinereous below, with a border as in *Neglecta*. The number, shape and arrangement of the spots on the under side of these species are similar, mostly differing in degree of fineness; in *Pseudargiolus* they are very delicate; in *Neglecta* much less so; in *Lucia* heavy and coarse. *Pseudargiolus* varies much in size. It appears to be rather a Southern species. It is common on the mountains of Western Virginia, and is occasionally met with in New York. *Neglecta* is common in New York, and I have received it from Wisconsin and from Lake Winnipeg. *Lucia* seems to be confined to the Northern parts of the continent. I have received from Mr. Drexler a female of *Chionobas Taygete* (*Encis Taygete*) of Hubner, taken at Albany River, Hudson's Bay, which agrees with Hubner's figure, but differs from *C. Bootes*, described by Boisduval and Le Conte as identical, and from the figure of *Bootes*

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in Boisduval's spec. gen. Boisduval, in his *Icones*, figures *Taygete* and calls it *Bootes* without any reference to Hubner. *Bootes* is an European species, *Taygete* an American only, and the priority of name belongs to Hubner. The only description we have, therefore, being incorrect, I described *Taygete* from Mr. Drexler's specimen. Herrich-Schaeffer, *Lep. Eur.* f. 112, gives *Taygete* as same with Boisduval's *C. also*. But *C. also* is *Hipparchia semidea* of Say, a species as yet only known to be found in the White Mountains of New Hampshire. Boisduval's description was taken from a single specimen forwarded by the late Dr. Harris to Major Le Conte with Say's name, which should have been retained. *C. semidea* appears to have been lost sight of, and doubted as a species for many years, till, in 1857, Mr. Scudder found it abundant on the summit of Mt. Washington.

#### CHINOBAS TAYGETE.

*Olneis Taygete*, Hubner.

*C. Bootes*, Boisduval and Le Conte.

*C. Bootes*, Boisduval in *Icones*.

Female. Expands 2.2 inches.

Upper side ochrey brown, both wings, from the base to beyond the cell, clouded with black, which makes externally an irregular outline, crenate in the median interspaces of primaries; hind margin of both wings and apex of primaries bordered with dark brown; between this and the clouded space a broad common band, in which, on the primaries, are three black pyriform spots, the first being between the discoidal nervules and the others in the two spaces between the median nervules; a small round black spot in the anal angle of secondaries; costal margin of primaries sprinkled with black and grey.

Under side: primaries paler, the whole wing marked by fine, transverse, abbreviated streaks of dark brown, most dense in the cell; spots as above; costa barred with grey and black; a heavy black line corresponds nearly to the dark outline of clouded space above, but wants the crenations and projects on the second discoidal nervule into an acute angle.

Secondaries wholly mottled and streaked transversely with grey, light brown and black, the latter color predominating next the base, and light brown on the hind margin; a broad band crosses the disk, black on the edges, the inner edge angular, the outer sinuous; a minute black spot in the anal angle; nervures grey and prominent.

Albany River, Hudson's Bay, by Mr. Drexler.

#### PAMPHILA VERNA, nov. sp.

Expands 1.2 inch. Size and form of *Otho*.

Male. Both wings dark glossy brown; body covered with greenish hairs; on costa of primaries near apex a yellowish spot, divided into three by the nervures, on the disk an oblique black bar, posterior to which, and running with it from the middle of the inner margin, are three yellowish, translucent spots, the anterior minute, the next a parallelogram, the third separated from the second by a wide space.

Beneath dark brown, with a purple reflection; same spots on primaries as above, but enlarged; across the disk of secondaries an obsolete row of points, thorax grey; abdomen, head and palpi whitish.

Female. Same color; the oblique band of yellowish spots varies, the second being nearly square and preceded by an additional small spot at its upper inner angle. Beneath lighter brown; the obsolete points on secondaries of the male become distinct yellow spots, crossing the wing two-thirds the distance from the abdominal margin, when they bend at right angles, and run nearly to the costa.

Illinois, from Mr. Walsh, Washington.

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**PAMPHILA RUREA, nov. sp.**

Expands 1·1 inch.

Male. Color above and below dark glossy brown ; on primaries an oblique black bar.

Female. Same color ; on the costa of primaries, near the apex, a yellowish spot divided into three by the nervures, and two small spots near middle of the wing ; all these are repeated below, and on the disk of secondaries are four obsolete points in a transverse line.

Rock Island, Illinois, from Mr. B. D. Walsh.

**HESPERIA VIALIS, nov. sp.**

Expands 9-10 inch.

Color fuscous ; the only markings are four fine, yellowish-white spots on costa of primaries near apex ; fringe long, color brown, barred with black by the intersection of the nervures.

Under side darker, with a purple reflection on apex of primaries and hind margin of secondaries ; thorax grey, palpi light grey.

Rock Island, Illinois ; Lake Winnipeg.

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**Description of a New CARDIUM from the Pleistocene of Hudson's Bay**

BY WM. STIMPSON.

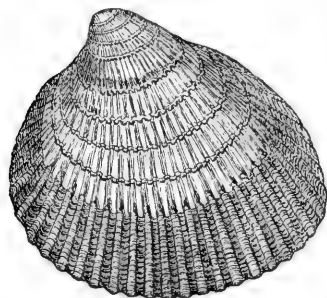
**CARDIUM DAWSONI.**

*Cardium islandicum* Stimpson, (non Chemn.) Proc. Acad. Nat. Sci., Phila., 1861, p. 97.

Shell subovate, oblique, very inequilateral, and somewhat angular posteriorly ; beaks small and much elevated ; hinge thin ; teeth weak, especially the posterior ones ; ribs about thirty-five in number, in the anterior part of the shell narrower than their interspaces, in the middle and posterior parts broader and more flattened ; ventral margin crenated.

Length 1·63 ; height 1·53 ; convexity, or breadth, 1 inch. Imperfect specimens indicate a larger size.

This shell resembles *C. islandicum*, (*ciliatam* O. Fabr.,) in the characters of the hinge, but is easily distinguished by its obliquity and the great elevation of its small beaks, the prominence of which gives



an angularity of outline to the umbonal slope, very different from the evenly rounded and more depressed slope of the recent shell. The posterior extremity also is much less rounded, and in some specimens the posterior and ventral margins form nearly a right angle with each other. The ribs are not acute as in *C. islandicum*, but more or less flattened, and generally broader than their interspaces. From *C. decorticatum* S. Wood, of the English crag, this species differs in its thinner hinge and weak teeth ; from *C. interruptum* of the same author, and formation, by its greater obliquity, and the prominence of the beaks.

Our specimens all present a character which may perhaps be considered specific ; that of broad concentric bands of erosion, separated by corresponding crenulated ridges, indicating periods of arrest of growth in the shell, at which periods the margins, being slowly formed, were of stronger substance than when the deposit proceeded more rapidly. These periods were probably annual, occurring in winter.

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It was found by Mr. Drexler abundantly on the beach at Cape Hope, on the southeast side of Hudson's Bay, having in all probability been washed out of a Pleistocene deposit. The specimens are in the Museum of the Smithsonian Institution, under the auspices of which Mr. D. visited that country.

This is doubtless the shell figured as a *Mya* by E. Emmons, in the fourth volume of the "Natural History of New York, pl. i., fig. 9, as occurring in the Pleistocene of Lake Champlain.

I have dedicated the species to the accomplished President of McGill College, Montreal, to whom we are indebted for so much of our knowledge of the Natural History and Geology of Canada, particularly that of its Pleistocene deposits.

### Additions to the Nomenclature of North American LEPIDOPTERA.

BY AUG. R. GROTE.

In offering these papers, the writer would refer to the difficulties experienced by the American student of Entomology in obtaining the knowledge of the descriptions of native species; difficulties so well presented by Dr. T. W. Harris in his Catalogue of the Insects of Massachusetts.

And it seems no more than probable that, laboring under these difficulties, the writer may redescribe already acknowledged species. Where this is brought to his notice, he will willingly and gladly acknowledge his synonyms, giving the priority to the rightful author.

#### NOCTUÆ.

##### Gen. PLATYPTERIX, Laspeyres.

Antennæ doubly pectinate in the male; pectinations turned towards each other; simple in the female. Palpi with three articles, of which the second is longest, the third short and pointed. Body slender, shorter than the wings. Wings broad, the anterior ones with a sickle-shaped outer margin, recurving at the tips. Posterior pair rounded.

*P. fabula*, nov. sp.—Anterior wings dirty white. From the curved tip a dark brown line with paler margin follows the inclination of the wing to the hind margin. Emerging from this line, and between it and the outer margin of the wing, a wavy dark brown line goes down to the hind margin, joining it close to the outer edge of the wing. Between the base of the wing and the first named and broadest line, three distinct, irregular, brown wavy lines cross the wing from the upper to the hind margin. The second and third from the base of the wing run close together and unite three times; forming two unequal enclosed spaces up to about half of the wing, and then diverging, form an outline which bears a slight resemblance to the profile of a face. Two dark spots are enclosed in this, and a third and larger one is crossed by the third line near the centre of the wing. Outer margin dark brown, deepening towards the tip. Posterior wings dirty white, with two dark dots near the upper edge, and crossed by several interrupted wavy lines, the one nearest the outer margin continued. Body and thorax dirty white. Exp.  $1\frac{3}{8}$  inch.

A male, taken on Long Island, New York.

*Obs.* This insect bears a resemblance in its markings to the European *P. falcula*; it differs, however, specifically from that species in its coloring as well as that the wavy lines on the anterior wings are not confluent, thus forming no enclosed spaces.

*P. genicula*, nov. sp.—Anterior wings light ochre yellow. From the tip a curved dark brown line follows the inclination of the wings to the hind margin. Between this distinct line and the base of the wing three irregular

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wavy lines cross the wing from the anterior edge to the hind margin; the second and third from the base and the widest apart enclosing three dark brown spots, two larger and one smaller. Outer margin of the wing brown, deepening in color and widening toward the tip, which shows a slightly bluish shade. Posterior wings light ochre yellow, with two black dots near the upper edge, and crossed by several wavy and more or less interrupted lines. Outer margin light brown. Body and thorax light ochre yellow. Under surface of the wings of a lighter shade, and showing the spots on the anterior wings and two dots on each of the posterior wings. Exp.  $1\frac{1}{4}$  inch.

A male. Staten Island, N. Y.

From the collection of Mr. E. L. Graef, Brooklyn, L. I. Closely allied to *P. fabula*, but well distinguished by its ground color and divergence of the wavy lines on the anterior wings.

*P. formula*, nov. sp.—Light roseate brown. Legs light orange on the inside. Anterior wings light roseate brown, with a broad light citron yellow band running from the tip to the hind margin of the wing, leaving a roseate brown space between it and the outer margin, deepening in color towards the inner angle of the curve. Two small white spots toward the anterior edge of the wing, between which and the base of the wing an irregular deeper shade-line runs down and is continued through the posterior wings to the inner margin and near the base of the wing. Posterior wings same color as anterior, with the citron yellow band enlarged to the whole outer margin of the wing, except a small space in the upper corner, two rows of minute dark spots, apparently continued from the upper wing, run through this band near the outer edge of the wing. Base of the wing roseate brown, with two small white spots outside of the continued dark shade-line running through both wings. Thorax and body roseate brown. Under surface of the wings lighter shaded, showing the small dark spots more apparent and lengthened on the anterior wings. Exp.  $1\frac{1}{4}$  inch.

A female. New York.

With the male of this species I am not acquainted. The peculiar curving of the anterior wings seem to warrant its disposition under the present genus. It has the general coloring of an autumn leaf.

#### Synopsis of the Species of *HOLCOSUS* and *AMEIVA*, with Diagnoses of new West Indian and South American Colubridæ.

BY E. D. COPE.

##### I.

##### *Holcosus* Cope.

Ventral shields large, in six longitudinal rows, without keels. Femoral pores present. Tail cylindrical, keels of the scales very strong. Two dermal gular folds. Frontal, fronto-parietal and parietal plates very numerous; supra-orbitals forming an isolated disc. Tongue sheathed at the base.

##### *H. septemlineatus*.

*Ameiva septemlineata* Duméril, Catal. Method. Collect. 1851, p. 114.

Frontal plates four, occipitals five, succeeded by a transverse series of five other plates. Supraoculars two. Median gular scales a little larger than those surrounding, smaller than those of the postgular fold. Heels without spinous tubercles. Bronze green, with seven longitudinal yellowish lines, one median, three upon each side.

*Hab.*—Tropical America.

##### *H. sexscutatus*.

*Ameiva sexscutata* Günther, Proc. Zool. Soc. Nov. 1859.

An anterior nasal on each side; an anterior frontal; two posterior frontals

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separated by a shield: three pairs of parietals in a longitudinal series. Occipital region irregularly shielded. Supraorbitals two. A median chin shield behind the symphyseal. Greenish olive, irregularly speckled with darker. A greenish white vertebral stripe. A lateral black greenish-white bordered band from in front of the eye to the thigh. Beneath greenish white.

*Hab.*—Andes of Western Equador.

#### AMEIVA Cuvier.

For convenience of analysis, this genus may be divided into the following sections, nearly as has been done by Dr. J. E. Gray.

Inner aspect of heel without spinous tubercles.

Abdominal shields in eight longitudinal rows.....A

Abdominal shields in ten longitudinal rows, (supraoculars four).....B

Abdominal shields in twelve or more longitudinal rows.....C

Inner aspect of heel with spinous tubercles.....D

No species belonging to any of these groups exists in the nearctic region; there their place is supplied by an extensive development of the genus *Cnemidophorus*. Section A (embracing eight species) is characteristic of northwestern South America and Mexico, though two of the species, forming a subgroup, are West Indian. The latter seems to be allied to *Cnemidophorus* through the West Indian and South American species of the latter, while the connection of that genus with the former subgroup is maintained by some of the *Cnemidophori* of the North American deserts. *Ameiva guttata* approximates in size and coloration to section B. With *A. undulata* it marks the northern limit of the genus on the American continent,—viz., about the latitude of Vera Cruz. Of sections B, C and D, eight are insular, five continental. Of the former, so far as is yet ascertained, two species appear to be peculiar to Cuba, one to New Providence, one to Sombrero, one to Jamaica, one to Santa Cruz. One species is said to be common to Hayti, Porto Rico, St. Thomas, Santa Cruz and Martinique. The continental *A. surinamensis* inhabits Trinidad: small specimens from Paraguay closely resemble the young of the same. The genus does not seem to occur on the Pacific slope of the Andes, unless the *Cnemidophorus undulatus*, mentioned by Günther (Proc. Zool. Soc., April, 1860) as having been brought from Guyaquil, belongs to it.

In preparing the present synopsis, I have availed myself of the *Erpetologie Generale* and the work of Dr. Gray. In the latter, an *A. murina* from Surinam is mentioned, of which little can be ascertained. Prince Neuwied has described (Rept. Brazil, p. 180) an *A. cyanomelas* from Southeastern Brazil, to which I can only allude, on account of imperfections in the description. It resembles *A. eutropia*, but belongs probably to section B.

#### A

I. Plates of the caudal whorls carinate superiorly.

a. Median gular scales very large, plate-like.

\*Premaxillary teeth six or seven.

*A. quadrilineata* Cope.

*Cnemidophorus quadrilineatus* Hallow., Proc. Acad. Nat. Sci. Phila. 1860, p. 483.

Three supraorbitals, sometimes a minute posterior fourth; marginal supraorbitals five, second very long. Occipitals three. Large gular scales numerous, graduating into the smaller. Plates of the fold in two rows, six or eight in the longest. Two antibrachial series, the posterior continuous with the single brachial; postbrachials large, one principal row. Four femoral rows, two complete tibial, the second and third shields of the external very large. External digit equalling or exceeding extremity of internal. Preanal plates in a single series, the posterior largest. Above olive brown. Two narrow yellow  
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lines on each side; the superior from the superciliary margin, convergent on the nuchal region; the inferior from the orbit, interrupted by the femur, continued on the base of the tail, bounded above and beneath by black. Inferior lateral region black, greenish vermiculated. Back posteriorly varied with black. Beneath greenish white. Total length 3 in. 4 lin. Body 1 in. 4 lin.

*Hab.*—Nicaragua. Mus. Smithsonian.

*A. pulchra* *Hallowell*, Proc. Acad. Nat. Sci. Phila., 1860, p. 483.

Three supraorbitals; six marginal supraorbitals, the second very long. Lateral occipitals one on each side, bordered with irregular scales. Shields of the mesopterygium large. Brachial and antebrachial plates each in two rows, the posterior of the former continuous with the anterior of the latter; postbrachials large. Twenty femoral pores. Three rows of plates on the tibia, the inner not appearing on the inferior surface; the outer composed of eight transverse plates, the median three or four of nearly equal size. Preanal plates in two longitudinal rows. Sole of the foot externally acutely tuberculous. External digit not reaching to extremity of internal. On the rump brown; proceeding anteriorly the shade of color becomes lighter, until upon the muzzle it is ochraceous; the whole is faintly tinged with olive. A deeper shade extends from the superior angle of the eye to above the groin, which is marked by about twelve short, deep brown, vertical bands. These are bounded beneath by a series of light dots which extend from the tympanum posteriorly. Sides olivaceous; tail olivaceous, spotted with brown above. Total length 8 in. 6 lin.

*Hab.*—Nicaragua. Mus. Smithsonian; Acad. Philadelphia.

\*\*Premaxillary teeth nine.

*A. eutropia* *Cope*.

Three supraorbitals; five marginal supraorbitals, the second very long. Three occipitals, bounded posteriorly by many irregular shields. Infralabials large, five on each side; median gulars four or six, very large: a single row of eight or ten large plates upon the mesopterygium. One series of brachial and one of antebrachial shields, continuous with each other; postbrachials large. One very large subround median anal, entirely surrounded by smaller plates. Inferior femoral plates large, in three or four rows; two rows of inferior tibials, the external composed of six plates, of which the second is largest. Seventeen to nineteen femoral pores. Digits strongly pectinate, the external equal to the internal. Keels of the tail shields strong inferiorly as well as superiorly. Above blackish brown with an olive tint. A blue-grey median band extends from the occiput, and becomes broad and undulating in outline posteriorly because of the dark shade which bounds it laterally becoming resolved into spots. Two lateral narrow bluish gray lines, more or less interrupted, the inferior reaching the groin. The median band in its prolongation to the muzzle is light brown. Inferior surfaces light bluish green. Total length 11 in. 9 l.; head and body 3 in. 9 l.

*Hab.*—Region of the Truando, New Grenada. Discovered by Arthur Schott, of Lieut. N. Michler's Expedition. Mus. Smithsonian, (Nos. 4320, 4325.) Acad. Philadelphia.

*A. undulata* *Gray*, Catal. Liz. Brit. Mus. Duméril, Catal. Method. pt. 1, p. 113. *Cnemidophorus undulatus* *Wiegman*, Herp. Mex. 27.

Three supraorbitals; five marginal supraorbitals, the second very long. Occipitals three, succeeded by irregular shields. Large gular plates transverse. Plates of the mesopterygium in two rows. Two rows of antebrachial, one of brachial plates; postbrachial large. Five or six series of femoral plates; three of tibial, the inner not visible from beneath. Preanals small, in two longitudinal rows. Tubercles of the sole acute, outer digit not reaching extremity of inner. Tail plates strongly keeled above and below. Twenty femoral pores. Olive brown above, vermiculated with brown posteriorly, bounded on each side by a series of triangular light bluish spots, (their apices directed downward,) which are

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surrounded by a deep brown shade. Sometimes they are confluent and form a longitudinal band; the apices prolonged may form vertical bands. Head brownish. Beneath greenish white. Total length 11 in.; head and body 3 in. 6 lin.

*Hab.*—Honduras. Mus. Acad. Philadelphia. Dr. John L. Le Conte donor.

Var. a, *Wieg.*

Sides with numerous short light bluish lines, imitating broken longitudinal bands. Marginal supraoculars six, the third longest. Otherwise similar to the ordinary variety.

*Hab.*—Vera Cruz, Mexico. Mus. Smithsonian. Dr. C. Sartorius donor.

aa. Median gular scales but little larger than those surrounding.

b. Premaxillary teeth eight.

*A. guttata Cope.*

*Cnemidophorus guttatus* Wieg., *Herp. Mex.* 29. Gray, *Catal. Brit. Mus.* 22.

Supraorbitals three, the two posterior sometimes isolated by granular scales in males; marginal supraorbitals six, the third very long. Nostril in the nasal plate. Three occipitals, the median elongate. Postsymphyseal plate broader than long. Three rows of plates upon the mesopterygium. Scales a little larger than the intermandibular extend across the gular region. Three rows of brachial plates continuous with two of antebrachials. Postbrachials moderate, transverse. Femoral shields numerous; pores twenty to twenty-three. Three series of tibial plates, none of the external series disproportionately large. Extremities of external and internal digits equal. Tail keels moderate. Brownish olive above; upon the superior lateral region a narrow brown band bordered above with lighter. Irregular short yellow lines or spots are distributed more or less distinctly in four longitudinal series from nape to rump. Tail unspotted. In the female the lateral brown band is scarcely margined with paler above. Total length 14 in. 6 lin.; head and body 4 in. 9 lin.

*Hab.*—Vera Cruz, Mexico. Mus. Acad. Philadelphia.

*A. sackii Cope.*

*Cnemidophorus sackii* Wieg., *Herp. Mex.* p. 28. Gray, *Catal. Brit. Mus.* 22.

Supraorbitals four, posterior minute; marginal scales eight, the anterior three longer. Three occipitals. Three principal preanal plates. Femoral pores twenty-two. Grayish olive; sides olive brown, margined above with a pale longitudinal band, transversely banded with blackish brown. A second narrow lateral band extending from beneath the orbit to the posterior part of the side. Total length 15 in.; head and body 6 in.

*Hab.*—Mexico.

bb. Premaxillary teeth six.

*A. tæniura Cope.*

Supraorbitals three; the marginal five, second longest. Nostril pierced in the nasal plate. Five occipitals. Plates of the mesopterygium numerous. One series of brachial, two of antebrachial, scarcely continuous. Postbrachials small. Four series of large femoral plates, bounded by smaller anteriorly and posteriorly. Three tibial rows, two upon the inferior face of the limb; the external composed of seven plates, the third very large. Larger preanals are two transverse marginal, two or three longitudinal median. External digit extending beyond the internal. Lateral tail plates smooth, superior keeled. Femoral pores fifteen. Above brown. A narrow yellowish line extends from the superciliary margin to a nearer or more distant point upon the tail. This is bordered above by a black band, three times its width, which is sometimes faintly margined above with yellowish. Sides black as far as a yellowish line which extends from the superior border of the ear to the groin, and thence with increased width for some distance upon the tail: on the latter region it is bounded below

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by a black band. A third and inferior pale line is sometimes seen on the side, a space above the margins of the external abdominal plates. The latter with the femora and tibiae are sometimes spotted with whitish upon a dark ground. Beneath yellowish white. Total length 10 in. 6 lin.; head and body 3 in.

*Hab.*—Hayti, (near Jeremie.) Mus. Compar. Zoology Cambridge, No. 1503.) Acad. Philada.

This species is intimately allied to the *A. lineolata* D. & B., also an inhabitant of Hayti. The latter is peculiar in having shields upon the superior posterior fore-arm, and in its keelless tail plates. In *tæniura* these keels are weak. The coloration of *lineolata* is different from that of the present species. Our group A, of which *A. pulchra* may be regarded as type, is connected with B, *A. surinamensis* type, through this species in the former group, and *A. polops* in the latter. The five occipital plates, elongate form, and pattern of coloration, are indications of this in the *tæniura*.

## II. Scales of the caudal whorls smooth superiorly.

*A. lineolata* Dum. et Bibr., Erpetol. Gen. v. p. 119.

Nostril pierced in the nasal plate. One anterior series of seven plates upon the brachium, several posterior series, replacing the granules which exist in other species. Two anterior antibrachial series. Postbrachial or elbow plates present, rhombic. Five series of inferior femorals, two of inferior tibials. Three large preanals surrounded by smaller scales. Fifteen femoral pores. Head above brown, laterally varied with black and white. Superior regions of body black with nine longitudinal lines, the median dorsal double at the middle of its length. Of the lateral lines, one is from the occiput, one from the supercilium, one from the eye, one from beneath the tympanic orifice. Irregular white lines upon the arm and the posterior foot. A light posterior femoral band continuous with one on the tail: the latter member with other indistinct longitudinal bands. Total length (?young) 9 in. 7 lin.; body 2 in. 2 lin.

*Hab.*—Hayti.

## B.

I. Three rows of tibial shields, two appearing on the inferior face.

a. Frontal plate one: no palatine teeth.

b. Three supraorbitals; premaxillary teeth ten.

*A. thoracica* Cope.

Anterior and superior temporal and postoccipital regions irregularly squamous. Five marginal supraoculars, second longest. Nostril in the nasal plate. Median gular scales minute; those of the mesopterygium larger, in six rows. Three (two small, one large) antibrachial series, scarcely continuous with brachial row. Postbrachials small in three short rows. Femoral plates numerous; eighteen femoral pores. External tibial plates seven, very wide, second, third and fourth largest, third broad, fourth narrow, transverse. External digit extending beyond extremity of internal. A slight tendency to acumination in the heel scales of some specimens. Preanals a series of three or four large marginal, one or two large median, longitudinally arranged. Color above brown tinged with olive. Two indistinct light bands—the superior from the supercilium, the inferior from the superior margin of the auricular opening—enclose a black band, which is continued some distance upon the base of the tail, with its inferior light border. Beneath greenish or yellowish white, the pectoral and gular regions more or less black. The female differs in having the brown of the back lighter and marked with a narrow median line. The black upon the throat is also sometimes wanting. The size is much less, being in total length 9 in. 2 lin.; of head and body 3 in. The male, 15 in.; head and body 4 in. 6 lin.

*Hab.*—New Providence Island, Bahamas. Mus. Philada. Acad. (Dr. H. C. Wood, Jr., Coll.) Salem, Mass.

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This species is most nearly related to *auberi* of Cuba and *plei* of Hayti. From the former it differs in the absence of spurs upon the heel, in the complete black pale-bordered lateral band and the black of the antero-inferior regions. The same peculiarities of coloration separate it from the *plei*, which has in further distinction the median gular scales a little larger, and the tail spotted. This species is very abundant in New Providence, and, like the others, is very swift. The most ready way of obtaining them is by shooting.

*bb. Four supraorbital plates.*

*A. laeta* Cope.

?*A. guttata* Gray, Catal. Liz. Brit. Mus. p. 18, not *Cnemid. guttatus* Wiegman.

Nostril in the nasal suture; common suture of fronto-nasal plates elongate. Five marginal supraoculars, first and second longest; equal. Nine premaxillary teeth. Three gular folds; gular scales all large, the posterior largest. Plates of the posterior fold larger than those of the median. Two series of antibrachials continuous with three of brachial plates; postbrachials large, irregular. Scales of the dorsal region large. External and internal digits very short, the latter extending beyond the former, its claw short, curved. Posterior preanals largest, one or two large anterior. Eight series of femoral plates; fifteen to seventeen pores. Six or seven external tibials, the second and third very large. Male, above olive, black-speckled; sides dark with cross rows of black-edged white spots. Female rather bright olivaceous, with a light brown pale-bordered band upon each side. The superior pale border very indistinct, extending from the temporal angle, the inferior a bright band bordered with black beneath, extending from the middle of the tympanic orifice some distance upon the tail. Head brown above. Under surfaces yellowish, external belly plates black spotted, external tibial plates and tail bluish varied. Total length 15 in.; excluding the tail, 5 in.

*Hab.*—Near Rio Janeiro; according to Gray, Demerara and Pernambuco. Mus. Compar. Zoology, Cambridge, No. 1483.

In the above description the colors of the male are taken from Dr. Gray. I have presumed that the two female specimens described belong to the species *guttata*, on account of their near resemblance to the *surinamensis* and their difference from it in the tibial shields and anal plates. Dr. Gray's diagnosis furnishes nothing else to base an identification upon. This species further differs from the *surinamensis* in the larger dorsal scales and longer common fronto-nasal suture.

*A. plei* Dum. et Bibr., Erpetol. Gen. v.

Median gular scales a little larger than those surrounding; marginal supraoculars five or six, second longest. One large, one or two small series of antibrachials, separated by granular scales from the large brachial series; postbrachials numerous, irregular. Two large posterior preanals, one large median, and several smaller anterior and peripheral. Exterior digit equalling or extending beyond the interior. Seven exterior tibial plates, the last very minute, second and third very large. Femoral plates numerous, the pores sixteen. Premaxillary teeth six, eight or ten; superior maxillaries twenty-one in the adult, in the oldest specimens three or four posterior only imperfectly bi- or tricuspid; those anterior to the latter are cylindrical with obtusely rounded crowns; the most anterior conic, curved. In younger individuals the number of compressed tricuspid teeth is greater, (though the total number of teeth is less,) until in the youngest all but the "canines" conform to this standard of the generic structure. General color above, brown olivaceous, the posterior extremities, tail and posterior dorsal region more or less distinctly spotted with yellowish. Sides vertically banded with greenish or yellowish; superiorly there is usually a series of black spots, which are sometimes only present anteriorly, sometimes confluent into a longitudinal band. Beneath greenish straw-  
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colored, the denticulations and tubercles of the palms and toes tipped with brown. Total length, 20 in.; head and body to vent 6 in. 6 lin.

*Hab.*—St. Thomas, Santa Cruz, Porto Rico; according to the *Erpetologie Generale*, Martinique and Hayti. Mus. Philadelphia Academy. Smithsonian. Compar. Zoology, Cambridge.

Two specimens from Porto Rico have the lateral black spots larger, with a trace of a superior series posteriorly. In this animal the adult presents but three obtuse-crowned median maxillary teeth. This difference between the Porto Rican form and that of St. Thomas appears of importance when we recollect the relation which exists between the genera *Ameiva* and *Tupinambis* (Teius Gr.) in this respect. Indeed, although the present species is closely allied in superficial characters to the *A. auberi* and *thoracica*, were it not for the repressed development just alluded to in its Porto Rican form, it would appear proper to regard the significance of this dentitional peculiarity as fully generic. Should the Porto Rican form begin to develop cylindrical and obtuse-crowned teeth at an earlier age, so as finally to exclude the compressed tricuspid, this peculiarity would become the index of a *definable* generic group; or should the time of the appearance of these teeth be finally postponed to a period beyond the usual limit of life, the same separation would be the result, the Porto Rican form remaining as a distinct species of *Ameiva*. The anatomical relation between these lacertian forms is certainly identical with that existing between *Protonopsis* and *Megalobatrachus*, *Siredon* and *Amblystoma*; and if a generic connection between the former can be reasonably suspected, (and geological as well as morphological considerations support this view), it might be as justly inferred in the case of the latter. The largest shields of the external tibial series reach a considerable development in the Porto Rican specimens; hence I have suspected the *Ameiva scutata* of Dr. Gray might belong here. One or two of the St. Thomas specimens exhibit a development of these plates fully equal. Whether all belong to the true *A. plei* Dum. & Bibr., can only be settled by those who can compare Martinique specimens with those from the localities in question.

#### Var. *exsul*.

This form differs in possessing a narrow bright yellow band on each side, extending from the superciliary ridge to a point on the anterior part of the tail. The anterior extremity extended backward exceeds the extremity of the appressed femur. Total length 7 in. 6 lin.; exclusive of tail, 2 in. 1 lin. (Probably young.)

*Hab.*—Water Island. Mus. Smithsonian.

#### *A. polops* Cope.

Seven or eight marginal supraorbitals. Median gular scales little larger than the lateral; scales of the neck-fold moderate. One large and several small series of antibrachial plates not continuous with the short brachial series; postbrachials distinct. Preanals in two parallel longitudinal series. Femoral plates numerous; pores nineteen. Tibial series two, the internal small; the external composed of seven plates, fourth largest, third next. External digit extending much beyond the internal. Above olive brown; a brownish black band, anteriorly light bordered above, extends from the superior border of the auricular opening to the crural region. This is bordered beneath by a narrow light line which terminates above the femur. Below this is a brown band, which is separated from a brown line on the exterior belly plate by a narrow yellow line. Tibia with an anterior light line. Femora behind light banded continuously with the tail. The latter member appears to be faintly annulated. Belly light greenish. Total length 1 in. 2 lin.; exclusive of tail, 2 in. 6 lin.

*Hab.*—St. Croix, West Indies. Mus. Smithsonian.

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*aa.* Frontal plates two; palatine teeth present.

*A. bifrontata* Cope.

Three posterior supraoculars, surrounded with granular scales in the male. Marginal supraoculars five, two anterior elongate. Frontal shield divided transversely. An indistinct longitudinal frontal carina. Posterior gular scales larger than the anterior. Two series of antibrachial scales, continuous with one brachial. Postbrachials large, transverse. Marginal preanals largest. Femorals numerous; the pores fifteen to nineteen. Plates of the median tibial series not small; nine plates in the external, third and fourth largest. External digit not equalling the tip of the internal. Tail plates narrow, strongly keeled. Above brownish pea-green, tail paler; in young specimens traces of two lateral and one median pale line, sometimes visible posteriorly in adults. Occasionally a few brown spots upon the rump. External belly plates varied with blue and white. Inferior surfaces yellow. In females the anterior supraocular is in contact with the second, the lateral longitudinal bands are more distinct and enclose one of a deeper shade, and there are two rows of deep brown spots on the posterior part of the dorsal region. Tail spotted with brown above. Total length 14 in.; head and body, 4 in. 6 lin.

*Hab.*—St. Thomas, W. Indies. Mus. Philada. Acad.

The specimens described as females are labelled as having come from New Grenada, probably incorrectly.

II. Four rows of tibial shields, three appearing on the inferior surface. External posterior digit not reaching the extremity of the internal.

*A. præsignis* Cope.

*Cnemidophorus præsignis* Bd. & Gd., Proc. Acad. Nat. Sci. Phila., 1852, p. 129.

Five marginal supraorbitals; external occipitals small. Posterior gular scales larger than anterior. Two series of antibrachials continuous with the brachial. Postbrachials numerous, subhexagonal, anterior claws very elongate. Eight femoral series medially; pores thirteen to seventeen. Eight plates in the external tibial series, second and third largest. Two posterior, a median, and sometimes an anterior preanal. ♀ Deep brownish olivaceous above; a broad median dorsal band, bounded on each side by transverse black bars, which extend to a black border of a yellowish lateral line which extends from the temporal ridge. An inferior yellow line from the auricular border, separated from the superior by a broad black band, which is traversed by a single row of yellow spots. Sides and extremities black-green spotted. Tail green, black spotted; two lateral light lines anteriorly. In the male the median band is better defined. The light superior border of the lateral black band vanishes posteriorly; the inferior is less distinct: over all are about seven longitudinal series of yellow spots. Beneath pale greenish yellow. Length of head and body 5 in. (Tail mutilated.)

*Hab.*—Panama.\* Mus. Smithsonian. Philada. Acad.

The coloration is the principal means of distinguishing this species from that succeeding.

*A. surinamensis* Gray, Catal. Liz. Brit. Mus. p. 18.

*Lacerta ameiva*, *L. lateristriga* et *L. tristriata* Spix, Anim. Braz. tab. xxiii. et xxiv. 182.

*Teius ameiva* Merr., Nieuw. Zool. Braz. Rept. p. 170.

*Ameiva vulgaris* Licht., Dum. & Bibr. Erp. Gen.

Two series of antibrachial plates, nine in the exterior, which is continuous with the brachial; postbrachials irregular, subquadrate. Larger scales extending across the posterior gular region; those of the neck-fold in about four rows.

\* "Said to be abundant at Para."—Hallowell, Proc. Acad. Nat. Sci. 483, 1860. *Panama*, not *Para*, is meant, 1862.]

A few large plates exterior to the superior part of the exterior tibial row. Of the latter there are eight or nine, second, third and fourth largest. Posterior preanal plates largest. Above olivaceous, more or less vermiculated with black upon the head, nape and anterior extremities. Sides of a much darker shade, which is well defined superiorly, and is crossed by vertical series of yellow black-bordered spots. External belly and anterior femoral plates yellow and black varied. In the female the lateral shade takes the form of a band. In a large specimen from Venezuela the anterior regions and extremities are light brown, speckled with black on the head and neck; the lateral vertical spots are upon a ground similar to that of the back. This is *Lacerta ameiva*, figured by Spix. Total length 20 in. 6 lin.; head and body 7 in.

*Hab.*—Surinam, Venezuela, Bolivia, Brazil, ("south to Rio Janeiro."—*Neuwied*), Paraguay, ?Trinidad. Mus. Philada. Acad. Washington.

## C.

*A. corvina* Cope, Proc. Acad. Nat. Sci. Philada. p. 312, 1861.

Premaxillary teeth ten. Median occipital plate short; position of external occipitals longitudinal divergent. Four continuous supraorbitals; marginal plates five, anterior two longest. Median gular scales small, those of the mesoptychium scarcely larger. Anterior half of antebrachium with a series of plates; brachium without plates, coarsely scaled; postbrachials a little larger. Abdominal plates in twelve series. Median preanals largest. Large anterior femoral plates upon the terminal portion of femur; pores in ♂ 36, in ♀ 32. Tibial series four, eight or nine in the external, of which three or four are of nearly equal size. External digit extending beyond internal. Tail plates weakly keeled. General color black; under surface of belly and tail glaucous green, sometimes tinged with yellow. Total length 16 in. 2 lin.; head and body 4 in. 10 lin.

*Hab.*—Sombrero Island, West Indies. Mus. Philada. Acad. Smithsonian. Compar. Zoology Cambridge.

*A. punctata* Gray, Catal. Liz. Brit. Mus. p. 17.

Postbrachial plates rather large, rhombic. Ventral shields in fourteen rows. Exterior tibial series seven, the second and third largest, nearly equal. Olive with black wavy lines; sides darker with white spots upon the lower part; head in spirits pale reddish.

*Hab.*—Demerara.

*A. major* Dum. et Bibr., Erp. Gen. v. p. 117.

Median gular scales larger than the external, equal to those of the mesoptychium. Brachial plates large, separated from the antebrachials, which are near the fore-foot; posthumeral granular. External tibial plates large. Abdominal plates in from fourteen to eighteen series. Preanal plates numerous, not large. Above olivaceous, beneath yellowish or greenish; in the young two light lines on each side, the superior from the temporal ridge. Total length 20 in. 7 lin.; head and body 8 in. 2 lin.

*Hab.*—Cayenne. Trinidad.

The antebrachial plates of this species seem to be similar to those of *A. corvina*.

## D.

*A. auberi* Coct. et Bibr., De la Sagra's Hist. Cuba Rept. p. 74.

Abdominal shields in ten or twelve rows. Occipitals five: marginal supraoculars five or six, posterior three small; the superior supraoculars three, sometimes a rudimentary fourth. Temporal region with superior and anterior marginal plates. Premaxillary teeth ten. Gular scales equal; plates of the fold large, in four rows. The antebrachial series of plates bounded within by smaller shields; brachials continuous with the former, little dilated transversely. Postbrachials large, transverse. Femoral series eight or nine. Pores

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fourteen to sixteen. One or two anterior preanals larger than any of the four or six marginal. Two series of tibial shields, the internal imperfect, six plates in the external, the second and third very large. External digit extending beyond the hip of the internal. General color light olivaceous brown, shaded with yellow on the head and extremities. A series of irregular spots, forming a broken band, extends from above the axillary region to the groin. Beneath yellowish. Total length 13 in.; head and body, 4 in.

*Hab.*—Cuba. Mus. Philada. Academy. Washington. Cambridge.

*A. trilineata* Gray, Catal. Liz. Brit. Mus. 19.

Supraoculars three, marginals five. Gular scales minute; four series of moderate plates on the antero-pectoral fold. Temporal region bounded above and anteriorly by plates. Antebrachial and brachial plates continuous, the latter little dilated. Postbrachials large, dilated. Ten rows of abdominal plates. Eight series of femoral plates; fifteen pores; median preanals larger than posterior. Three tibial series, seven in the external, the second and third very large. External posterior digit extending beyond the internal. Above olivaceous, with a median yellowish band, which covers a width of four scales anteriorly, six posteriorly. A light lateral line extending from the temporal angle, bounded beneath by a more or less irregular black band, and above, in adult specimens, by another, very narrow and irregular in its superior outline. A light line extends from the ear to the groin, and a trace of a third is sometimes seen beneath it. Sides posteriorly, and anterior and posterior extremities coarsely vermiculated and varied with black and light olive. Gular and prethoracic regions black. Total length 10 in.; head and body 3 in.

*Hab.*—Cuba. Mus. Washington. Phila. Acad.

This animal appears to be identical with that described by MM. Cocteau and Bibron, and by the authors of the *Erpetologie Generale*, as the young of the *A. auberi*. Small specimens of the latter, however, resemble the adult closely, while the *trilineata* reaches a size nearly equal to that of the full grown *auberi*. It nevertheless offers no distinctive marks beyond those of coloration. We should therefore suspect it to be the female of the latter, were it not that some of the specimens appear to be males. While the opinion expressed in the *Hist. de l'Isle Cuba* is entitled to much respect, I accept for the present that of Dr. J. E. Gray as most tenable.

Compared with the female of *A. thoracica*, it differs as follows: The continuity of the brachials and antebrachials is not interrupted by small scales; the postbrachials are larger; there is a single *large* external palmar tubercle instead of two of equal size. The vermiculated banding of the extremities does not exist in the *thoracica*, and the vertebral band is much narrower. There are no calcaral spines.

*A. dorsalis* Gray, Ann. Nat. Hist. i. p. 277.

*A. Sloanei* Dum. & Bibr., v. 107

Five occipitals, all short, especially the median. Temporal region bounded anteriorly and superiorly by plates. Three supraorbitals, five marginals, the second longest. Median gulars small; scales of the mesoptychis moderate, in five rows. Premaxillary teeth ten, the external on each side sometimes wanting. Brachial plates small, subhexagonal. Antebrachials usually not continuous with them, sometimes confined to the terminal portion of the forearm. Postbrachials large, transverse. Posterior preanals largest; one or two anterior plates. Femoral plates in nine to eleven rows medially; pores twenty-three to twenty-five. Three tibial series, the internal minute, the median incomplete, the external of six or seven plates, the second, third and fourth large. Above olivaceous, darkest superiorly. A median vitta commences at the occiput and extends to the crural region; in the former region it is narrow, in the latter it occupies nearly the whole dorsal surface. Four longitudinal series of spots upon each side, those of the two superior elongate, sometimes

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forming bands. In the female these bound a more or less irregular black band; another dark band margins the dorsal vitta. Beneath greenish white. Total length 14 in.; head and body 4 in. 6 lin.

*Hab.*—Jamaica. Mus. Philada. Academy. Smithsonian, (No. 5770.)

The short occipitals, the small brachials and shortened series of antebrachials of this species, are repeated in the *A. corvina*.

## II.

### *Eunectes notæus*.

General form elongate; tail one-eighth of the total length. Muzzle depressed, broadly rounded. Rostral plate twice as broad as high, its labial sutures divergent, straight. Of the three nasal plates, the two superior are trapezoid, the inferior three times as long as wide. Loreal, preocular and superciliary large, their superior border nearly continuous. They are bounded superiorly by three large elongate plates which embrace a median series of three smaller rhombic plates. Of the former, the posterior are as long as the anterior, the median shorter. Of the latter, the two anterior are in contact, the posterior not smaller, sometimes isolated anteriorly by the exterior plates. In addition to the superciliary and preocular, the orbital ring is formed by five small plates, of which the two anterior are in contact with the sixth, seventh and eighth superior labials, without the intervention of a second sub-orbital series. Superior labials thirteen, the anterior but little higher than the rest. Scales large, broad as long, in forty-five rows on the thickest part of the body. Maxillary teeth 15 on each side; mandibulars 17. Urosteiges 59. Total length 9 ft. 4 in. Of tail 1 ft. 4 in.

Above, light yellowish brown anteriorly; upon the middle and posterior parts of the body, dark brown. A deep brown band commences upon each temple, and unites with its fellow on the middle of the muzzle. A similar band commences at the eye, and extends beyond the canthus of the mouth. A broad median head band arises between the orbits, and extending upon the neck becomes zigzag, and is finally broken into transverse blackish spots which extend to the end of the tail. There are fifty-three distinct spots on the body, seventeen on the tail. They extend over twelve scales transversely, and are two scales apart. Two bands commence on each side of the neck, the superior is continuous for a short distance, and is then broken into longitudinal spots which alternate with the dorsal. The inferior band is soon broken and is merged into two or three very irregular series of lateral black spots. Belly yellow, irregularly spotted with black, outlining two longitudinal streaks.

*Habitat.*—Paraguay River and confluent. Mus. Acad. Phila. Smithsonian (No. 4707). Capt. Page's Exped.

This serpent is one of the largest in America; in its proportions it is rather more slender than the *E. murina* or anaconda, which attains a greater size than any of the Boas, and equals or exceeds the largest Pythons.

It also differs from the *murina* in the greater size of the posterior three head plates, especially the median; in the immediate contact of the orbital ring of plates with the labial shields, and the less narrow and elevated form of the latter anteriorly. The dorsal scales are larger, and in fewer rows. Both the ground color, and the distribution of spots upon it, are quite different from those of the *murina*.

### *Homalochilus multisectus*.

Head rather elongate, very distinct from the neck, the plates of its superior surface irregular, not large. Three small superciliaries on each side, separated by five longitudinal series of frontal scales. Rostral plate five sided, those in contact with the labials shortest. Internasals confluent with the prenasal (as sometimes occurs in *H. striatus*), their common suture very short. Prefrontals large, their common suture as long as the posterior border of each. Posterior to these a pair of transversely oval postfrontals (sometimes divided).

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Postoculars five, small; preoculars two, the superior vertical, the inferior the last of a series of three or four cut from the summits of the labials. Two loreals, anterior larger. Superior labials sixteen or seventeen, eighth and ninth entering orbit. Inferior, twenty; six pair of scales separated by the mental groove. Scales of the body in sixty longitudinal rows, the lateral smallest. Anal plate entire. Tail slender, contained six and a half times in the total length. The latter amounts, in the only specimen, a young one, to 26 inches; head and body 22 inches. General color above, brown, with about one hundred yellowish cross bands bordered posteriorly with darker brown. Near the middle of the body these are about five scales apart; posteriorly they are nearer together. One, sometimes two, series of irregular spots exist on each side, which are confluent anteriorly into one imperfect longitudinal band. Two narrow dark bands posterior to the eye, separated by about five temporal scales. Beneath yellow, marked with irregular longitudinal lines posteriorly.

*Habitat*.—

Mus. Academy Nat. Sciences, from Messrs. Smith and Stewardson.

#### *Homalochilus strigilatus*.

Head rather stouter than in other species of the genus, distinct. One large superciliary plate on each side, separated from the other by two, or sometimes one, large shield. Anterior to these are two transverse series of irregular plates, in front of which are two elliptical postfrontal shields in contact. Between these and the supranasals is a pair of transverse prefrontals; their posterior border is curved, parallel with the anterior, much longer than their common suture. Both nasal plates distinct. One loreal, which is a little shorter than in *striatus*. Two preoculars, the superior nearly as long as high, the inferior narrow, bounded below by two labial plates. No small plates anterior to the latter. Eye small, less than is usual in *H. striatus*, bounded beneath by the seventh and eighth, sometimes the ninth superior labial plate. The latter number fifteen. Inferior labials eighteen, the anterior six elongate. Scales in fifty-one longitudinal rows, the median lateral smallest. Anal plate entire. Tail 9 in., in a specimen 67 in. long, i. e. one 8.5th.

General color above, dark brown, almost black posteriorly. One or two series of transverse, short, dark bordered pale spots extend throughout the total length, or become obsolete posteriorly. The lateral ground color is paler; it is sometimes separated from that of the back by a zigzag outline. A lateral series of brown light bordered rhombic spots is converted upon the anterior fourth of the body into a longitudinal band, extending past the canthus of the mouth and through the orbit. Posterior to the latter, a light band bounds it above. Muzzle paler. Beneath brownish white, becoming darker posteriorly; a median dark band beneath the tail.

*Habitat*.—Id. New Providence, Bahamas. Mus. Academy Natural Sciences. From Dr. H. C. Wood, Jr.'s, collection.

Briefly, *H. striatus* of Hayti, differs from this species in its two superciliaries, in its subloreal, in its cross bands, and absence of the lateral and subcaudal stripes.

#### *Tachynectes chryostictus*.

Scales elongate, poreless, in twenty-three rows, all keeled except sometimes the first. Superior angles of the nasal plates in contact, one trapezoid loreal as high as long, one narrow preocular not reaching the vertical; two postoculars in contact with the occipital and one temporal. Occipitals short, their common suture scarcely as long as the vertical; the lateral borders of the latter are parallel, elongate. Superior labials eight, eye over the fourth; sixth and seventh largest. Twelve inferior labials, five posterior small. Anal plate divided; tail one-third the total length, i. e., in the type specimen 5 in. in 15.

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Color above as far as the fourth row of scales on each side, reddish brown, with five alternating series of indistinct quadrate spots of a darker hue. Sides light yellowish brown. Beneath dark chocolate, near the middle of the body every third or fourth gastrostege one-half yellow. Posteriorly these spots are smaller and closer together, upon the gular region they form a broken longitudinal series, which is crossed by a similar series extending from one angle of the mouth to the other, and by an anterior one upon the chin. Tail scarcely spotted beneath. Head light brown, a yellow shade upon the posterior superior labials. A median longitudinal nuchal band.

*Habitat*.—Amazon. Mus. Smithsonian (No. 6007). From Lieut. Henderson's collection.

I have placed this species in *Tachynectes*, Fitz. on account of its slender body and elongate tail; in all respects it is a *Helicops* as defined by Duméril.

#### *Hypsirhynchus scalaris*.

Scales in nineteen longitudinal rows, thin, not elongate, with a single large pore at the extremity, not median. Head lanceolate flat, the muzzle slightly, the superciliary plates very much, elevated. Rostral plate transverse, oblique from the prominence of the muzzle, its lateral and superior outlines continuous, curved. Vertical plate more than twice as long as broad, the lateral borders concave; superciliaries broad arched; occipitals elongate, rounded posteriorly, the median posterior emargination nearly acute angled. Nasals two, nostril principally in the anterior; posterior larger, its posterior outline oblique. Loreal none. Preocular single, longer than high, not reaching the vertical. Postoculars two, the inferior half the size of the superior, and in contact with an elongate temporal and the angle of the occipital. Eight superior labials, second elongate, third, fourth and fifth entering the orbit, sixth largest. Ten inferior labials, sixth largest; post genials longer than pregenials. Anal plate bifid; tail elongate (mutilated). Length of head and body nineteen inches.

General color dark brown, the result of close punctulations on a paler ground. A darker band extends upon the third, fourth and fifth rows of scales on each side, throughout the length of the body, though indistinct posteriorly. The dorsal space enclosed is crossed by numerous incomplete bands of the same shade, at distances of three or four scales. The lateral band is more distinct anteriorly, where it is bounded beneath by a narrow yellowish vitta extending from the canthus of the mouth. A yellowish band extends through the eye. Superior labial, mental and gular regions, blackish brown. A brown spot upon each frontal plate, longitudinal vermiculations on the plates posterior to them. Beneath brownish yellow, thickly punctulated.

*Habitat*.—Hayti, (near Jeremie). Mus. Compar. Zoology, Cambridge (No. 1517). Dr. A. F. Weinland donor.

In the present species the teeth are widely spaced and become longer on the posterior portions of the superior maxillary bone. The absence of the loreal plate, and the pattern of coloration, separate it from the *H. ferrox*, Gthr., of Barbadoes, the only other species of the genus.

#### *Pliocercus euryzonus*.

Dentition diacranterian, as in *P. æqualis* Salvin.\* Head broad posteriorly and at the muzzle. Rostral plate low, the nasal sutures long, straight. Common prefrontal suture less than half that of the postfrontals. Vertical broad, sides convergent; obtuse angled behind. Occipitals well developed, rounded posteriorly; temporals one large, (narrow,) four small. Nasals two, loreal

\*This author spells the generic name *Pleiocercus*; a more consistent orthography would be *Pleiokerkos*. Those who prefer the unlatinised method should also write *kua-noura*, *skutale*, *kalcoura*, etc.

well developed; superior preoculars not reaching vertical, the inferior wanting on one side. Superciliaries very narrow. Two postoculars. Superior labials nine, fifth and sixth entering the orbit. Ten inferior labials. Scales in seventeen rows, rather lanceolate medially. Total length 23 in. 9 lin.; the tail 9 in. 8 lin., rather more than two-fifths. Ground color red. This is crossed on the body by nineteen black rings, which leave it in spaces of only a scale in width above, and one to three gastrosteges beneath. On the head the ground only appears as a spot on the second and third labials, one on the middle of each superciliary, one near the anterior angle of the vertical, and one on the common occipital suture; also a band extending from the seventh and eighth superior labials posteriorly to the occipitals. Anterior and posterior inferior labials black. Tail with eleven black rings broader than those on the body.

*Hab.*—Region of the Truando, New Grenada. Mus. Smithsonian, (No. 4303,) Lieut. Michler's Exploring and Surveying Expedition Coll.

*Philodryas latirostris.*

Muzzle obtuse, depressed, rather broad. Rostral shield elevated, rounded above. Prefrontals broader than long, postfrontals broad. Vertical narrow, not twice as long as its anterior breadth, the lateral borders concave; occipitals not elongate; temporals five, the anterior and largest narrow, in contact with the whole posterior border of the inferior postocular. Preocular grooved so as to appear divided, in contact with the vertical; loreal parallel sided; prenasal larger than postnasal. Eight superior oculars, fourth and fifth entering orbit, the posterior three as high as, or higher, than long. Pregeneals longer than postgeneals. Scales smooth, in nineteen longitudinal rows. Gastrosteges not angulated. Total length 3 in. 2 lin.; the tail 6 in. 6 lin.

Green, paler beneath, yellowish on the mental and superior labial regions. A narrow black band from the eye along the borders of the upper labials.

*Hab.*—Paraguay. Mus. Smithsonian, (No. 5311,) Capt. Page Coll.

This species has a broader muzzle than *P. viridissimus* Günth. The vertical plate is more elongate than in *P. crassifrons* Cope. From both it differs in the contact of the latter with the preocular, and in the absence of angulation of the gastrosteges.

*Ialtris vultuosa.*

*Char. gen.*—Form elongate, principally on account of the development of the tail. Head moderately distinct, a little elongate, rather massive. Eye moderate, pupil round. The nine normal cephalic shields. Rostral normal, not prominent. Two nasals, one loreal, one preocular. Anal plate divided. Scales smooth, the pores double. Anterior superior maxillary teeth moderate, equal, separated by a short space from an elongate stout grooveless tooth which occupies a position half way between the extremities of the maxillary. Posterior half of this bone edentulous, except a long grooved tooth at its hinder extremity. Several anterior mandibulars long, stout, separated by a space from the succeeding series of small ones.

*Char. specif.*—Scales not elongate, in nineteen longitudinal rows. Posterior border of each postfrontal convex. Vertical twice as long as its anterior breadth, the lateral borders a little concave, the posterior angle obtuse. Occipitals elongate, acuminate posteriorly, the common emargination acute angled; common suture as long as the vertical. Temporals, three large, one small, on each side, the anterior in contact with the two postoculars, and the fifth and sixth superior labials. One grooved preocular, one parallelogrammic loreal, two nasals, the posterior higher. Rostral low, rounded above. Seven superior labials, third and fourth entering the orbit, seventh longer than high. Nine inferior labials, the fourth and fifth very large. Total length 45 in. 6 lin., tail, 13 in. 6 lin. or .38 of the whole.

The general color is leaden olivaceous; the gastro and urosteges are bor-

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dered more or less distinctly with darker, the latter clouded with the same. The mental region sometimes spotted with darkish. The posterior borders of the superciliary and vertical plates are black; from the posterior angle of the latter extends a black band which bifurcates with the border of the plates, and widening, unites with a straight longitudinal postocular band. The latter approaches more or less nearly a large black muchal spot. A series of alternating spots extends for a few inches posterior to this; they are then resolved into transverse bars, which are obsolete through the greater part of the length. Posteriorly the scales are all bordered with darker.

Obtained near Jeremie, Hayti, by Dr. Weinland. Mus. Comparative Zoology, Cambridge, Mass., (No. 1519).

The genus *Ialtris* (*αλλο* jacto, rapio) is allied to *Dromicus*, but differs widely in dentition. In the latter respect it somewhat resembles *Psammophis*, and evidently lessens the brief interval between this genus and the former, which herpetologists have hitherto admitted. A peculiarity not shared by any other genus, is the absence of solid teeth on the os maxillare posterior to the median long one. In specific characters this serpent resembles *Alsophis angulifer*, especially the variety of the latter found in eastern Cuba. It must be in some degree similar to the *Philodryas dorsalis* from Hayti, but I have not been able to compare them.

#### *Alsophis vudii*.

Scales in seventeen longitudinal rows, biporous. Head lanceolate depressed, canthus rostralis distinct, rounded. Rostral plate rounded, not prominent; vertical plate once and a half times as long as its anterior breadth, lateral borders slightly concave. Occipital plates very elongate, posterior emargination acute angled, common suture remarkably deep, longer than the vertical plate. Temporal plates, two large, two or three small, the anterior in contact with one or both of the postoculars, and the posterior three superior labial shields. Of the latter there are eight, the third, fourth and fifth entering the orbit. Nasals and loreal elongate, superior border of the latter nearly parallel to the inferior. Preocular extending upon the surface of the head, not reaching the vertical. Inferior labials eleven, sixth largest; postgenials longer than pregenials. Total length 39 in.; tail 11 in.

Light brown above, leaden brown beneath, everywhere thickly punctulated with darker. A deeper shade, which is sometimes of a rufous tint, occupies the median line of the back. Many of the scales have one white margin. Many one or two black margins; the latter are sometimes arranged in transverse series, most distinct anteriorly. The common occipital, posterior and supercilio-vertical sutures are dark shaded. A dark brown band extends from the end of the muzzle and terminates at the neck; it is succeeded by a few interrupted brown spots or lines or lines on the neck, beneath which a reddish tint prevails. Labials yellowish, punctulated and bordered with brown; gular and mental regions indistinctly lined with the same; gastrosteges bordered with leaden brown.

*Habitat*.—New Providence Id., Bahamas. Mus. Academy Nat. Sci., Phila. Salem, Mass.

This species is dedicated to my friend, Dr. H. C. Wood, Jr., author of memoirs on Myriapoda and extinct Cryptogamia. According to this gentleman, who obtained it, it is the most common snake in its native island. It is very nearly allied to *Alsophis angulifer* of Cuba, but differs constantly in coloration, and in a greater attenuation of form. The occipitals are longer as compared with the vertical than in *angulifer*.

That a variety of the same serpent is found in the same island is proven by Dr. Wood's collection. It is light yellowish brown as in *angulifer*, with complete blackish cross bands upon the posterior portion of the body, three scales apart. These are wanting upon the anterior third of the body, but are represented by black margin; margined scales at intervals upon the side.

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Head without markings, except a darker shade posterior to the eye. Relations of vertical and occipital plates as in typical *v u d i i*.

In the extensive series of serpents possessing the diacranterian dentition and bifid anal scutum, which connect the stout, heavy bodied *Xenodons* with the slender *Drymobii*, the authors of the *Erpetologie Generale* have recognized two generic forms, viz. *Liophis*, *Wagl.*, and *Dromicus*, *Bibr.* These they separate upon a difference in the relative development of the tail; in the former this member is said to be short, in the latter elongate. In thus defining their groups they have well contrasted the prominent characteristics of the extremes of the series in question. Another point of contrast is here added, viz. in the short tailed extreme there are no scale pores; in the longest tailed, these pores exist in pairs. The first may be represented by the *Liophis cobella*, the last, by the *Dromicus ater* of authors. That these species belong to different genera admits of no doubt; they are placed in different "families" by some authors. The *Dromicus ater*, and its immediate allies, more nearly resemble in general form and habits some species of *Drymobius*, than they do the *Liophis cobella*; the latter represents a genus of water snakes, the former are terrestrial and arborial.

The relative length of the tail cannot be entirely relied upon as a definite index of the genera included between these extremes. There are species in which this member is of an intermediate length, and some of these though included by authors in their genus *Dromicus*, can by no means be separated from the genus *Liophis*, as has been elsewhere shown.\* From these types to that of the *D. ater*, the gradation seems complete. In like manner the number of rows of scales on the body is a safe index of genera in some parts of the system, in others it is not specific, varying with the age and circumstance of the individual; the same may be said of the division of the anal plate and preocular, of the carination of the scales, of the grooving of posterior maxillary teeth; also of the number of the toes in the sauria, and in an infinite number of instances which will occur to every zoologist. Where, however, an organ exhibits a perfect gradation between its different type forms, as we know to be the case with most or all, at one or more points in the morphic scale of each, the usual breaks or steps in this scale of modification of some other structure or organ, most commonly indicate to us Nature's divisions as at present existing.

In passing from *Dromicus ater* toward the species with shorter tails, we find the two scale pores become reduced to one. Finally, in the third series, typified by *Dromicus lineatus*, where the pores have disappeared, the tail never, so far as is known, equals that of the *Dromicus ater* group in length, nor is it thick, nor is the body heavy as in the poreless *cobella* group. A fifth series, also with poreless scales, represented by *Dromicus fugitivus*, exhibits the very elongate tail of the *ater* group. I know of no species connecting it with the third, or *lineatus* type, though the discovery of such an one would not be a matter of surprise; in that case the forms would be included under one head. The groups thus defined, with their species, may be enumerated as follows:

*Ophiomorphus Fitz.* (sine diagnosi). Body short, stout. Head distinct. Scales poreless. Tail short, thick, about one-fifth the total length. (*Liophis Fitz. Dum.*)

*O. cobella*, *O. merremii*,† (type,) *O. doliatus*, *O. breviceps*. *Lygophis Fitz.* (sine diagnosi). Body, slender, elongate. Scales poreless. Tail one-fourth the total length, sometimes a little longer, rarely shorter, always slender.

\* Proc. Acad. Nat. Sci., Phila., 1860, p. 251.

† *Xenodon typhlus*, Schl. is almost identical in form with these species, but our specimens being without epidermis, the absence or presence of pores cannot be determined. 1862.]

*L. lineatus* (type), *L. dilepis* n. sp., *L. elegans*, *L. flavifrenatus* n. sp., *L. rutilus* n. sp., *L. conirostris* (approaches near to *Ophiomorphus*).

*Dromicus Bibr.* Body moderate or short. Head little distinct. Scales poreless. Tail one-third, or a greater proportion of the total length. (*Calophis Fitz.*)

*D. fugitivus* (type). *D. parvifrons* n. sp., *D. temporalis*,\* *D. callilaemus*, *D. exiguus* n. sp.

*Liophis Wagl.* Body elongate, slender. Head distinct. Scales uniporous. Tail one-fourth the total length, or longer. (*Orophis et Limadophis Fitz.*)

*L. reginae* (type) ? *L. taeniurus*, *L. almadensis*, *L. subfasciatus* n. sp., *L. melanonotus*, *L. temminckii*, *L. perfuscus* n. sp., *L. epinephelus* n. sp., *L. putnamii*, n. sp.

*Alsophis Fitz.* (sine diagnosi). Body moderate. Head distinct, acute. Scales biporous. Tail one-third total length, or longer.

*A. antillensis* (type). *A. sancticrucis* n. sp., *A. melanichnus* n. sp., *A. angulifer*, *A. rudii*, n. sp., *A. leucomelas*,† *A. ater*, *A. funereus* n. sp.

*Dromici triscalis*, *inornatus*, *rufiventris* and *plei* of the *Erp. Gen.* and *D. rufodorsatus* and *affinis* of Günther; *Liophis bicinctus* Dum., *L. taeniurus* and *L. lateristriga*,‡ Berth. I have not been able to compare.

So far as is known, *Alsophis* and *Dromicus* are West Indian, *Lygophis* and *Ophiomorphus* South American; *Liophis* inhabits both regions.

*Alsophis sancticrucis.*

Body thick. Scales broad in seventeen longitudinal rows. In other respects the squamation is similar to that of *H. antillensis*, as pointed out by Dr. Günther,|| including the peculiar loreal plate, which presents an angle upwards. The color superiorly is deep yellowish brown, or almost black, sometimes the scales of the fourth row with yellowish centres, producing a banded appearance, others with one yellow margin. The whole, or anterior part only of the superior surface of the head is varied, or shaded with dark yellow. A narrow band of the same passed along the canthus rostralis beyond the eye to the temporal region. Superior labials and chin bright golden yellow, sometimes varied with brown. Gastrosteges deep yellow, margined, finally shaded and obscured with brown and blackish, the yellow remaining upon their extremities, forming a band of spots. A narrow yellow line extends for some distance upon the neck, on the line of separation of the second and third rows of scales. Total length 50 inches, tail 17 inches.

*Habitat.*—St. Croix Id., W. Indies. Mus. Philadelphia, Washington.

Examination of a number of specimens of *A. antillensis* and comparison of them with two of this animal, and with Dr. Günther's description of three that came under his notice, has resulted in a conviction of their specific difference. This and the succeeding species would be called by some zoologists "geographical" or "local varieties."

*Alsophis melanichnus.*

Squamation as in *H. sancticrucis*; seventeen rows of rather broad scales, two more than *antillensis*. Yellowish olivaceous above, without lines or punctulation, every scale tipped, and bordered with brown. Superior labials lighter, unspotted. A narrow black band from the rostral plate to the

\* *Pr. Nat. Sci., Phila., 1860, p. 370.*

† This species is not identical with *H. ater*, as stated by Gunther.

‡ *Goettingen Nachrichten, 1859, p. 210.*

|| *Ann. Mag. Nat. Hist., 1859, p. 210:* Here also are noticed the double scale pores of this species.

temporal region, and three, one median and two lateral divergent, from the posterior border of the occipital shields. Urosteges and posterior three-fourths of the gastrosteges bordered with brown, ground color olivaceous yellowish, unspotted. Total length 36 in., tail 10 in. 3 lin.

*Habitat*.—Hayti, near Jeremie. Mus. Compar. Zoology, Cambridge, Mass. (No. 1522). Dr. Weinland Coll.

*Alsophis funereus*.

Head distinct, not lanceolate. Rostral plate scarcely visible from above. Superciliaries and vertical plates not elongate; the lateral borders of the latter straight, convergent, as long as the anterior. Occipitals rather broad, the common suture as long as the vertical; three large, two small temporals. Supero-anterior border of loreal continuous, curved. Preocular not reaching vertical; two postoculars. Seven superior labials, third and fourth entering the orbit. Seventeen rows of obtuse scales. Total length of specimen 16 in.; tail 5 in. 6 lines.

General color black; anteriorly the inferior surface is plumbeous, as are also the superior labials.

*Habitat*.—Jamaica. Mus. Washington, (No. 5779.) Prof. C. B. Adams' Coll.

The breadth of the vertical plate distinguishes this species at once from others of the genus.

*Liophis perfuscus*.

Scales obtuse, rather broad, in nineteen longitudinal series. Head moderately distinct, not very elongate, the front slightly curved in profile; canthus rostralis very obtuse. Rostral shield much broader than high, not appearing on the superior surface of the muzzle. Prefrontals very small, their common suture half the length of that of the postfrontals. Vertical plate elongate, less so than in *Haliophis antillensis*, more so than in *H. funereus*, its anterior broader more than half the total length, the lateral a little concave, not convergent. Occipitals moderate, acuminate, bifurcate. Two postoculars, both in contact with an elongate temporal, which is not in contact with the last (eighth) superior labial. This labial is well developed; the seventh is high, five-sided, its commissural border shorter than its anterior, superior, and sometimes its lower posterior border; upper posterior very short. One preocular, not reaching the vertical, the superior extremity half separated by a suture from the orbit. Geniæ of about equal length. Total length 17 in.; the tail 3 in. 9 lin.

General color deep mud brown, paler on the sides and beneath; sometimes certain scales are irregularly darker or lighter.

*Habitat*.—Barbadoes. Obtained by Prof. Theodore Gill, who has presented specimens to Mus. Phila. Acad. and Smithsonian, Wash., (No. 6044.)

*Liophis subfasciatus*.

Form stout, tail short, thick, head moderately distinct. Scales in nineteen longitudinal rows. Rostral plate small, swollen, a little recurved superiorly. Canthus rostralis none. Prefrontals small, their common suture more than half that of the postfrontals. Vertical shorter than in *L. reginae*, lateral borders, slightly curved and convergent, posterior angle right. Occipitals short, broad and obtuse posteriorly, bounded by two large and one or two small temporals, the anterior in contact with two labials and two postoculars. Of the latter the superior is twice the size of the inferior. One preocular not reaching vertical; one loreal nearly rectangular. Superior labials eight, fourth and fifth entering orbit. Last two higher than long. The posterior superior maxillary tooth is of unusual length and curvature. Total length 18 in. 3 lin.; tail 3 in.

Color above brown, sometimes nearly unicolor, sometimes with transverse bands of deep brown, one and two scales apart. These bands are formed by dark edges and tips of the scales, and so have a zigzag form; sometimes they

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are broken into spots. Their extremities are separated into lateral spots, which become smaller posteriorly, and are finally confluent into a line, which is on the third or fourth rows of scales; it is obsolete on the tail. Superior labials and under surface yellowish; a few dark shades upon the margins and extremities of the gastrosteges.

*Habitat*.—Paraguay. Mus. Smithsonian, (No. 5809.) Capt. Page's Expedition.

This species is a near relation of *L. almadensis*.\* It has one more row of scales on each side, a shorter, thicker tail, a less distinct head, a more acute muzzle and different coloration. It is annectant to *Ophiomorphus*, where it most resembles *O. cobella*.

*Liophis epinephalus*.

General form elongate, the head not very distinct, with broad muzzle, the tail slender, more elongate than in the preceding species, not so much so as in *L. reginae*. Rostral plate flat, broad, rounded, visible from above; common suture of prefrontals two-thirds that of the postfrontals; the latter are very broad. Vertical and superciliaries elongate, the former one and a half times as long as its anterior suture; lateral sutures straight, convergent, posterior sutures short. Occipitals rather short, rounded posteriorly, bounded by two large and two small temporals. The anterior of these is elongate, in contact with two labials and two postoculars. Loreal higher than long, encroaching on the preocular. Superior labials eight; third, fourth and fifth entering the orbit. Inferior labials ten. Total length 20 in. 9 l.; tail 4 in. 9 l.

General color above brown; the sides tinged with yellow; a few scales, with a light margin. Large alternating black spots, broad on the median line, narrowed upon the sides, almost obscure the ground color. They are more distinct anteriorly; posteriorly the ground is visible in short alternating half bands. Tail blackish above, a black band on each side, which is the continuation of a confluent series of spots which are cut off from the extremities of the dorsal spots. Top of head blackish; a black dot on each side of the occipital suture. Superior labials light yellowish, immaculate.

*Habitat*.—Truando, New Granada. Mus. Washington, (No. 4305.) Lieut. Michler's Expedition.

This species is a near ally of *L. reginae* and *almadensis*. In squamation it resembles them closely, but differs very widely from both in coloration. The absence of temple bands and of ventral spots, separate it from the former, while the ground color and spots of the upper surface are not imitated by the latter.

*Liophis putnamii*.

General form elongate. Head very distinct, rather short, with narrow prominent muzzle, flat above. Rostral plate not visible from above, vertical and superciliaries elongate, the former very nearly twice as long as the anterior border; lateral borders a little concave. Occipitals not elongate, bifurcate, obtuse. Temporals two large, one or two small, the anterior in contact with two labials and two postoculars. One preocular, considerably separated from vertical. Loreal higher than long, its superior border longitudinal. Eight superior labials, fourth and fifth entering orbit; sixth with a postocular suture longer than a temporal. Temporal suture of seventh very long. Inferior labials ten. Scales in seventeen longitudinal rows. Total length 25 in. 9 lin.; tail 7 in.

Yellowish brown above, with a deep brown median dorsal band occupying three rows of scales. The median row of scales for a short distance anteriorly is lighter. On the tail the band is narrow, and is wanting on the terminal

\* *S. wagleri*, Jan. Arch. f. Naturgesch. 1859: *Natrix almada et semilineata* Wagl. Spix Serp. Braz. *L. reginae*, var. Pr. A. N. S., 1860, 253.



third. A similar lateral band occupies the third and fourth rows, and is continued to near the end of the tail; anteriorly it is continuous with a narrow band on the superior margins of the lateral plates. Muzzle and labials yellowish; beneath yellowish white, unspotted.

*Habitat*.—Martinique. Mus. Acad. Philada.; Mus. Gard. Plants in ex.

This is the specimen referred to in the "Catalogue of Colubridæ," Pr. A. N. Sc., 1860, p. 560, as a variety of *Dromicus fugitivus*. It differs from the Cuban form of that species in having uniporous scales, a shorter tail, a broader and more distinct head, a much narrower anterior temporal, and different system of coloration. I have named it in honor of my friend Fredk. W. Putnam, Esq., of Cambridge, Mass., in recognition of his merit as a zoologist, and of obligations for opportunities of examining valuable collections.

#### *Dromicus parvifrons*.

Some scales upon the nape with a pore. Scales of the back obtuse, not elongate, in seventeen or nineteen longitudinal rows. Head small and but little distinct from the body. Eyes moderate. Rostral plate rounded above. Suture of prefrontals with pre-nasal twice or thrice as long as with postnasal. Vertical and superciliaries elongate, the former twice as long as its anterior breadth, longer than the common occipital suture; its lateral borders a little concave, its posterior angle less than right. Occipitals rather small; temporals three large, two small, the anterior large, in contact with two labials and two postoculars. Loreal nearly quadrangular, preocular a little concave, not reaching vertical. Superior labials eight; third, fourth and fifth entering the orbit; the first very narrowly. Preanal plate divided. Total length 26 in. 6 lin.; tail 16 inches.

General coloration dark olivaceous. A brown band extends from the muzzle through the eye, and for the greater part of the total length upon the fourth row of scales. It is bounded above by a light band, which occupies half of the fifth row; it becomes lighter anteriorly and extends to the superciliary plates. The median dorsal band thus remaining is sometimes divided anteriorly by a darker vertebral line, upon one row of scales.

*Habitat*.—Hayti, near Jeremie. Mus. Compar. Zoology, Cambridge, Mass. From Dr. Weinland.

#### *Dromicus exiguus*.

Size small; body stout; head little distinct, flat above, muzzle prominent. Rostral plate broad, presenting no superior surface. Prefrontals well developed. Vertical elongate, lateral borders straight, the posterior long, forming an acute angle. Occipitals well developed, the median or common suture shorter than vertical plate, obtuse posteriorly, bounded by one large and five small temporals on each side. Postoculars two; preocular one, rather broad; loreal small. Postnasal longer than prenasal. Eight superior labials, third, fourth and fifth entering orbit. Nine inferior labials, fourth and fifth largest. Scales in nineteen longitudinal rows. Total length of largest of five specimens 17 in. 1 lin.; tail 5 in. 4 lin.

Above light brown, sometimes yellowish, densely punctulated with darker. The median dorsal region is of a deeper shade; distant dark brown dots sometimes form two parallel series, one on each side of it. A dark brown band along the fourth row of scales nearly to the end of the tail; it is sharply defined only superiorly; it is continuous with a head-band which passes through the eye. Beneath yellowish, punctulated with brown, especially toward the extremities of the gastrosteges.

*Hab*.—St. Johns and St. Thomas, W. I. Mus. Washington, (Rüse Coll.) Phila. Academy.

This species may be readily mistaken for the young of *Alsophis antillensis*, and probably has been. In very small specimens of the latter, the double scale-pores may be observed; the animal is also more elongate, the 1862.]

gastrostege reaching 180 or 190; in the *exiguus*, 137 is the most that I have counted. The head of the latter is relatively smaller and less distinct, in accordance with the character of *Dromicus*. *D. callilæmus* is similar in some respects, but exhibits a broader vertical shield, a more elongate tail, and only seven superior labial plates.

*Lygophis rutilus*.

Form approaching *Opithomorphus*, but the tail is slender, though not long. Scales in nineteen longitudinal rows, rather elongate medially. Head moderately distinct, rather short. Rostral plate not low, the nasal borders a little concave. Prefrontals as long as broad. Vertical and superciliaries elongate; the former nearly twice as long as broad, the borders a little concave, scarcely convergent. Occipitals very short. Temporals small, three larger, three smaller. One pre- two postoculars, both in contact with the temporal. Eight superior labials, fourth and fifth entering orbit, all higher than long excepting sometimes the first and last. Inferior labials ten, fifth and sixth largest. Pregeneials longer than postgeneials. Total length 18 in. 10 lin.; tail 3 in. 9 lin.

Above dark brown; two yellow lines extend from the anterior extremity of the superciliary shields to the end of the tail, occupying on the body the centre of the scales of the seventh row, being separated by five scales. The median line is occupied by a similar red stripe which is most distinct behind the occipital plates and on the posterior regions. The space between the yellow lines contains two series of black spots which usually alternate, sometimes coalesce. The sides are marked with vertical black spots or bars which extend from the second row to the yellow line, and which are one or two scales apart. Small yellow dots are scattered over these and other parts of the body. Head above black. A yellow line near the inner border of each occipital, a bifurcate one on the vertical, a large one on each pre- and postfrontal, also on each nasal, the loreal, the pre- and postoculars. Labials and chin yellow; belly deep rose-red, every second or third gastrostege with its posterior angle black.

*Hab.*—Paraguay, along the Parana River and its branches, in particular the Tigre. Mus. Smithsonian, Washington, (No. 5397.) Acad. Philada.

In this beautiful water-snake I find a depression near the tip of some of the scales, but nowhere have I discovered a true pore.

*Lygophis flavifrenatus*.

Scales rather elongate, in seventeen longitudinal series. Head slightly distinct, rather elongate. Rostral plate a little produced posteriorly above; nasal sutures slightly concave. Prefrontals as long as broad. Superciliaries narrow; vertical elongate, the lateral borders a little concave, posterior sutures short. Occipitals short, much rounded posteriorly, bounded by six temporals which decrease in size from the anterior. The latter is short, in contact with both postoculars and two labials. Eight superior labials, none very high, fourth and fifth (which are longer than high) entering the orbit. Inferior labials ten. Total length 25 in. 10 lin.; tail 6 in. 10 lin.

Above brown, inferior two rows of scales tinged with olivaceous. A narrow yellow line extends from the summit of the rostral plate across the superciliary and occipital plates on each side to the end of the tail. It is on the seventh row of scales on the body. Three rows separate these lines; the scales of the external of the three have their terminal halves black. Tips of scales of the first row black anteriorly; tips, and finally the whole of those of the third black, forming a band on the posterior fourth of the body and tail. Anterior angle of every gastrostege black; remainder greenish white. Some black spots on the sides of the neck; one posterior to the eye prominent.

*Hab.*—Rio Vermejo region. Mus. Phila. Acad.; Smithsonian, (Nos. 5397, 5398,) Capt. Page's Expedition.

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This serpent at first sight resembles the preceding species, but is more truly allied to that that follows.

*Lygophis dilepis.*

Form slender. Head elongate, distinct, rather obtuse. Scales not abbreviated, in nineteen longitudinal series. Rostral plate elevated, a little recurved posteriorly. Prefrontals well developed, their common suture longer than that of the postfrontals. The latter are rather small. Vertical twice the length of its anterior suture, lateral borders a little concave. Occipitals moderate, rounded posteriorly; one large, four medium or small temporals, the anterior narrow, in contact with both postoculars and two labials. Prenasal larger than postnasal, loreal nearly rectangular. Inferior preoculars higher than long, lower than loreal; superior nearly reaching vertical. Eight superior labials, posterior labial suture of the penultimate as long as the anterior. Inferior labials ten. Total length 25 in. 6 lin.; of tail 4 in. 10 lin.

A deep brown band extends from the muzzle, occupying nearly the whole upper surface of the head—throughout the body, where it is black bordered, and occupies one and two halves rows of scales—to the end of the tail. A darker band extends from the eye, throughout the total length, occupying the fifth row and the halves of the adjacent rows above and below. Belly, sides and labials yellowish; space between the bands pale brown.

*Hab.*—Paraguay. Mus. Smithsonian, Washington, (No. 5861,) Capt. Page's Expedition.

This species bears much resemblance to the *L. lineatus*; it may be distinguished by the broader head, stouter body and shorter tail; by the greater width of the lateral and head bands; by the two preoculars, etc.

*Colorhogia redimita.*

*Char. Gen.*—Dentition diacranterian. Head moderately distinct, obtuse. Pupil round. Head shields normal except in the coalescence of the two postfrontals. One preocular, one loreal, one nasal. Rostral plate small, obtuse. Dorsal scales smooth, poreless. Anal plate divided. Tail elongate.

*Char. Specif.*—Size small, head little distinct, short, obtuse. Scales short obtuse, in seventeen longitudinal rows. Rostral plate low, rounded above. Prefrontals small, transverse. Postfrontal large. Anterior border of vertical plate equal to the lateral, which are straight, convergent; posterior angle acute. Occipitals elongate, obtuse posteriorly, bounded by three large and two small temporals, the anterior large, in contact with the fifth and sixth superior labials and the inferior postocular. Of the latter plates there are two. One preocular curtailed above by the superciliary, which forms part of the anterior border of the orbit. Loreal rectangular, longer than high. Nasal nearly rectangular, the nostril near the superior suture. Superior labials seven, third and fourth entering the orbit. Inferior labials nine; pregenaeals longer than postgenaeals. Total length 7 in. 9 lin.; tail 2 in. 9 lin.

General color brownish grey, lighter beneath. The median portions of the dorsal scales are punctulated with brown; a narrow line of the same color occupies the middle of the fourth row of scales to the end of the tail. The vertebral series is occupied by a similar narrow line for the same extent. A dark brown band passes through the eye and is continuous with the lateral line. The entire crown is occupied by a large subsagittiform liver-brown spot, whose outline is parallel with the lateral brown bands. Between these is enclosed a light frontal and temporal band (*redimiculum*.) Posteriorly it is joined by the median dorsal band. Two light occipital spots as in *Tropidonotus* sp. Labial plates and chin punctulated with deep brown. Belly immaculate.

*Hab.*—Eastern Cuba. Mus. Smithsonian, (No. 5747,) from Mr. Charles Wright.

This little serpent is allied to *Dromicus* and *Contia*, but is readily distinguished.

guished by the single postfrontal. Five other genera have been enumerated\* which possess this structure, but none of them have any close affinity with the present. Specifically it resembles the *Dromicus calliæmus* from Jamaica; it may also be loosely compared to the Cuban *Arrhyton tæniatum*.

*Hab.*—Cuba. Mus. Smithsonian, Prof. Poly. Coll.

*Arrhyton fulvum*.

*Arrhyton taniatum* Cope, Proc. Acad. Nat. Sci. Philad., 1860, p. 421.

This species differs from the *A. tæniatum* in its broader head and more acute muzzle. The preocular plate is larger, the postfrontal in contact with the second labial only; the vertical is shorter, with more convergent outer borders. Temporals six or seven on each side, the anterior as deep as long. The head and body above the third row of scales is deep brown; the lateral band occupies the fourth and fifth and half the third and sixth rows of scales; the median the vertebral series alone. In *tæniatum* these bands are of equal width, occupying one and two half rows.

*Hab.*—Cuba. Mus. Smithsonian.

*Arrhyton bivittatum*.

Scales in seventeen longitudinal rows. Dentition, as in other species of the genus, strongly diacranterian. Head wider than body, arched in profile, with acute prominent muzzle. Rostral plate visible from above: nasal plates united? Loreal present, longer than high, rectangular. Preocular plate a little higher. Superior labials seven, third and fourth entering the orbit. Postoculars two; temporals, three large, two small, anterior broad: the external borders of the vertical parallel. Prefrontals not small. Inferior labials seven; anterior general longer. Total length 11 in.; tail 3 in. 2 lin.

General color brown; a blackish band on each side which occupies the adjacent halves of the scales of the third and fourth rows.

*Hab.*—Cuba. Mus. Smithsonian, (No. 5784.)

#### Monograph of the species of TROGOSITA, inhabiting the United States.

BY GEORGE H. HORN, M. D.

The publication of the present paper was suggested by the neglected condition of the genus. Many American species have been published from time to time by various authors, amounting to about twelve or thirteen, of which Melsheimer (Proc. Acad. ii.) and Pal. de Beauvois, (Ins. d'Afrique et d'Amerique) have published one half, the other half being scattered among various authors. It is to be feared that Beauvois has, from describing insects from two widely separated parts of the globe, caused confusion by the mingling of specimens. Some of his other American (?) insects remain unknown even now. The possession of several of Melsheimer's types enables us to determine their true value with certainty.

The species here described have been derived in great part from the collection of Dr. Le Conte, with whom all the typical specimens will be found, the collections from other sources serving rather to increase the number of specimens than species.

Our species may be arranged in groups as follows:

Sec. A. Antennæ with the eighth joint equal to the ninth. Species 1—2.

Sec. B. Antennæ with the eighth joint much smaller than the ninth:

1. Sides of thorax sinuate or rounded, strongly emarginate before the posterior angles, which are acute. Species 3—6.
2. Thorax subquadrate, sides moderately rounded, posterior angles acute.
  - a. Convex Species 7—10.
  - b. Depressed Species 11—13.

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\* Proc. Ac. Nat. Sci. Phil. 1861, pp. 302, 524.

3. Thorax broad, subtransverse sides much rounded, posterior angles small, obtuse. Species 14—20.
4. Thorax broad, sides strongly rounded posterior angles scarcely evident. Species 21.

## A.

1. *T. mauritanica*, nigro-picea, obscura, modice depressa, capite thoraceque parce grosse punctatis, hoc linea dorsali lævi, lateribus, sinuatis, antice latiore, postice angustato, margine vix reflexo, basi rotundato, angulis posticis parvis acutis, elytris oblongis, basi late emarginatis, striis punctatis interstitiis paulo convexis, rugulosis, biserialiter subtiliter punctulatis, abdomine prosternoque parce punctatis, gula postice subtiliter punctulata, antice grosse punctata, antennis pedibusque rufis. Long. .38.

*T. mauritanica*, Linn. (Tenebrio,) Mann. Bull. Mosc. 1843, 302.

*T. caraboides*, Fab. 1, 151.

This species has been carried all over the world in articles of commerce; specimens have been received from Europe, Cuba, Sierra Leone, Texas and Pennsylvania. With the succeeding species, the *mauritanica* forms a natural section, characterized by having the joints of the antennæ gradually increasing in breadth, while, in the next group, the last three joints are suddenly larger, forming a loose club. These two forms appear to be characteristic, the former of the species of the eastern hemisphere, the latter of those of North and South America.

2. *T. nitida*, nigro-picea nitida, modice depressa, subtus subtiliter punctulata capite thoraceque parce subtiliter punctulatis, hoc antice latiore, postice angustato, lateribus sinuatis, margine reflexo, angulis posticis, acutis reflexis, basi rotundato, elytris oblongis, basi vix emarginatis humeris rectis, striis punctatis interstitiis planis parce rugulosis biserialiter subtiliter punctulatis, abdomine prosternoque parce subtiliter punctulatis, gula antice parce grosse punctata, postice læve, antennis pedibusque piceo-rufis. Long. .40.

This species like the *mauritanica* has been imported. Numerous specimens were obtained from a vessel from Sierra Leone, in the spring of 1861, since then others have been found in the neighborhood of Philadelphia. In its general form it resembles closely the *mauritanica*, from which it may be readily distinguished by its more glossy appearance, and less deeply and closely punctured head and thorax. The posterior angles of the thorax are somewhat larger, more acute, and slightly reflexed. The under surface of the body is also more finely and less densely punctured.

## B—1.

3. *T. californica*, nigro-picea, subnitida, depressa, capite thoraceque parce grosse punctatis, hoc antice latiore, postice angustato lateribus sinuatis ante angulos emarginatis, his acutis reflexis, margine vix reflexo, basi rotundato, medio truncato, elytris oblongis, basi late emarginatis versus humeros impressis, his rectis, striis valde punctatis interstitiis planis, parce rugulosis, biserialiter subtiliter punctulatis, antennis pedibusque rufis, abdomine prosternoque parce subtiliter punctulatis, gula antice vix punctulata, postice subplicata. Long. .40.

California, one specimen; Dr. Le Conte. This is the largest California species yet known. The thorax is much broader anteriorly than long, the breadth posteriorly is about equal to its length. The sides are sinuate, anterior to the angles deeply emarginate. This character is possessed in a greater or less degree by all of the California species. In all of this group the posterior angles are well developed, acute and slightly reflexed.

4. *T. crassicornis*, rufa subnitida, depressa, subtus parce punctata, capite thoraceque parce grosse punctatis hoc medio læviore, antice latiore postice angustato, lateribus haud rotundatis, ante angulos emarginatis, his acutis reflexis 1862.]

margine reflexo, basi modice rotundato medio truncato elytris oblongis basi late emarginatis, humeris rectis, striis punctatis, interstitiis planis vix rugulosis, biseriatim subtiliter punctulatis, gula modice rugosa. Long. .23.

California, one specimen; Dr. Le Conte. Distinct from the preceding by its smaller size, more depressed form, and less deeply punctured head and thorax. Its color is light rufous, probably immature. The antennæ in this species are much shorter, and the joints much more globose, than in any other of this group. The eighth joint is not as much smaller as in all the other American *Trogosita*, exhibiting thus a relationship with Section A.

5. *T. pleuralis*, nigro-picea depressa, capite thoraceque parce grosse punctatis, hoc lateribus densiore punctatis et colore ferrugineis, antice latiore postice angustato, lateribus modice rotundatis ante angulos modice emarginatis, margine reflexo, basi rotundato, elytris oblongis, basi rectis, striis punctatis, interstitiis planis rugulosis, biseriatim subtiliter punctulatis, abdomine parce grosse punctato, gula prosternoque parce subtiliter punctulatis, antennis pedibusque nigro ferrugineis. Long. .23—30.

California, two specimens; Dr. Le Conte. This species is the most depressed of this group, resembling the *collaris*, Sturm. The sides of the thorax and anterior portion of the head are ferrugineous. The elytra are much wider in proportion to their length than in any others of this group.

6. *T. limbalis*, brunnea, modice convexa, capite thoraceque dense punctatis, hoc lateribus rotundatis, antice latiore, postice angustato, ante angulos vix emarginatis, his acutis, margine reflexo, basi rotundato, elytris oblongis basi late emarginatis humeris rectis, striis punctatis, interstitiis, planis, nitidis, biseriatim subtiliter punctulatis, gula transverse plicata antennis pedibusque pallidioribus Long. .22.

*T. limbalis*, Mels. Proc. Acad. ii. 109.

Pennsylvania, two specimens; Dr. Le Conte. Resembles *crassicornis*, from which it differs by its more convex form, its smooth elytral interspaces, and the plications of the gular region, which are in three transverse series. The antennæ are of normal form, the eighth joint being much smaller than the ninth.

7. *T. corticalis*, nigra, subnitida, modice convexa, capite thoraceque grosse punctatis, hoc lateribus modice rotundatis, antice latiore, postice vix angustato, margine reflexo, angulis posticis acutis, basi rotundato, elytris oblongis, basi vix emarginatis, humeris rectis, striis punctatis, interstitiis modice convexis, subtiliter rugulosis, biseriatim subtiliter punctulatis, abdomine prosternoque grosse punctatis, gula haud plicata, pedibus nigris, antennis nigro-ferrugineis. Long. .33.

*T. corticalis*, Mels. Proc. Acad. ii. p. 109.

Common in Pennsylvania. This is, probably, the best known of all our species. It may be found under the bark of stumps, at almost any season. The thorax is broader than long, coarsely punctured, and in Melsheimer's typical specimen with the sides near the margin with shallow impressions. The elytra are twice as long as broad, and slightly dilated behind the middle.

8. *T. intermedia*, nigro-picea, subnitida, convexa, capite thoraceque parce grosse punctatis, hoc lateribus rotundatis, antice latiore postice angustato, margine reflexo, angulis posticis acutis vix reflexis, elytris oblongis, basi late emarginatis, versus humeros impressis his rectis, striis punctatis, interstitiis planis parce rugulosis, biseriatim subtiliter punctulatis, abdomine confertim punctulatis, prosterno parce punctato, gula subplicata. Long. .32.

Kansas two, San Jose one specimen. The species resembles the *corticalis* differing in the more elongate thorax which is more narrowed posteriorly, the posterior angles are better developed and slightly reflexed, its body is less depressed, and the sides of the elytra more nearly parallel.

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9. *T. dubia*, Mels, nigro-picea, convexa, capite thoracque grosse punctatis, hoc antice latiore, postice parum angustato, lateribus vix rotundatis, angulis posticis acutis, margine reflexo, basi rotundato, elytris oblongis, humeris rectis, basi rectis, versus humeros impressis, striis punctatis, interstitiis planis, parce rugulosis, biserialiter subtiliter punctulatis, abdomine prosternoque subtiliter punctulatis, gula triserialiter transverse-plicata, antennis pedibusque nigro-ferrugineis. Long. .25.

*T. dubia*, Mels. Proc. Acad. ii. 110.

Pennsylvania, common. Resembles both the *corticalis* and *intermedia*, but is smaller than either. Its thorax is more quadrate, the sides neither so much rounded as in the former, nor so convergent as in the latter species. The gular region is rendered less smooth than in the other two by the presence of three transverse ridges or folds.

10. *T. semicylindrica*, rufa, valde convexa, subtus parce grosse punctata, capite thoracque parce punctatis, hoc quadrato, versus latera vix punctata, postice haud angustato, lateribus vix rotundatis, angulis posticis rectis, margine reflexo, basi rotundato, elytris oblongis humeris rectis, basi late emarginatis, striis grosse punctatis, interstitiis planis, vix rugulosis, biserialiter subtiliter punctulatis, gula transverse-plicata, femoribus antennisque pallidioribus. Long. .23.

Two specimens, Georgia; Dr. Le Conte. This can hardly be confounded with any other American *Trogosita*. Its form is rather elongate, very convex and with parallel sides; the thorax is nearly quadrate, slightly narrower posteriorly, the posterior angles right, and with coarse punctures not closely arranged. The interstitial spaces are flat, scarcely roughened and having the two rows of smaller punctures very poorly marked, in some interspaces but one row appearing. Its color is light rufous, with a slight brassy refulgence. It may be immature.

B—2b.

11. *T. nana*, rufo-picea, depressa, capite thoracque parce grosse punctatis, hoc antice latiore, postice parum angustato, lateribus modice rotundatis, margine reflexo, angulis posticis acutis parvis, basi rotundato, elytris oblongis, striis punctatis, interstitiis modice convexis, parce rugulosis, biserialiter subtiliter punctulatis, prosterno vix punctulato, gula antice abdomineque parce grosse punctato, gula postice transverse plicata. Long. .24.

*T. nana*, Mels. Proc. Acad. ii. p. 110.

? *T. mutica*, Palisot de Beauv. Ins. p. 126, pl. 32, fig. 6.

Pennsylvania, common. This species can hardly be confounded with any other. The thorax is slightly broader than long, its sides moderately rounded, and somewhat convergent posteriorly. The elytra are about twice as long as wide, with the sides moderately rounded, and broader behind the middle. Its color approaches castaneous. The color of the species of the genus *Trogosita* is generally black or dark brown, hence from the color of this and the preceding species, their immaturity might be inferred, but in this instance the color appears constant, being the same in each individual of a full series, collected during several seasons.

12. *T. collaris*, valde depressa, subtus vix punctulata, capite thoracque parce subtiliter punctulatis, rubris, hoc antice latiore, postice vix angustato lateribus rotundatis, marginae reflexo, angulis posticis acutis, basi rotundato, elytris oblongis, nigris, humeris rectis, basi emarginatis, striis vix punctulatis, interstitiis planis, laevis, vix biserialiter punctulatis. Long. .23—.28.

*T. collaris*, Sturm., Ins. Deutsch ii. p. 246. pl. 48.

*T. nigripennis*, Dej. Catal.

Georgia, two specimens; Dr. Le Conte. The color alone would serve to distinguish this from any other species. The head and thorax are of an orange red, and the elytra black. In shape this resembles the preceding species. Its 1862.]

thorax and head are much more finely punctured, the elytra smooth, scarcely striate and the intermediate rows of smaller punctures scarcely evident. Excepting the obtusa, this is the most depressed of our Trogositæ.

13. *T. sinuata*, nigro-picea nitida, depressa, capite thoraceque sat parce punctatis, hoc latitudine paulo brevior, postice parum angustato, lateribus late rotundatis, postice sinuatis, margine fortius reflexo, angulis posticis rectis, basi sinuatim truncata, elytris oblongis, basi late emarginatis, humeris rectis, striis punctatis haud impressis, interstitiis planis, parce rugulosis, biserialiter subtiliter punctulatis, antennis pedibusque piceo rufis, abdomine prosternoque parce subtiliter punctulatis gula antice vix punctulata, postice, læve nitida. Long. .28.

*T. sinuata* Lec. Proc. Acad. Nat. Sci. 1861, p. 344.

East of Fort Colville, one specimen; Mr. Gibbs. This species resembles in appearance *T. corticalis* Mels., and several others from the Atlantic States, but is easily known by the thorax being less transverse and less narrowed behind, with the hind angles more prominent, and the base not rounded, but nearly truncate and sinuate, and slightly emarginate at the middle.

### B—3.

14. *T. cucujiformis*, rufa, valde depressa, capite thoraceque parce grosse punctatis, hoc lateribus rotundatis, antice latiore, postice parum angustato, margine vix reflexo, angulis posticis parvis, obtusis, basi rotundato, elytris oblongis, humeris rectis, basi vix emarginatis, striis punctatis, interstitiis planis, parce rugulosis, biserialiter subtiliter punctulatis, abdomine subtiliter punctulatis prosterno grosse punctato, gula antice punctulata, postice transverse plicata. Long. .20.

One specimen, Pennsylvania; Dr. Le Conte. This is the most depressed species of the group. Its upper surface is flat, much more so than in any other known species. The thorax is about one half wider than long, with the sides moderately rounded, scarcely converging posteriorly.

15. *T. nigrita*, nigro-picea subnitida, modice depressa, capite thoraceque parce grosse punctatis, hoc lateribus rotundatis, margine fortiter reflexo, angulis posticis obtusis, basi rotundato, elytris oblongis, humeris rectis, basi late emarginatis, striis punctatis, interstitiis convexis, rugulosis, biserialiter subtiliter punctulatis, gula antice grosse punctata, postice lævi, prosterno parce subtiliter punctulato, abdomine confertim punctulata. Long. .22—30.

Kansas, two specimens; Dr. Le Conte. This species resembles the *castanea*, Mels. It may be readily distinguished by the less transverse thorax, the more reflexed margin and more rounded sides. The interstitial spaces are more convex and rugulose than in either of the two succeeding species.

16. *T. castanea*, nigro-picea, modice depressa, capite thoraceque confertim subtiliter punctulatis, hoc lateribus rotundatis, margine reflexo, angulis posticis obtusis parvis; basi vix rotundato, elytris elongato-ovalibus basi vix emarginatis, striis punctatis, interstitiis modice convexis rugulosis, biserialiter subtiliter punctulatis, gula antice parce grosse punctata, postice lævi, prosterno parce punctata, abdomine confertim punctulato. Long. .42.

*T. castanea*, Mels. Proc. Acad. ii. 109.

*T. brevicollis*, Dej. Catalogue (?)

Texas, common. This is the broad depressed species so common in our Southern States. The thorax is broader than in the preceding species, and is less deeply and coarsely punctured.

17. *T. latcollis*, nigro-picea, modice depressa, capite thoraceque confertim subtiliter punctulatis, hoc transverso, latitudine duplo brevior, lateribus rotundatis, margine reflexo basi rotundato, angulis posticis obtusis parvis, elytris oblongo-ovalibus, basi vix emarginatis, humeris rectis, striis punctatis, inter-

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stiliis planis, vix rugulosis biserialim subtiliter punctulatis, subtus subtiliter punctulata. Long. .35.

Southern and Western States; Dr. Le Conte. Closely allied to the preceding species. Differing in the much more transverse thorax, and the flat scarcely rugulose interstitial spaces.

18. *T. bimaculata*, nigro ænea, subnitida modice depressa, capite thoraceque confertim punctulatis hoc transverso, lateribus rotundatis, margine vix reflexo, angulis posticis parvis obtusis, basi rotundato, elytris elongato-ovalibus, macula flava ante medium, basi vix emarginatis, versus humeros impressis, striis punctatis, interstitiis modice convexis, valde rugulosis, biserialim subtiliter punctulatis, gula antice subtiliter punctulata, postice biserialim transverse plicata. Long. .20.

*T. bimaculata*, Mels., Proc. Acad. ii.

Middle States, rare; Southern States common. May be readily distinguished by the subtransverse thorax with rounded sides and the brassy refulgence of the elytra, which have an irregularly shaped yellow spot, slightly in advance of the middle.

19. *T. obscura*, rufo-picea, subnitida, modice depressa, capite thoraceque parce punctatis, hoc transverso, lateribus rotundatis, margine modice reflexo, antice latiore postice vix angustato, angulis postice parvis vix acutis, basi modice rotundato, elytris oblongo-ovalibus, basi vix emarginatis, humeris rectis, striis punctatis valde impressis, interstitiis modice convexis, rugulosis, biserialim subtiliter punctulatis, abdomine prosternoque parce subtiliter punctulatis, gula antice confertim punctulata, postice modice plicata. Long. .20.

Illinois; two specimens, Dr. Le Conte. Resembles the *bimaculata* Mels. The thorax is less transverse and sides less rounded, the punctures are coarser and less closely placed. The interstitial spaces are much less elevated and rugulose.

20. *T. rugosipennis*, rufo-picea, modice depressa, capite thoraceque, confertim punctatis, hoc transverso, lateribus rotundatis, postice vix angustato, margine vix reflexo, angulis posticis obtusis parvis, basi modice rotundato, elytris oblongo-ovalibus, basi emarginatis, versus humeros impressis, striis punctatis, interstitiis convexis valde rugulosis, biserialim subtiliter punctulatis, abdomine prosternoque parce punctatis, gula antice punctulata, postice subplicata. Long. .17.

One specimen, Pennsylvania; Dr. Le Conte. This is the smallest known North American species. Its form is more convex, and the sides of the thorax are more narrowed than in the other species of this group. The interstitial spaces of the elytra are very convex and rugulose, the intermediate rows of punctures are quite large, giving to the elytra a roughened appearance not seen in any other member of the genus.

#### B—4.

21. *T. obtusa*, ferruginea, subnitida, valde depressa, capite thoraceque confertim subtiliter punctulatis, hoc lateribus valde rotundatis, antice latiore, postice angustato, margine vix reflexo, basi rotundato, medio emarginato, angulis parvis minutis, vix prominulis, elytris oblongis, basi rectis, striis punctatis, interstitiis planis parce rugulosis, biserialim subtiliter punctulatis, abdomine gula prosternoque parce subtiliter punctulatis. Long. .27.

Two specimens, Pennsylvania, H., Dist. Columbia; Ulke.

This species may be readily known from any other by its more elongated depressed form, the posterior angles of the thorax small, scarcely evident, and sides much rounded. The width of the base equals about one half the width anteriorly. Its form is more depressed than any other *Trogosita*, the lateral view being almost linear.

1862.]

The following species cannot be properly identified from the descriptions given:

*T. americana* Kirby, N. Z. 166.

*T. subnigra* Beauv., Ins. 127, tab. 32, fig. 9.

*T. depressior* " " 126, " fig. 7.

*T. marginata* " " 125, " fig. 3.

The *marginata* of Beauv. may be an immature form of *nana* Mels.; *depressior* may be *mauritania* Linn. The catalogue of Dejean contains many species named from North America; as no descriptions have ever been given of the greater part of them, their synonymy cannot be determined.

*Trogosita pusillima* Mann. Bull. Mose. 1843, 302, does not belong to the genus; it is, however, unknown to me.

### Descriptions of PLANTS.—No. 3.

BY S. B. BUCKLEY.

#### GRAMINEÆ.

*Polypogon alopecuroides*, s. n.—Radice fibrosa; culmo erecto (6—8 policar.) glabro; vaginis glabris; ligulis elongatis (3—4 lin.) membranaceis integerrimis vel tarde fissis; foliis planis glabris (2—4 policar.); panicula terminali (1½—2 policar. lon. 3—4 lin. lata) densiflora; glumis paulo inæqualibus dorsis scabris marginibus hyalinis, apicibus brevi-aristatis; valvulis albo-hyalinis glumæ ½ brevioribus, inferiore longe aristata.

Columbia plains, Oregon; Nuttall.

Bristles of the lower valve 3—4 lines long and more than double the length of those of the glumes; awn of the lower glume a little larger than that of the upper; rays short, fasciculated, compound and many flowered; glumes tinged with purple.

*Vilfa agrostioides*, s. n.—Culmo decumbente (3—4 pedali) glabro tereti; foliis lineari-lanceolatis; vaginis internodio parum brevioribus faucibus dense pilosis; panicula elongata 4—8 policari basi nonnunquam in vagina inclusa; spiculis glabris parvis ovatis acutis; glumis inæqualibus inferiore superiore duplo brevioribus; valvulis subæqualibus glabris acutis glumæ longioribus; caryopsi rotunda ovata breviter apiculata glabra.

Ilano County, Texas.

Panicles axillary and terminal; also often with their bases enclosed in the sheaths, especially in a dry season, when at least one-half of the panicle is thus encased; rays opposite or alternate, scarcely more than an inch in length and appressed; flowers numerous and tinged with reddish-brown; upper glume nearly as long as the palea, which are shortly pointed; throat of the sheath densely bearded with long white hairs, which sometimes extend about an inch downward on the margins of the sheath. Radical leaves a foot or more in length, and cauline leaves 2—6 inches long, and about 2 lines wide.

*Sporobolus (Vilfa) angustus*, s. n.—Radice fibrosa; culmo erecto 2—3 pedali, tereti simplice glabro; vaginis striatulis glabris internodio duplice brevioribus; ligulis nullis; foliis glabriusculis anguste linearibus apice setaceis; panicula elongata 5—8 policari anguste coarctata; glumis inæqualibus, inferiore ovata acuta vel obtusa valvula ⅔—¾ brevioribus; superiore acuta inferiorem fere duplo excedente; valvulis inæqualibus muticis membranaceis acutis; caryopsi ovoidea ellipsoidea obtuse caduca.

Buchanan County. June.

Glumes variable, the lower being not half the length of the upper and obtuse, and again nearly equal to it in length and acute; valves nearly equal or one almost ¼ longer than the other, nerveless, or the lower obscurely 1—3 nerved;

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panicle 4—6 lines in width; rays numerous and densely flowered; leaves 4—8 inches long; palea  $\frac{1}{2}$  longer than the seed.

*Vilfa rigida*, s. n.—Culmo glabro rigido erecto 2—3-pedali tereti; vaginis glabris; ligulis breviter ciliatis; foliis glabris convolutis 6—8-pollicar. 1 lin. latis; panicula patente terminale stricta; radiis compositis solitariis infimis basi nudis glabris; spiculis acutis circum. 3 lin. longis; glumis inæqualibus lanceolatis acutis inferiori superiore  $\frac{1}{2}$  breviori; valvulis subæqualibus glabris acuminatis basi pilosis glumam superiorem æquantibus aut parum excedentibus.

Oregon? In the herbarium of the Academy, without a label.

Panicle 6—8 inches long and 2 inches broad in the widest part; lower branches two inches long, with the lower half naked, and the upper with short alternate branches, containing two or three florets each on short pedicels; upper branches with flowers from the base to the top.

*Vilfa* (Sporobulus) *alba*, s. n.—Culmo erecto glabro tereti simplici; vaginis glabris internodio longioribus aut parum brevioribus; ligulis membranaceis apice laciniatis; foliis planiusculis 4—8-pollicaribus glabris; panicula coarctata albescens 3—4-pollicari; glumis inæqualibus scabriusculis inferiore lineare subacuta, superiore ovata acuta palea brevior; valvulis inæqualibus subacutis muticis.

Oregon. Spalding.

Culm 1—2 feet high; panicle contracted, densely flowered, 4—8 lines wide and base scarcely exerted from the upper sheath; lower glume about half as wide as the upper, and nearly  $\frac{1}{4}$  shorter; upper glume keeled, more or less obscurely 3 nerved; and little shorter than the lower valve, upper valve not much longer than the lower, and both nerveless.

Sporobulus (*Vilfa*) *arenaceus*, s. n.—Radice fibrosa; culmo erecto vel decumbente 6—10-pollicari; foliis lineari-setaceis; 1—3 pollicaribus; vaginis scabriusculis striatulis internodio longioribus vel brevioribus; ligulis membranaceis lacineatis 3—6 lin. lon.; panicula patentissima; radiis inæqualibus capillaribus paucifloris; spiculis acutis; glumis inæqualibus uninerviis acutis hyalinis valvula  $\frac{1}{2}$  brevioribus; valvulis subæqualibus uninerviis vel carinatis; acutis aut mucronatis caducis; caryopsi ellipsoidea caduca.

Hill sides, Western Texas.

Radical leaves and abortive stems numerous; panicle 3—4 inches long, and its lower branches about 2 inches in length; pedicels one flowered.

*Uralepis* (*Tricuspis*) *elongata*, s. n.—Culmo erecto aut decumbente glabro ad nodos piloso; vaginis scabris internodium obtegentibus faucibus pilosis marginibus parce ciliatis; foliis planis aut convolutis 8—12 pollicar. longis 1—2 lin. latis; panicula elongata 7—9 pollicar. lon. 2—3 lin. lata basi inclusa; rachi tereti scabra; radiis solitariis erectis; spiculis oblongis acutis 5—7-floris breviter pedicellatis; glumis ovatis subæqualibus acuminatis paniculis infimis spiculam superantibus, superioribus spicula brevioribus; valvulis ovatis 3-nerviis basi et margine infra dense ciliata, apice breviter 3-dentata, medio dente breviter cuspidato; valvula superiore apice bifida ovata  $\frac{1}{2}$  valvula superiore breviori.

Northern Texas. May.

Internodes of the rachis 1—2 inches long, and the rays of about the same length, with spikelets from base to top. Spikelets somewhat terete; pedicels 1—3 lines long. Glumes on the lower part of the panicle as long or longer than the spikelets, above they are shorter than the spikelets.

*Vilfa* (Sporobulus) *varians*, s. n.—Culmo erecto (12—15 pollicari); vaginis internodium superantibus; ligulis setiformibus; foliis planiusculis margine scabriusculis convolutis; panicula (5—6-pollicari) diffusa basi inclusa: 1862.]

glumis inæqualibus, inferiore lineari acuta valvula brevior, superiore ovata acuta valvula parum brevior; valvulis inæqualibus aut æqualibus muticis.

Dry plains at the base of the Rocky Mountains. Nuttall.

Smooth and of a pale green; leaves and sheaths of abortive culms, numerous at the base; panicle somewhat spreading, with the lower branches (2—3 inches long) appressed upward, with many flowers on short branchlets; glumes and valves very variable, and more or less unequal, green, with chartaceous margins; stem leaves 4—6 inches long and the upper portions filamentose.

*Sporobulus (Vilfa) diffusissimus*, s. n.—Tota glabra; culmo erecto simplici 2 pedali; vaginis internodio brevioribus; ligulis pauci-pilosis; foliis 8—12-policaribus planis aut convolutis apice filiformibus; panicula diffusa ampla pyramidalis; radiis filiformibus patentibus ramosis; glumis hyalinis ovatis muticis inæqualibus valvula brevioribus; valvulis muticis lato-ovatis subæqualibus albo-hyalinis caryopsi parum longioribus; caryopsi ellipsoidea obtusa.

Western Texas.

Panicle spreading, its lower branches 4—6 inches long and refracted; upper sheath 3—4 inches below the panicle; flowers rather numerous, on short branchlets.

*Vilfa (Sporobulus) Sabæana*, s. n.—Decumbens culmis basi numerosis teretibus; foliis planis (2—6-policar.) marginibus scabris; vaginis internodio brevioribus faucibus villosis; paniculis terminalibus lateralibusque patentibus subpyramidalibus et albescentibus; radiis capillaribus infimis verticellatis, superioribus alternatis 10—15-floris; glumis inæqualibus, inferiore parva superiore  $\frac{3}{4}$  breviori; valvulis æqualibus acutis; glumis et paleis albo-hyalinis; caryopsi ovoidea obtusa castanea.

San Saba County, Texas.

Culms 1—2 feet long, often divaricately branched near the root; panicles 3—4 inches in length; lower 12—15 lines long; seeds caducous; when mature the glumes and valves are translucent; upper glume as long as the valves.

*Agrostis aquatica*, s. nov.—Radice fibrosa repente; culmis decumbentibus teretibus striatulis glabris; foliis linearibus planis 2—3-policaribus; ligulis scabrosis ovatis 5—9-nervosis acutis vel subobtusis; vaginis striatulis internodio brevioribus; panicula coarctata decomposita densiflora; radiis filiformibus, subverticellatis; glumis æqualibus scabrosis acutis vel subobtusis ovatis; valvulis ovatis subacutis aut obtusis gluma  $\frac{1}{2}$  brevioribus callo utrinque breve piloso; rudimento nullo.

On small floating islands in the mill-pond or large spring at San Saba, the capital of San Saba County.

Achenia ovate, smooth; stems  $1\frac{1}{2}$ —2 feet long, decumbent, growing in dense tufts; leaves 2—3 inches long and 2—3 lines wide; valves transparent.

*Agrostis scabriuscula*, s. n.—Radice repente fibrosa; culmo basi procumbente erecto glabro tereti 12—15-policari; vaginis scabriusculis internodio brevioribus; ligula ovata acuta integerrima seu parum fissa; foliis scabris planis 3—4-policaribus, 2—3 lin. latis; panicula ampla interrupte rubescente 7—8-policari; radiis scabris semiverticellatis inæqualibus 5—7-nis apice ramosis et subdensifloris, inferne 4—5-policaribus; glumis parum inæqualibus acutis scabris valvula solitaria  $\frac{1}{4}$  longioribus; callo antrorsum brevissime barbato; rudimento nullo.

Oregon; Columbia Plains. Nuttall.

Branches of the panicle semi-verticillate and naked below, about midway verticillately branched, the flowers being near the summit of the branchlets, on pedicels more or less elongated; pedicels one-flowered; base of the panicle often sheathed.

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*Agrostis albicans*, s. n.—Culmo erecto glabro simplici subgeniculato, 2—3 pedali; foliis planis glabris 4—5-policaribus; vaginis internodio brevioribus; ligulis ovatis lanceolatis acutis aut apice fissis; panicula interrupta subcoarctata elongata 5—9-policari; radiis lateralibus confertis inæqualibus scabriusculis densifloris; glumis æqualibus aut parum inæqualibus lanceolatis acutis dorsis scabris viridescentibus lateralibus albo-hyalinis; valvulis hyalinis subacutis gluma  $\frac{1}{4}$  brevioribus callo nudo; receptaculum nullum.

Oregon, Columbia Woods. Nuttall.

Intervals between branches of the panicle  $\frac{1}{2}$ —1 inch long and the branches 1—1 $\frac{1}{2}$  inches long; panicle greenish white.

*Muhlenbergia arenicola*, s. n.—Radice fibrosa culmo erecto tereti glabro 12—18-policari; foliis linearibus convolutis 2—6-policarisibus; vaginis internodium æquantibus aut excedentibus striatulis glabris; ligulis membranaceis linearibus acutis vel laciniatis 4—6 lin.; paniculis terminalibus diffusis; radiis capillaribus ramosis; glumis subæqualibus scabriusculis acutis valvula brevioribus, inferiore breviter aristata; valvulis æqualibus inferiore breviter aristata.

Arid places in Western Texas.

Stem leaves few and also the radical leaves, which are short; panicle spreading, its lower branches 3—4 inches in length, which have branchlets 4—8 lines long, with 3—6 flowers on pedicels 5—10 lines in length; pedicels one-flowered; valves about twice the length of the glumes, with bristles 2—4 lines long.

*Muhlenbergia monticola*, s. n.—Caule ramoso decumbente glabro; foliis convolutis 2—4-policaribus ligula 4—6 lin. fissa vel integerrima; panicula coarctata basi inclusa glumis inæqualibus acutis valvula brevioribus; paleis inæqualibus scabrosis basi pilosis, inferiore longe aristata.

Northwestern Texas.

Stems 1—1 $\frac{1}{2}$  feet long; lateral branches with small, slightly exerted panicles; awns 3—4 times longer than the ; brownish red valves; lower valve linear,  $\frac{1}{3}$  shorter than the upper, and gradually elongated into the awn; some of the pairs of valves are nearly equal in length; panicles 3—4 inches long; upper glume  $\frac{1}{4}$  shorter than the upper valve; glumes equal, or the lower  $\frac{1}{3}$  shorter; keels green and scabrous, sides hyaline.

*Muhlenbergia pauciflora*, s. n.—Culmo subdecumbente 12—18-policari; foliis convolutis apice setaceis glabriusculis; vaginis internodio parum brevioribus; ligulis membranaceis linearibus subobtusis; paniculis 2—3-policaribus interruptis paucifloris; glumis ovatis acutis æqualibus subcarinatis valvula  $\frac{2}{3}$  brevioribus; valvulis lanceolatis inferiore valde 3-nervia et longe aristata; spiculis rufescentibus; carinis et nervis subviridescentibus.

Hill sides, Western Texas.

Panicle terminal, with short appressed branchlets of 4—6 flowers, each of a brownish red color; bristles longer than the flowers.

*Muhlenbergia Texana*, s. n.—Culmo erecto ad basin decumbente gracile (4—6-policari) tereti; foliis subsetaceis scabriusculis; vaginis internodio brevioribus 6—12 lin. longis convolutis; panicula elongata 4—5-policari lucida patula; radiis alternatis capillaribus 3—5-floris; spiculis minutis ovatis acutis; glumis pilosis æqualibus valvula parum brevioribus; valvulis lanceolatis acutis subæqualibus, inferiore in aristam flosculo parum breviorum terminata; caryopsi lineari-ellipsoidea subobtusata glabra palea  $\frac{1}{4}$  brevior.

Northern Texas. May.

Roots small and fibrous; culms 1—2 inches long, scabrous, terminated by the elongated open panicle; lateral panicles small, scarcely exerted from the sheaths of the lower leaves.

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*Calamagrostis Oregonensis*, s. n.—Culmo geniculato erecto  $1\frac{1}{2}$ —2 pedali glabro; vaginis glabris; ligula elongata membranacea; foliis planis vel convolutis glabris 4—8-policaribus 1—3 lin. latis; panicula contracta sub-interrupta 3—5-policari longis; radiis 5—7-nis compositis angulatis scabris; glumis inæqualibus glabriusculis acutis, inferiore sub 3-nervia flosculo parum longiore, superiore valvulam subæquante; valvulis parum inæqualibus, inferiore bidentata dorso aristata; aristisque et pilis corollam excedentibus.

Columbia River. Nuttall.

Internodes on the panicle about  $\frac{1}{2}$  an inch long; glumes tinged with purple.

*Calamagrostis rubescens*, s. n.—Culmo glabro (2—3 pedali) erecto; vaginis glabris; ligula elongata (3—4 lin.) membranacea apice fissa; foliis planis parce pubescentibus; panicula coarctata 3—4-policari 6 lin. lata; radiis fasciculatis compositis confertissimis multifloris; glumis paulo inæqualibus lanceolatis acuminatis glabris aut parce scabris rubescentibus; valvulis glabriusculis integerrimis acutis; arista torta paulo infra medium vel ad basin inserta et valvulam subæquante; pilis numerosis valvula  $\frac{1}{3}$ — $\frac{1}{2}$  brevioribus.

Oregon. Nuttall.

Rachis and branches of the panicle terete and glabrous; branches erect, rigid, about an inch in length, with numerous pedicels, more or less bent and densely flowered; internodes of the rachis  $\frac{1}{2}$ —1 inch in length.

*Calamagrostis albicans*, s. n.—Culmo erecto glabro supra scabro 3—4 pedali; vaginis glabris; ligula membranacea apice integra obtusa tarde parum fissa 1—2 lin. longa; foliis planis marginibus scabris 1— $1\frac{1}{2}$  pedalibus; panicula 6—9 lin. longa subcoarctata vel patente; radiis 5-nis basi ramosis et supra compositis angulatis scabris; glumis inæqualibus lanceolatis acutis, inferiore valvulam superante, superiore corollam æquante; valvulis æqualibus, inferiore glabra apice bifida arista dorsali parum longiore; pilis flosculo  $\frac{1}{2}$  brevioribus; rudimento brevissimo.

Oregon, Columbia Plains. Nuttall.

Internodes of the panicle  $\frac{1}{2}$ —1 inch long; rays fasciculated, erect and branching about a line from the base, and also above; sides of the glumes membranaceous and white; the palea are also more or less hyaline and white; bristle often near the base, or about the middle of the lower valve, rarely near the top; it is  $\frac{1}{4}$  shorter than the valve.

*Aristida curtiseta*, s. n.—Tota glabra, culmo simplici glabro erecto 6—8-policari; vaginis internodio brevioribus; ligulis paucipilosis; foliis radicalibus plurimis convolutis filiformibus; panicula stricta pauciflora; radiis geminis inæqualibus unifloris; glumis æqualibus aut inæqualibus carinatis paleam æquantibus vel superantibus; palea inferiore valde 3-nervia; setis brevibus inæqualibus.

Northern Texas. May.

Bristles 4—8 lines long, 2—3 parted and sometimes undivided; leaves of the stem 2 inches long; radical leaves 3—4 inches in length; joints of the stem obscure.

*Aristida pauciflora*, s. n.—Radice fibrosa; culmo rigido erecto  $1\frac{1}{2}$ —2 pedali ad nodos ramoso et subgeniculato; foliis radicalibus convolutis filamentis culmum æquantibus vel superantibus glabriusculis; ligulis nullis aut brevissime pilosis; panicula pauciflora glumis inæqualibus apice setaceis flosculum superantibus scabriusculis; flosculo glabro compresso vel angulato apice non torto; aristis 3 inæqualibus  $1\frac{1}{2}$ —2 policaribus; radiis unifloris solitariis 2—4 lin. longis.

Northern Texas.

It has abortive stems and leaves at the joints, which are often not sheathed at the base; upper leaves mixed with the panicle, which has 5—8 solitary

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flowers; lower glume strongly 3-nerved; nerves green, or slightly tinged with reddish brown; the midrib of both glumes is prolonged into bristles, the one exceeding the other 3—4 lines.

*Aristida filipendula*, s. n.—Culmo erecto glabro, firmo simplici tereti  $1\frac{1}{2}$ —2 pedali; foliis paucis convolutis 3—8-policaribus vaginis glabris internodio brevioribus; ligulis breve pilosis; panicula interrupta 7—9-policari; radiis capillaribus inæquantibus flexuosis longissimis (1—2 policaribus); glumis inæqualibus mucronatis, inferiore flosculo  $\frac{1}{3}$  brevior, superiore flosculum superante; flosculo scabro et albo-punctato apice torto ad basin piloso; setis 3 subæqualibus lato divaricatis circum  $1\frac{3}{4}$  policaribus.

Western Texas. June.

Flowers purple and somewhat fascicled on short pedicels near the ends of the filiform branches.

This is a common species on dry hills, often being found in the vicinity of the dens of the stinging ant. It differs from the *A. purpurea* of Nutt. in its shorter bristles, scabrous and dotted florets, which are often more or less twisted at the top. It also flowers about two months later, the *A. purpurea* flowering the last of March and first of April, being then very common and conspicuous on the prairies of Northern Texas, with its purple panicles, with bristles 3—4 inches long, waving in the wind.

The *Aristida longiseta* of Steudel is apparently founded on dwarf specimens of *A. purpurea*, judging from specimens collected by Fendler in New Mexico which are in the Herbarium of the Academy.

*Bouteloua pumila*, s. n.—Radice fibrosa; culmis basi ramosis geniculatis glabris 4—6-policaribus; vaginis glabris; ligula breve membranacea apice multilaciniata; foliis planis glabris 1—2 policaribus 1 lin. latis; spicis secundis solitariis breviter pedicellatis 20—30 spiculatis; spiculis ovatis densis 2—3-floris; glumis 2 ovatis inæqualibus carinatis apice brevisetis; superiore flosculum æquante; valvulis hermaphroditis ovatis inferiore tridentata glabra margine ciliata, superiore glabra tridentata basi et apice breviter ciliata; flosculo sterili triaristato; setis hermaphroditam æquantibus.

Northwestern Texas.

Growing in tufts on hill sides; culms slender; spikes 3—4 on a stem,  $\frac{1}{2}$ —1 inch distant; florets, including the bristles, about a line in length.

*Bouteloua brevifolia*, s. n.—Radice fibrosa; culmis basi numerosis erectis teretibus pilosis geniculatis; vaginis glabriusculis; ligulis pilosis; foliis convolutis aut planis glabris 1—2 policaribus circum 1 lin. latis; spicis secundis breviter pedicellatis; pedicellis valde pilosis; rachis compresso parce scabro 10—15 floro; spiculis bifloris brevissime pedicellatis alternatis confertis; glumis glabris inæqualibus, inferiore lineari-subulata superiore duplo brevior; inferiore glabra apice breviter aristata; flosculo sterili 3-aristato.

Northwestern Texas.

Growing in tufts on dry hill sides; roots perennial; bristles of the neutral florets little longer than those of the upper glume; culms 1—2 feet high; spikes  $\frac{1}{2}$ —1 inch long; hairs of the stem white, numerous and suberect.

*Uralepis (Tricuspis) brevicuspidata*, s. n.—Culmo glabro (3—4 pedali) erecto geniculato; vaginis glabris internodio brevioribus; ligula brevissima laciniata; foliis scabris 6—12-policaribus 3—4 lin. latis; panicula patente 8—14 policari long. 4—6 policari lato; radiis solitariis aut geminis a basi floreris scabris 4—6-policaribus multispicatis; spiculis 5—7-floris obovatis distichis breviter pedicellatis; glumis parum inæqualibus carinatis dorso scabris acuminatis flosculis brevioribus; valvula inferiore trinervia apice bifida margine breviter ciliata, medio dente brevissimo aristato; lateralibus dentibus obtusiusculis scariosis.

Northern Texas. May.

1862.]

Branches of the panicle mostly solitary, with spikes 3—4 lines distant from their bases to their summits; axils at the base of the rays pubescent; pedicels about a line in length; spikes 3—4 lines long and two lines wide, loosely flowered; intervals on the rachis, between the branches, 1—2 lines long.

*Uralepis (Tricuspis) pilosa*, s. n.—Radice fibrosa cæspitifera; culmis erectis (6—12-policaribus) basi numerosis glabris; vaginis internodio brevioribus faucibus pilosis; ligulis nullis aut villosis; foliis basi plurimis striatulis marginibus albis, 2—4-policaribus 1—2 lin. latis; panicula coarctata subcapitata; radiis solitariis alternatis 2—4-spicatis angulatis scabris; spiculis lato-ovatis distichis 8—12-floris; glumis subæqualibus ovatis acutis carinatis; valvula inferiore 3-nervia basi et margine ciliata neuris viridescentibus cæteris albido-membranaceis, apice 3-dentata, medio dente exserto cuspidato; valvula interiore apice integerrima subobtusata.

Middle Texas.

Dry hill sides, growing in tufts; spikes about  $\frac{1}{2}$  an inch long and 4 lines broad; pedicels filiform, 2—3-spiked; panicle 1—1 $\frac{1}{2}$  inch long and  $\frac{3}{4}$  of an inch wide, compressed and greenish white; hairs of the valves numerous, white, 3—4 lines long; ligules none, unless the hairs at the mouth of the sheath be considered as such. The two lateral nerves of the lower valve are on or near its margins.

*Uralepis (Tricuspis) poæoides*, s. n.—Culmo tereti glabro (1—2 pedali) erecto; vaginis glabris internodis longioribus; ligula membranacea ovata integra 2 lin. longa; foliis glabris 2—5-policaribus 1—2 lin. latis; panicula terminali patente 3—4-policari, 4—6 lin. latis; radiis 2—3-nis erectis basi nudis compositis parum scabrosis angulatis; glumis subæqualibus acutis glabris aut parum scabris spicula  $\frac{1}{3}$ — $\frac{1}{2}$  brevioribus; spiculis ovatis teretibus acutis 4—5-floris; valvula inferiore ovata infra mediam villosa apice breviter 3-dentata, dentibus lateralibus obtusis, medio dente brevi-cuspidato; valvula superiore bicarinata, carinis breviter ciliatis.

New Mexico. Fendler, 932.

Internodes of the rachis  $\frac{1}{4}$ —1 inch long; lower rays about 2 inches long, and the lower half naked; the upper rays are  $\frac{1}{4}$ — $\frac{1}{2}$  an inch long, with spikes on short pedicels from the base to the summit.

*Uralepis (Tricuspis) densiflora*, s. n.—Radice fibrosa, culmo erecto rigido simplici glabro; vaginis glabris ore pilosis; ligulis setaceis; foliis planis aut convolutis 10—12-policaribus 2—3 lin. latis, radicalibus 15—18-policari panicula elongata stricta 6—7-policari 4—6 lin. lata; ramis solitariis glabris dense-spicatis 6—12 lin. longis; spiculis 5—7-floris lato-ovatis; glumis subæqualibus glabris carinatis acutis lateralibus membranaceis carinis viridescentibus; superiori apice bifida breve-aristata; inferiore integra basi nuda; valvula inferiore margine et dorso dense ciliata apice 3—5-denticulata; dente medio breviter cuspidato.

Middle Texas.

Branches erect and appressed; spikes about 3 lines long and nearly the same width, numerous, with close diverging florets, the two upper forming an open angle at the top; intervals on the rachis between the branchlets 6 lines to one inch long.

*Uralepis (Tricuspis) composita*, s. n.—Radice fibrosa; culmo erecto glabro rigido 3—4 pedali ad nodos ramoso; ramis erectis strictis; vaginis glabris; ligulis 6—8 lin. longis apice fissis; foliis glabris planis 8—12-policaribus 3—4 lin. latis; panicula 8—12-policari; ramis solitariis aut geminis erectis 3—4-policaribus dense spicatis glabris; spiculis oblongo-ovatis 7—9-floris breviter pedicellatis; glumis inæqualibus carinatis acutis dorso parum scabris; valvula inferiore basi et margine dense ciliata, superne glabra apice tridentata, medio dente breve-aristato.

New Mexico. Dr. Woodhouse.

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It has 3—4 erect stems from one root, branched at the joints; branches erect, straight, with large terminal panicles, densely flowered; leaves at the joints of the culm without sheaths and stems, smooth and naked below, the base of the panicle is often sheathed by the upper leaves; whole plant pale green.

*Uralepis (Tricuspis) pilosa*, s. n.—Culmo erecto rigido  $1\frac{1}{2}$ —2-pedali; vaginis pilosis internodium obtegentibus; ligulis ciliatis; foliis convolutis rigidis numerosis parce ciliatis aut tarde glabris 6—12-policaribus 1—2 lin. latis; panicula terminale basi inclusa 2—3-policari 4—6 lin. latis dense-spicata; radiis solitariis compositis scabris; glumis inæqualibus lanceolatis acutis glabris; valvula inferiore 3-nervia supra medium glabra basi dense pilosa apice breve tricuspidata, dentibus lateralibus obtusis, dente medio brevissima cuspidata.

Northern Texas.

Hairs of the sheath erect and numerous; lower leaves abundant; spikelets 3—4 lines long, packed closely on the short rays; internodes of the rachis 4—6 lines long, scabrous.

*Pleuraphis mutica*, s. n.—Culmo subprostrato geniculato glabro, ( $1\frac{1}{2}$ -pedali); foliis planis parum scabris 3—4-policaribus 2—3 lin. latis; vaginis faucibus pilosis internodio brevioribus; ligulis membranaceis laciniatis; spica terminali 2-policari 5—6 lin. lata; glumis lato-obovatis 5—7-nerviis apice albo-hyalinis breviter laciniatis inermisbus; valvulis subæqualibus muticis hyalinis vel 1—3-nerviis obtusis laciniatis.

Northern Texas.

It is a much smoother plant, with fewer leaves than *P. Jamesii Torr.* A very few of its glumes with 7 nerves have a short bristle on each side below the middle, formed by the extension of the lateral nerves; nerves green, the remainder hyaline.

*Glyceria bulbosa*, s. n.—Culmo erecto; vaginis scabris; ligula brevissime truncata; foliis planis vel convolutis glabris; radiis angulatis patentibus compositis scabris; spiculis 3—4-floris oblongo-ovatis subaxillaris; glumis glabris ovatis subacutis inferiore  $\frac{1}{4}$  brevior; valvulis oblongis acutis inferiore ovata obscure 7-nervia parum scabra, inferiore margine ciliata.

Columbia Woods. Nuttall.

*Glyceria leptostachya*, s. n.—Culmo erecto gracilenti tereti simpliciter basi geniculato; vaginis glabris; ligulis 3—4 lin. longis fissis; foliis planis glabris 6-policaribus 4 lin. latis; panicula elongata circum 12 lin. longa interrupta; radiis geminis scabris angulatis; spiculis 3—4-floris; flosculis remotiusculis obtusis scabris; glumis membranaceis; valvula inferiore distincte 7-nervia obovata apice obtusa scariosa, superiore obtusa apice membranacea.

Oregon, Columbia River. Nuttall.

Panicle about one foot long; its branches double, and placed at intervals of 1—2 inches on the stems, the longer branch about an inch in length, with 2—3 loose spikes of flowers on short pedicels, the shorter branch 3—4 lines long, having one spike.

*Glyceria stricta*, s. n.—Culmo rigido erecto tereti glabro 2—3-pedali; vaginis glabris; ligula brevissima truncata; foliis planis vel convolutis glabris 6—12-policaribus, 2—3 lin. latis; panicula stricta coarctata 5—6-policari 4—5 lin. lata; radiis 2—3-nis erectis scabris angulatis; spiculis 3—4-floris glabris laxis; glumis inæqualibus uninerviis oblongo-ovatis acutis; valvula inferiore plus minus distincte 5-nervia oblongo acuminata glabra; superne subacuta integerrima.

Middle Texas.

Branches of the panicle erect and unequal, the longest naked near its base, and with 3—4 spikes at and near its extremity; the longest of the lowest 1862.]

3 branches is about  $1\frac{1}{2}$  inch in length; the remainder, the one is sessile and one-spiked, the other nearly  $\frac{1}{2}$  an inch long and two-spiked; the upper branches are about  $\frac{1}{2}$  an inch long and 1—3-flowered; some of the palea are smooth and nerveless, and others distinctly nerved; florets 3—4 lines long, the two upper somewhat divided from the lower, being distant from each other on the rachis 1—2 lines.

*Glyceria microtheca*, s. n.—Caule erecto geniculato simplici glabro tereti; vaginis glabris internodio brevioribus; ligula conspicua apice fissa basi decurrente; foliis planis 3—4-policaribus et 3—4 lin. latis glabris; panicula patente 3—4-policari 3—4 lin. lata; radiis geminis compositis basi nudis parum scabris; spiculis ovatis sub 5-floris; glumis inæqualibus scariosis obtusis; valvulis apice scariosis obtusis, inferiore distincte 5-nervia rare 7-nervia, inferiore apice bifida.

Oregon, Columbia River. Nuttall.

Panicle terminal, with few pairs of branches at intervals of  $\frac{1}{2}$ —1 inch apart, lower branches about 2 inches long; spikes about 4 lines long and 1—2 broad on filiform pedicels; valves caducous, glumes persistent.

*Glyceria montana*, s. n.—Radice fibrosa; culmo erecto tereti simplici glabro 10—15-policari; vaginis glabris internodio longioribus superiore marginibus albo-hyalinis; ligula ovata integra 1—2 lin. longa; foliis planis vel convolutis 4—5 pol. longis et 1—2 lin. latis; panicula elongata interrupta basi inclusa 3—5-policari 6—8 lin. lata; radiis 2—4-nis erectis compositis scabris  $1\frac{1}{2}$ —2-policaribus; spiculis 3—4-floris ovatis acutis; glumis ovatis; valvulis ovatis acutis, inferiore obscure 7-nervia.

Rocky Mountains. Nuttall.

Intervals on the rachis between the branches of the panicle  $\frac{1}{2}$ —1 inch long; lower branches naked near the bases and 4—5 spikes at and near their extremities; spikes small, pale green; a semi-transparent membrane from the ligula extends down along the margins of the sheath 1—2 inches.

*Poa laxiflora*, s. n.—Culmo erecto 2—3-pedali simplici geniculato scabro; vaginis internodio multo brevioribus scabris; ligula conspicua sub-obtusa 2—3 lin. longa; foliis planis scabris 4—5-policaribus 2—3 lin. latis; panicula patente circum 6 policari; radiis 2—4-nis compositis filiformibus 1—2-policaribus; 3—4-stachyis; spiculis pedicellatis 3—4-floris laxis; glumis inæqualibus acutis dorso scabris; valvula inferiore oblongo-ovata acuta obscure 5-nervia glabra basi parum villosa; inferiore basi et dorso parce ciliata.

Oregon, Columbia Woods. Nuttall.

Culm 6—8 inches below the panicle, naked; leaves few.

*Poa tenuifolia*, s. n.—Radice fibrosa; culmo geniculato glabro rigido tereti ( $1\frac{1}{2}$  pedali), vaginis internodio brevioribus glabris; ligulis 3—4 lin. longis ovatis fissis; foliis planis vel convolutis basi plurimis (3—4-policaribus), parum scabris aut glabris 1—2 lin. latis; panicula coarctata 3—4-policari 8—12 lin. lata; radiis 2—3-nis ad pressis scabris compositis apice multistachyis; spiculis 2—3-floris oblongo ovatis acutis; glumis subæqualibus ovatis acutis scabris; valvula inferiore margine et dorso scabra obscure 5-nervia basi nuda; inferiore margine ciliata.

Columbia River. Nuttall.

*Poa densiflora*, s. n.—Culmo erecto ( $1\frac{1}{2}$ —2 pedali) glabro; vaginis internodium obtegentibus glabris; ligula membranacea brevissima truncata; foliis planis (4—9-policaribus) marginibus scabris 2—3 lin. latis; panicula conferta parum interrupta 2—8-policari 10—12 lin. lata; radiis 5—7-nis dense-spicatis scabris; spiculis 5—9-floris distichis lato-ovatis sublaxis; glumis parum inæqualibus carinatis dorso scabris acutis; valvula inferiore

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plus minus obscure 5—7 nervia acuminata basi et interiore parce lanosa aut glabra.

Northern Texas. April.

Longest branches of the panicle about an inch in length and its upper half densely spiked; spikes in twos and threes on short pedicels; short rays with spikes of flowers at and near the base; internodes on the rachis  $\frac{1}{2}$ —1 inch long.

*Eragrostis diffusa*, s. n.—Culmo caespitoso erecto vel basi procumbente et geniculato glabro; foliis planis 6—8-policaribus et basi numerosis; vaginis glabris internodio brevioribus ore pilosis; ligula margine longe ciliato; panicula diffusa ampla in long. 10—12-policaris, in latit. 6—9-policari; radiis 3—4-nis aut solitariis scabris basi parce villosis 20—35-spiculatis; spiculis oblongo-ovatis acutis 9—11-floris; glumis inaequalibus acutis margine albo-hyalinis inferiore  $\frac{1}{2}$  brevioribus; valvula inferiore valde 3-nervia acuta hyalino-membranacea; nervis viridescentibus; valvula superiore virido-carinata margine albo-hyalino persistente.

Northern Texas. May.

Stems from the root many, both procumbent and erect; spikes 4—5 lines long and 1—1 $\frac{1}{2}$  broad, and about equal to the pedicels in length; pedicels appressed to the stems; lower valve about double the size of the upper, leaves 3—4 lines broad, 5—7-nerved and glabrous.

*Eragrostis curtipedicellata*, s. n.—Culmis erectis basi decumbentibus glabris 2—3 pedalis; vaginis glabris internodium obtegentibus aut brevioribus ore pilosis; ligula margo; foliis planis glabris 4—6-policaribus et 3—4 lin. latis; panicula diffusa patente 10—12-policari in latit. 6—8-policari; radiis scabris solitariis alternis compositis; axillis pilosis; spiculis alternis breviter pedicellatis 5—7-floris; glumis subaequalibus ovatis acutis carinatis; valvula inferiore margine ciliata 3-nervia acuta; carinis scabris; superiore apice brevis hirsuta.

Northern Texas. June.

Pedicels generally shorter than the spikes, which are more or less appressed, often touching each other on the branchlets, along which they extend from the base or near the axils to the top; spikes 2—3 lines long and about 1 line wide.

*Eragrostis sessilispica*, s. n.—Culmo decumbente ramoso glabro rigido; vaginis glabris internodium superantibus ore pilosissimis; foliis paucis planis glabris; panicula diffusissime 1—1 $\frac{1}{2}$  pedali in latit. 12—15-policari; radiis rigidis glabris compositis; axillis pilosis; spiculis solitariis alternis sessilibus adpressis oblongo-ovatis 4—6-floris; glumis subaequalibus carinatis dorso scabriusculis; valvula inferiore ovata longe acuminata dorso scabriuscula; superiore carinata arcuata ad carinam leviter ciliata persistente.

Near Austin, Texas.

Lower palea strongly 3-nerved, equal in length or little longer than the upper, which is often curved outward, leaving an open space between the two; spikes about  $\frac{1}{2}$  an inch distant, the lowest being in the axils, where they (spikes) are sometimes double.

*Festuca gracilentia*, s. n.—Radice fibrosa; culmis basi numerosis geniculatis (1—1 $\frac{1}{2}$  pedali) gracilentis pubescentibus tarde glabris; vaginis striatulis pilosiusculis; ligulis membranaceis tarde fissis; foliis planis 3—4-policaribus, 1 lin. latis parce pubescentibus; panicula terminali gracilente patente (3—4 policari) interrupta; radiis solitariis aut 2-nis angulatis distantibus scabriusculis inaequalibus; spiculis ovatis 2—4-floris breviter pedicellatis; glumis inaequalibus acuminatis lineari-lanceolatis flosculo brevioribus

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inferiore  $\frac{1}{4}$ — $\frac{1}{6}$  brevior; valvulis infra glabris supra scabris inferiore breviter aristata; aristis 1—2 lin. longis.

Northern Texas. May.

Grows in tufts; internodes of the rachis  $\frac{1}{2}$ — $1\frac{1}{2}$  inches long, longest ray at the base of the panicle about  $1\frac{1}{2}$  inches long; short rays 4—6 lines in length.

*Festuca reflexa*, s. n.—Culmo geniculato glabro tereti 1— $1\frac{1}{2}$  pedali; vaginis parce pubescentibus marginibus breviter ciliatis; ligula brevissima membranacea truncata; foliis glabris tarde convolutis 2—4 pollicaribus 1—2 lin. latis; panicula terminale patente pauci-radiata; radiis solitariis parum ciliatis; spiculis 3—4 floris breviter pedicellatis tarde reflexis; glumis inæqualibus flosculo  $\frac{1}{2}$  brevioribus superiore 3-nervia subobtusa marginibus albo-hyalinis; valvulis glabris inferiore aristata, aristis 3—4 lin.

Upper California. Nuttall.

Panicle 3—4 inches long; rays about an inch in length, somewhat rigid, having 1—2 branches. Spikelets about as long as the bristles and 3—4 lines distant.

*Festuca pusilla*, s. n.—Culmo decumbente geniculato tereti ad basin glabro supra pubescenti (10—12 pollicari); vaginis glabris aut parce pubescentibus; ligulis membranaceis ovatis subintegræ; foliis convolutis glabris 3—4 pollicaribus 1 lin. latis; panicula terminali coarctata 2—3 pollicari longis circum 6 lin. lata; rachis pubescentibus subangulatis; radiis 2—3-nis scabris angulatis dense spicatis; spiculis 6—8 floris; glumis inæqualibus superiore 3-nervia acuminata flosculis  $\frac{1}{2}$  brevior; valvulis scabris, inferiore aristata.

Upper California. Nuttall.

Bristles 3—4 lines long, being a little longer than the lower valve; rays nearly an inch in length and densely spiked; internodes of the rachis  $\frac{1}{2}$ —1 inch long.

*Bromus breviaristatus*, s. n.—Culmo erecto piloso simplici  $1\frac{1}{2}$ —2 pedali; vaginis villosis internodio brevioribus; foliis planis pilosis 5—6 pollicaribus 2—3 ped. latis; ligula breve membranacea integra vel fissa; panicula stricta circum 6 pollicari, et 6 lin. lata; radiis geminis vel solitariis scabris erectis 1—2 spicatis; spiculis 2—3 floris oblongo-ovatis; glumis inæqualibus ovatis acuminatis obscure nervatis; valvula inferiore obscure 7—9 nervata pilosa apice integra aristata 2—3 lin. lon. *Ceratochloa breviaristata*? Hook.

Rocky Mountains. Nuttall.

Whole plant pilose, with short white erect hairs; panicle of few spikes; intervals on the rachis between the branches 1—2 inches long; longest ray about an inch in length, erect and 1—2 spiked, of which the lowest is near the base; short ray 2—3 lin. long and 1-spiked; spikes about  $\frac{1}{2}$  an inch long.

*Bromus virens*, s. n.—Culmo erecto aut decumbente glabro ( $1\frac{1}{2}$ —2 pedali) subgeniculato; vaginis internodium æquantibus vel superantibus faucibus marginibusque superioribus villosis; ligulis 1—2 lin. lon. laciniatis; foliis planis glabris 6—8 pollicaribus, 2—3 lin. latis; panicula patente 3—4 pollicari, circum 1 ped. lata; radiis 2—3 nis vel solitariis a basi floriferis aut breviter nudis scabris; spiculis laxis 5—7 floris circum pollicaribus; glumis inæqualibus ovato-lanceolatis acuminatis scabris, superiore 5—7-nervia, inferiore 3-nervia; valvula inferiore 7—9-nervia scabra margine et apice albo-hyalina; apice subintegra aristata; setis 4—5 lin. lon.

Rocky Mountains and Columbia River. Nuttall.

Branches of the panicle unequal, the longest 2—3 inches in length and erect, 2—2 spiked, near its top spikes on short pedicels; short branches 3 lines to 1 inch long and 1—2 spiked.

*Bromus setaceus*, s. n.—Culmo erecto 2—3 pedali; vaginis inferioribus  
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glabris, superioribus marginibus et faucibus parce villosis; ligulis 2—3 lin. lon. apice laciniatis; foliis glanis pubescentibus margine ciliatis 4—6 pollicaribus 3—4 lin. latis; panicula diffusa composita 6—8 pollicari 4—5 pollic. latis; radiis 5—7-nis basi nudis hirsutis ad apicem compositis; ramulis 3—4 nis, unispicatis; spiculis 4—5-floris oblongo-obovatis; glumis parum inæqualibus carinatis lineari-lanceolatis ciliatis acuminatis, marginibus apicibusque albohyalinis, superiore 3—5-nervia; valvula inferiore lanceolata 5—7-nervia ciliata apice bifida et aristata; seta 6 lin. lon.

Northern Texas.

The longest of the lower branches of the panicle 3—4 inches in length, and the shorter branches 1—2 inches long, all destitute of spikes excepting near their tops; spikes loosely flowered; internodes on the rachis 1—2 inches long; pedicels 4—6 lines in length; spikes without the bristle about  $\frac{1}{2}$  an inch long, loosely flowered; upper florets abortive, 2—3 united, appearing to the naked eye like one with 2—3 bristles.

*Uniola (Brizopyrum) flexuosa*, s. n.—Culmis erectis gracilentibus glabris  $1\frac{1}{2}$ —2 pedalibus; vaginis glabris internodio brevioribus ore parum pilosis vel nudis; ligula nulla; foliis planis glabris 4—6 pollicaribus et 1—3 lin. latis; panicula terminali conferta 2—3 pollicari, 6—10 lin. latis, 15—20 spicatis; spiculis 10—12-floris oblongo-ovatis acutis 6—8 lin. lon. et 2—3 lin. latis; glumis inæqualibus ovatis obscure 3-nerviis seu glabris acutis; valvula inferiore obscure nervata glabra subacuta; superiore bicarinata apice obtusa aut truncata.

On the Brazos at Fort Belknap.

Culms weak, smaller at the base than above; leaves of the stem 2—2 $\frac{1}{2}$  inches distant, not rigid; roots fibrous and small.

*Elymus interruptus*, s. n.—Culmo tereti simplici glabro erecto 2—3 pedali; vaginis glabris marginibus breviter ciliatis; ligula brevissima membranacea laciniata; foliis planis scabriusculis 6—8 pollicaribus, 3—4 lin. latis; spica pauciflora interrupta 3—5-pollicari; spiculis geminatis 3—4-floris laxis; glumis setaceis flosculum superantibus; valvula inferiore 5-nervia glabra in aristam terminata; arista arcuata scabra valvula duplo longiore; valvula superiore integerima, apice et margine breviter ciliata.

Llano County, Texas. Internodes on the rachis about  $\frac{1}{2}$  an inch long; florets about the same length; bristles of the palea an inch in length, those of the glume nearly eight lines long; rachis angular or compressed, smooth, or a little scabrous on the margins.

*Elymus triticoides*, s. n.—Culmo geniculato glabro (1—2 pedali); vaginis glabris vel parum pilosis; ligula brevissima laciniata; foliis convolutis aut planis (2—3 pollicari) pubescentibus; spica stricta  $1\frac{1}{2}$ —2 pollicari; spiculis solitariis aut geminis 2—3 floris racheos internodium superantibus; glumis subulatis marginibus scabris vel brevissime setosis; valvula inferiore enervia seu obscure 5-nervia glabra apice breviter aristata; valvula superiore subæquali obtusa apice et margine pubescente obscure 2-nervia.

Rocky Mountains. Nuttall.

Rachis slightly rough; bristles of the palea 2—3 lines long; glumes shorter than the valves.

*Elymus glaucus*, s. n.—Culmo basi glabro ad apicem parum scabro 1—2 pedali; vaginis parce scabris internodium superantibus; ligula membranacea truncata parum fissa; foliis planis glabriusculis 4—8 pollicaribus 2—3 lin. lat.; spica 2—3 pollicar. 3—4 lin. lat.; spiculis 2—3-floris adpressis; glumis flosculis parum brevioribus aut æquantibus 3—5-nerviis lineari-lanceolatis subulatis; valvula inferiore convoluta glabra obscure nervata vel enervia apice pubescente; setis scabris valvula 2—3-plo longioribus.

Columbia river. Nuttall.

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Its spikes are more slender than the other North American species. Rachis somewhat scabrous, and its internodes 2—3 lines long.

*Trisetum glabrum*, s. n.—Radice fibrosa; culmo glabro erecto geniculato 8—10 pollicari; vaginis glabris; ligula membranacea elongata fissa; foliis planis glabris 2—3 pollicaribus 1 lin. latis; panicula elongata patente; radiis 2-nis glabris basi nudis compositis filiformibus, spiculis 2-floris pedicellatis; glumis æqualibus lanceolatis acuminatis 3-nerviis glabris flosculos superantibus; valvulis glabris hyalinis ovatis subtruncatis apice 3-dentatis infra medium aristatis; arista geniculata flosculo duplo longiore.

Texas. Dr. Linsecum.

Glumes longer than the two paleaceous florets, which are vertical, the upper having a long sericeous stipe.

*Trisetum interruptum*, s. n.—Culmo geniculato pubescente erecto basi ramoso 8—12 pollicari; radiis 3-nis sen solitariis scabris compositis basi ad apicem densifloris; spiculis 1—2 floris sessilibus vel breviter pedicellatis; glumis scabris 7-nervatis acuminatis æqualibus valvulam subæquantibus marginibus et apicibus albo-hyalinis; valvulis glabris acutis paulo infra apicem longe aristatis, inferiore bifida basi parce setulosa.

Middle Texas.

The lower flowering branches are partly included in the sheaths, and are at intervals of from 1—2 inches from near the base of the culm to its summit, forming a vertical succession of little panicles, which are from 1—1½ inches long, densely flowered.

*Trisetum canescens*, s. n.—Radice fibrosa; culmo erecto (3—4 pedali) parce piloso; vaginis inferioribus canescenti villosis, superioribus glabriusculis; ligulis membranaceis (1—2 lin. lon.); foliis planis paulo pilosis; 4—6 pollicaribus, 3—4 lin. latis; panicula elongata stricta patente 8—10 pollicari; radiis 5—7-nis scabris inæqualibus compositis; spiculis 2-floris pedicellatis; pedicellis scabris; glumis inæqualibus carinatis acutis dorsis scabris, superiore duplo latiore; valvula inferiore glabra paulo infra apicem longe setulosa apice bifida callo dense piloso.

Oregon, Columbia Plains. Nuttall.

Internodes of the panicle 1—2½ inches long; rachis terete and slightly scabrous; branches of the panicle filiform and erect, the longest about 3 inches in length; margins of the glumes white and hyaline; bristles of the palea 4—6 lines long; florets about 3 lines in length.

*Hierochloa occidentalis*, s. n.—Culmo glabro erecto 1½—2 pedali simpliciter; vaginis glabris internodio brevioribus; ligula membranacea apice fissa; foliis planis glabris 2—3 pollicaribus et circum 2 lin. latis; panicula patente 2—3 pollicari; radiis solitariis compositis glabris basi nudis; pedicellis 1—2-spicatis; glumis ovatis acutis hyalinis 5—7 nerviis lateralibus et apicibus albidis, cæteris ferrugineis flosculos fere æquantibus; flosculis masculis lævibus muticis parce ciliatis; hermaphroditis glabris apice breviter ciliatis.

Columbia woods. Nuttall.

Lower branches of the panicle about 2 inches long, with lower half naked; internodes between the branches 6—15 lines long.

#### Note No. 2.—On *QUERCUS HETEROPHYLLA*, Mich.

BY S. B. BUCKLEY.

Since the first note was written, I have seen a young tree on the grounds of Joshua Hoopes at West Chester, near Philadelphia, which grew from an acorn obtained from a tree now living at Marshallton a few miles from West Chester. The Marshall tree is a seedling from the original Bartram Oak. The Bartrams

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wishing to continue the species, which was founded on a single tree, caused acorns from it to be planted in different places, from which two living trees are now known; one at the Bartram garden mentioned in a former paper, and the other in the old Marshall garden.

The Hoopes tree is about 15 feet high and 2—3 inches in diameter, and its leaves have a striking resemblance to Michaux's figure of the Bartram Oak. This may be caused in part from a tendency in many young oak trees to have lobed leaves, often quite different from those of mature trees of the same species. This is well known to many observers. Mr. T. Meehan, of Germantown, has specimens similar to *Q. heterophylla*, from Townsend, in New Castle County, Delaware, collected from the young shoots growing around a stump, surrounded by living willow oaks, of which it had every appearance of having been one.

The following is an extract from a letter lately received from Mr. Hoopes:

"There is a Bartram Oak in the garden at Marshallton, with foliage corresponding to the figure in Michaux, yielding acorns, which produce trees having foliage true to the original."

Dr. Darlington lately told me what amounts to the same as that just quoted from Mr. Hoopes. Should these trees maintain their present distinctive characters, and continue to produce trees of the same sort, it will be an example of the formation of a new species from a form of an old one; nor is it by any means improbable that the Bartram Oak may become distinct from its parent, the willow oak. It is believed by some botanists that new species have been formed, and are now being made from varieties of old species; but human life is so short that we cannot perceive the long gradual changes necessary for this creative process. These Bartram Oaks should be carefully preserved and propagated, that future generations may see whether a good species of *Quercus heterophylla* has been thus created.

It is singular that acorns from the original Bartram Oak should yield trees of such different foliage as the one at the old Bartram garden, and that at Marshallton. The oak in the Bartram place shows a tendency to breed back to the original stock of the willow oak, while the one at Marshallton seems to keep most of the characters of its immediate parent, the Bartram Oak. In confirmation of this I have just received the following note from Mr. Meehan in reference to some Bartram Oaks now being raised by Mr. Buist.

"Mr. Buist says his seedlings from the Bartram Oak all approach the willow oak, but none quite like, all having a few lobed leaves. His seed was gathered by himself from the tree in the Bartram garden which I pointed out to you."

T. MEEHAN."

These seedlings as they acquire age will probably be much more like the willow oak than at present, young trees often having foliage different from mature trees, as before stated.

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### March 4th.

The President, Mr. LEA, in the Chair.

Twenty-eight members present.

The following papers were presented for publication:

Synopsis of the Cirrhitoids; On the limits and arrangement of the Scomberoids; Descriptions of new species of Alepidosauridæ; and on a new species of *Priacanthus*. By Theodore Gill.

On a tropical Isopod found near the shores of Massachusetts, by Wm. Stimpson.

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Mr. Norris remarked that Dr. Hayes' Arctic collection contained a specimen of the common brook trout, (*Salmo fontinalis*,) taken near Godhaven, Greenland; and specimens of the salmon trout, (*Salmo trutta*,) common to the coasts of Scotland and new Brunswick, and the Gulf of St. Lawrence.

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March 11th.

The President, Mr. LEA, in the Chair.

Thirty-two members present.

Mr. Warner made some remarks on the imitation of the section of eggs by mathematical lines.

Dr. Corse exhibited, under the microscope, specimens of *Nitella*, showing the circulation within the nucule.

Dr. Carson exhibited specimens of metallic copper, deposited by voltaic action in the felt of the sunken frigates at Sevastopol.

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March 18th.

The President, Mr. LEA, in the Chair.

Twenty-nine members present.

The following papers were presented for publication:

On the West African genus *Hemichromis*, etc., by Theo. Gill.

Catalogue of the Fishes of Lower California, etc., by Theo. Gill.

On some new and little known American *Anura*, by E. D. Cope.

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March 25th.

The President, Mr. LEA, in the Chair.

Twenty-nine members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings:

#### Synopsis of the Family of CIRRHITOIDS.

BY THEODORE GILL.

Family CIRRHITOIDÆ Gray.

*Synonymy.*

Percoidei pt. } *Cuvier, Müller, &c.*

Sciænoidei pt. }

Cirrhitoidei *Gray*, Synopsis of the contents of the British Museum.

" *Richardson.*

Theraponidæ pt. } *Richardson.*

Polynemidæ pt. }

Cirrhitoidei *Bleeker*, Acta Societatis Scientiarum Indo-Nederlandicæ, vol. ii.,  
Vischsoorten von Amboina.

Cirrhitoidei *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii.,  
p. 70.

Sparidæ (Haplodactylina) *Günther*, op. cit., vol. i., p. 434.

The body is oblong and compressed, with the dorsal and abdominal outlines

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unequally arched. Scales cycloid and of moderate or rather large size. Lateral line simple, concurrent with the back. Head compressed, and of moderate or rather small size. Forehead nearly flat, or little convex transversely. Eyes submedian. Nostrils double, moderately approximated to each other. Suborbital bones not crossing the cheek nor articulated with the preoperculum. Preorbital bone moderate, or rather large. Preopercular, opercular, subopercular and interopercular bones normally developed. Mouth moderate, cleft on the sides. Intermaxillary bones with the ascending processes variable in development. Maxillary bones expanded towards their ends and behind the intermaxillaries at the ends. Teeth variable in form and position. Branchiostegal membrane generally extended more or less behind under the throat, and free. Branchiostegal rays normally six, rarely five and exceptionally three. Dorsal fin extending along the entire back, and with the spinous portion nearly as much or more developed than the soft. Anal fin commencing nearly under the first soft dorsal rays, and short or little oblong; spinous ray three. Caudal fin entire, or emarginated. Pectoral fins normally inserted on the sides, with the inferior rays well developed, simply articulated and not branched. Ventral fins inserted considerably behind the pectorals and with one spine and five branched rays.

The vertebral column is composed (in *Cirrhitinae*) of the normal or nearly normal number of vertebrae ( $\frac{10}{16}$ ) or a moderately increased number (in *Latri-dinae*,  $\frac{14}{20}$ ; in *Haplodactylinae*, said by Richardson to be  $\frac{16}{18}$  in *Dactylosargus arctidens*.) The stomach is caecal, and a few (4 to 5) pyloric appendages are present. The air bladder is sometimes absent (most *Cirrhitinae* and *Chironematinae*); or present and simple (most *Haplodactylinae*); or lobed or fringed (most *Latri-dinae*.)

This family is a very distinct and perhaps a natural one, although its several groups or subfamilies offer rather peculiar characters and decided variations. The chief characters by which those various groups are united, are the position of the *ventral fins very considerably behind the bases of the pectoral*, and the *simple, thickened and produced rays of the pectoral fins*; the branchiostegal membrane is also generally more ample beneath than in those forms which most resemble the Cirrhitoids in external appearance. In the artificial arrangement of Cuvier and his disciples, in which the fishes with the typical or percoid form were arranged according to the presence or absence of palatal teeth and of opercular armature, the members of the present family were partly referred to the Percoids and partly to the Sciaenoids, with which they have very little affinity. Dr. Gray appears to have been the first to propose the family which Sir John Richardson was afterwards inclined to adopt, although in his essay on "Ichthyology," in the *Encyclopædia Britannica*, he has referred *Cirrhitides*, *Aplodactylus* and *Chironemus* as the first of the genera, to his family of Theraponidæ, which family certainly is, as he admits, "a rather heterogeneous assemblage of Percoids, brought together by the single character of six branchiostegals." The other genera, *Cheilodactylus* and *Latris*, are placed by him after *Polynemus*, and constitute with it his family of Polynemidæ.

Dr. Bleeker has adopted the family of "Cirrhitoides," and divided it into three subfamilies,—Cirrhitiformes, Haplodactyliformes and Cheilodactyliformes. *Chironemus* has been once placed in the first subfamily, and again, as *Threpterus* of Richardson, in the third, Bleeker not having perceived their affinity to each other.

Dr. Günther has a family of "Cirrhitidæ," which is naturally constituted, but he has placed the *Haplodactylus* in a peculiar "group" or subfamily among the Sparidæ, to which it has apparently little true affinity.

The Cirrhitoids, so far as known, are peculiar to the torrid and temperate portions of the Pacific Ocean and its indentations. The *Cirrhitinae* are principally 1862.]

pally tropical, and chiefly developed in the Indian seas and those of the great archipelago, from which some wander to the Pacific, Chinese and African seas, and one (*Cirrhitus maculatus*) ranges to the Red Sea, where, indeed, it appears to be most common. Another (*Cirrhitus rivulatus* Val.) is found at both the Gallapagos Islands and Lower California, it having been observed at the latter place by Mr. Xantus.\* The *Chironematinæ* are peculiar to the Australian seas. The *Haplodactylinæ* and *Latridinæ* are principally inhabitants of the Southern temperate seas, and most numerous in the Chilian and Peruvian and the Australasian seas. Several are also found at the Cape of Good Hope, while several others are northern and inhabitants of the Chinese and Japanese waters.

The following synopsis will enable one to readily distinguish the different subfamilies:

*Synopsis.*

- I. Spinous portion of the dorsal longest, but with only 10 (9) spines. Vertebrae  $\frac{10}{16}$ .....Cirrhitinæ.
- II. Spinous portion of the dorsal more or less subequal to the soft, with 14—22 spines.
  - A. Teeth of jaws compressed and tricuspidate or lanceolate. Vertebrae  $\frac{10+x}{14+y}$ .....Haplodactylinæ.
  - AA. Teeth small, conic and acute.
    - B. Ventral fins (generally) rounded; caudal subtruncate; dorsal deeply notched behind each spine.....Chironematinæ.
    - BB. Ventral fins angulated; caudal with extended lobes; dorsal not notched behind each separate spine. Vertebrae  $\frac{14}{20}$ .....Latridinæ.

I have not been enabled to examine many of the species of the family, but I trust that the suggestions and views enunciated in this treatise will forward the classification and knowledge of the group, and prove useful to naturalists if it should only direct attention to the imperfect knowledge we have of some forms. Several of the species have been so described that it has not been possible to positively refer them to any group. The whole family, indeed, requires a careful revision, and the present classification will be doubtless considerably modified.

Subfamily CIRRHITINÆ Gill.

*Cirrhitæformes* pp., Bleeker.

Teeth conical and mostly small, but often with larger or canine ones intermixed. Dorsal fin with its spinous portion longer than the soft, and with ten spines, the last of which truly belongs to the second portion. Ventral fins generally angulated or subangulated, the second (branched) ray being rarely somewhat longest. Caudal fin truncated or emarginated. The vertebral column, in all the species examined, has been found to be constituted of ten abdominal and sixteen caudal vertebrae.

The Cirrhitinæ as defined above form a natural group, and differ from the *Cirrhitæformes* of Bleeker by the exclusion of *Chironemus*, which appears to represent a distinct subfamily.

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\*Another species not yet described is found at Cape St. Lucas. It had been unfortunately overlooked until after the transmission of the above paper; it will be described in the catalogue of the Fishes of Lower California.

*Synopsis.*

Spinous portion of dorsal longest, but with only 9 or 10 rays.

Vertebrae about  $\frac{10}{16}$ ..... CIRRHITINÆ.

*a.* Head abbreviated, with the jaws not produced.

Head decurved from the nape; operculum unarmed.

Origin of dorsal nearly over preopercular margin.

Canine teeth obsolescent..... Amblycirrhitus.

Origin of dorsal generally above carpus; canine teeth in both jaws..... Cirrhitus.

Head very obliquely incurved to the pointed snout. Operculum with two small spines..... Cirrhitichthys.

Preorbital not higher than the eye's diameter. .... Cirrhitichthys.

Preorbital considerably higher than an eye's diameter..... Cirrhitopsis.

*β.* Head oblong and incurved to the snout; intermaxillary produced, and with the posterior processes toothed.. Oxycirrhites.

## AMBLYCIRRHITUS Gill.

*Synonymy.*

*Cirrhitus* sp. *Cuv. et Val.*

Rostrum convexum. Dentes canini obsolescentes. *Pinna dorsalis fere supra preoperculi marginem incipiens.*

Body oblong-cuneiform, highest before the ventral fins, before which it is rapidly curved upwards. Scales large. Head short and elevated, higher than long. Occipito-nasal outline very oblique and nearly straight; snout slightly convex. Nape gibbous. Preoperculum finely serrated behind. Mouth little oblique and of moderate size, chiefly under the eyes. Teeth pluriserial, with the canine obsolete or rudimentary. Branchiostegal rays 6, 6. Dorsal fin commencing at the nape above the preoperculum; its spinous portion is convex, much lower behind than the articulated, and the membrane is very profoundly notched and produced into a slender lobe behind each spine. Anal fin with three spines, the second of which is largest, and with six branched rays. Caudal fin entire, with its angles acute. Pectoral fins with its undivided rays slightly produced.

*Type.* Amblycirrhitus fasciatus Gill.

The *Cirrhitus fasciatus* of the "Histoire Naturelle des Poissons" differs from the typical *Cirrhitus* by the form of the body, the region of greatest height being before the ventral fins and not above it, as in the latter; by the resultant more anterior commencement of the dorsal fin, and the deeply-notched and lobigerous membrane behind the spines of that fin, and by the absence of larger canine teeth.

Only one species of the genus is known.

AMBLYCIRRHITUS FASCIATUS, Gill.

*Cirrhitus fasciatus* *Cuv. et Val.*, Histoire Naturelle des Poissons, tom. iii. p. 76, pl. 47.

*Habitat.* East Indian seas, (Pondicherry.)

## CIRRHITUS (Commerson) Lac.

*Synonymy.*

*Cirrhitus* (*Comm.*) *Lacépède*, Histoire Naturelle des Poissons, tom. v., p. 2, 1803.

Rostrum convexum. Dentes canini antici in maxilla superiore 2. *Pinna dorsalis supra pinnae pectoralis basin incipiens.*

Body oblong-oval, highest before or above the ventral fins, covered with  
1862.]

rather large scales. Head moderate, and generally longer than high. Occipito-nasal profile obliquely and moderately decurved. Nape convex. Eyes moderate, above the rostrum-opercular line and submedian. Preoperculum more or less serrated behind, rarely entire. Anterior nostrils generally with short fimbriated tubes. Mouth oblique and of moderate size; the supramaxillary bones generally end under the eyes. Teeth pluriserial, margined by an external row of larger ones; canine teeth generally present on each jaw, in the upper in front, and in the lower on the sides. Front of vomer furnished with a row of small teeth. Branchiostegal rays six on each side. Dorsal fin furnished with ten spines and ten to twelve (rarely fourteen) rays, the former of which form nearly two-thirds of its length; the spinous portion is convex at the middle and behind much lower than the soft portion; the membrane is moderately notched behind each spine. Anal fin with three strong spines, the second of which is largest, and six branched rays. Caudal fin generally entire and abruptly truncated. Pectoral fins with the simply articulated rays moderately produced.

*Type.* *Cirrhitus maculatus* Lacépède.

The species retained in the genus *Cirrhitus* as now limited, appear to have the same physiognomy and to bear a strong resemblance to each other; but the *Cirrhitus maculatus*, which was the only species of the genus known to its founder, has a small patch of teeth on the anterior portion of each palatine bone, while in all the others the teeth are confined to the front of the vomer. For this reason Drs. Bleeker and Günther have referred that species, although the type of *Cirrhitus*, to the genus *Cirrhitichthys*, established by the former naturalist for fishes differing from *Cirrhitus* by the presence of palatine teeth. As the *Cirrhitine* with unarmed palatine bones do not appear to differ in any other respect from the *Cirrhitus maculatus*, and as the dentigerous palatine area is very small, we retain the species having the same specialized resemblance in the genus.

*Cirrhitichthys* is apparently an excellent genus, and is consequently retained, but with quite different limits and on other grounds than those for which it has been distinguished by Bleeker and Günther. As before mentioned, it was separated by them from *Cirrhitus* on account of the presence of palatine teeth. The most essential character appears to us to be the form of the head.

Nine species of the genus are now known.

Palatine bones with teeth anteriorly.....*C. marmoratus*.  
Palatine bones unarmed.

Preoperculum denticulated.

Dorsal IX. I. 10, 11.

Body not transversely banded. 7 simple pectoral rays.

Pectoral thickened, not extending beyond the anus.

Scales of the lateral line 40.....*C. alternatus*.\*

Scales of lateral line 48—50.

Head simply dotted with black.....*C. Fosteri*.

Head with a margined area behind the eyes.

Area marked by a whitish semicircular line, edged with brownish; sides above lateral line with a longitudinal whitish band..*C. arcatus*.

Area brown, bounded by yellow; sides with many (16) longitudinal lines.....*C. amblycephalus*.

*C. alternatus* has five indistinct, oblique, purple bands, the first of which alternate below the lateral line with their lower halves, while the last is continuous. But, as it has seven simple pectoral rays, and is closely allied to *C. marmoratus* and *C. Fosteri*, it is placed between them.

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Pectoral thickened ray extending to the  
 origin of the anal; scales of lateral  
 line 42.....C. punctatus.  
 Body (red) with 6 vertical blackish bands; 6  
 simple pectoral rays.....C. aprinus.  
 Dorsal IX. I. 13. Scales 49.....C. fasciatus.  
 Preoperculum entire.....C. rivulatus.

1. *CIRRHITUS MARMORATUS* Gill.  
*Labrus marmoratus* Lac., Hist. Nat. des Poissons, tome iii., p. 492, pl. 5,  
 fig. 3.  
*Cirrhitus maculatus* Lac., op. cit., tome v., p. 3.  
*Cirrhitus maculosus* Bennett, Zoological Journal, 1829, pl. 38.  
*Cirrhitichthys maculatus* Bleeker.  
*Habitat.* Red Sea, Southern Asia, Indian Archipelago, Isle of France and  
 Polynesia.
2. *CIRRHITUS ALTERNATUS* Gill.  
*Habitat.* Sandwich Islands.
3. *CIRRHITUS FORSTERI* Günther.  
*Perca tæniata* Forster.  
*Grammistes Forsteri* Bloch, Systema Ichthyologiae, Schneid. ed., p. 191.  
*Sparus pantherinus* Lac., Hist. Nat. des Poissons, tome iv., p. 100.  
*Cirrhitus pantherinus* Cuv. et Val., tome iii., p. 70.  
*Serranus Tankervilleæ* Bennett, Fishes of Ceylon, pl. 27.  
*Cirrhitus Forsteri* Günther, Catalogue of the Acanthopterygian Fishes, &c.,  
 p. 71.  
*Habitat.* Cape seas, Eastern Africa, Southern Asia and Indian Archipelago.
4. *CIRRHITUS ARCATUS* Cuv. et Val.  
*Cirrhitus arcatus* Cuv. et Val., tome iii., p. 74.  
*Cirrhitus vittatus* Val. in Cuv. Regne Animal, ed. ill. Poissons, pl. 39.  
*Habitat.* Mauritius, Southern Asia, Indian Archipelago, and Sandwich  
 Islands.
5. *CIRRHITUS AMBLYCEPHALUS* Bleeker.  
*Cirrhitus amblycephalus* Bleeker, Natuurkundig Tijdschrift voor Neder-  
 landsch Indie, vol. xii., p. 378.  
*Habitat.* Sangi.
6. *CIRRHITUS PUNCTATUS* Cuv. et Val.  
*Cirrhitus punctatus* Cuv. et Val., tome iii., p. 70.  
*Habitat.* Indian Ocean.
7. *CIRRHITUS APRINUS* Cuv. et Val.  
*Cirrhitus aprinus* Cuv. et Val., tome iii., p. 76.  
*Habitat.* Sea of Timor.
8. *CIRRHITUS FASCIATUS* Bennett.  
*Cirrhitus fasciatus* Bennett, Zoological Journal, 1829, p. 39.  
*Cirrhitus cinctus* Günther, Catalogue of the Acanthopterygian Fishes, vol.  
 ii., p. 73.  
 Not *Cirrhitus fasciatus* Cuv. et Val. (= *Amblycirrhitus fasciatus* Gill.)  
*Habitat.* Madagascar, Isle of France and Sandwich Islands.
9. *CIRRHITUS RIVULATUS* Val.  
*Cirrhitus rivulatus* Val., Voyage de la Vénus, Poissons, p. 309, pl. 3, fig. 1.  
*Habitat.* Galapagos Islands and Lower California.

## CIRRHITICHTHYS Bleeker.

*Synonymy.*

*Cirrhichthys* Bleeker, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, vol. x., (Index,) p. 474, 1856.

*Cirrhites* sp. *Temminck et Schlegel, Bleeker.*

*Rostrum acutum.* Dentes canini in maxilla superiori nulli; dentes palatini.

Body oblong-ovate, highest above the ventral fins, and covered with rather large scales. Head moderate, and nearly equally long and high. Nape and crown convex. Occipito-nasal outline obliquely concave and incurved towards the pointed snout; pectori-nasal outline curved upwards. Crown and forehead scaly; suborbital bones naked. Preoperculum finely serrated behind. Suborbital bone entire, or dentated posteriorly. Operculum armed with two minute spines. Nasal cirrhi fringed. Mouth oblique and rather small; supramaxillary bones ending under or nearly under the anterior borders of the orbits. Teeth pluriserial, larger in the external row; in the lower jaw on each side are larger canine teeth. Front of vomer and palatine bones armed with a band of villiform teeth. Branchiostegal rays 6—6. Dorsal fin with its spinous part convex, and the last ray generally longer than the penultimate. The interspinal membrane is simply notched, or produced in penicilligerous lobes behind each spine. The first articulated ray is more or less elongated. Anal fin with three spines, the second of which is very stout, and six or seven branched rays. Caudal fin subtruncated.

*Type.* *Cirrhichthys graphidopterus* Bleeker.

Under the name of *Cirrhichthys*, Dr. Bleeker has collected together several fishes which appear to have a considerable mutual resemblance, and to decidedly differ from *Cirrhites*, to which genus most of them had been previously referred. Four species have been placed in the genus which appear to concur in having the same physiognomy, but are distinguished from each other by some very decided characteristics. Three have a nearly similar size and position of the eye, which is separated about a diameter, or even less, from the end of the snout. A fourth has smaller eyes, much more distant from the snout. Of the first three, one has a distinctly serrated preorbital, while in the other two it is entire; the latter again are distinguished by the condition of the interspinal portion of the dorsal fin.

The following analytical synopsis will more readily show the relative differences:

Snout shorter than the eye; suborbital bone scaleless.

Preorbital serrated behind..... *C. graphidopterus.*

Preorbital entire behind.

Interspinal membrane penicilligerous..... *C. oxyrhynchus.*

Interspinal membrane not penicilligerous..... *C. oxycephalus.*

Snout longer than the eye; suborbital bone scaly..... *C. aureus.*

In the preceding table the categories have been arranged in the order which appears to best express their value. The most distinct groups or natural sections seem to be those characterized by the size of the eyes and their position. Many naturalists, confiding in characters which may be of very little real value, although at the same time trenchant and well defined, would regard the dentated or entire posterior margin of the preorbital bones as a character of greater value; and some would doubtless even consider it as entitled to generic rank. But, after a careful comparison of the descriptions of the various species that have hitherto been made known, we cannot discover that there is any other essential character by which *Cirrhichthys graphidopterus* is distinguished from *C. oxyrhynchus* and *C. oxycephalus*. There appearing, then, to be no differences coincident with the condition of the preorbital margin, and the physi-

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ognomy being apparently similar, one cannot be disposed to regard such a character in this case as generic.

The *Cirrhitus aureus* of Temminck and Schlegel is probably the type of a distinct genus. We have provisionally proposed for it the designation of *Cirrhitopsis*, but having seen none of the species of Bleeker's *Cirrhitichthys*, hesitate to rank it as a genus.

The *Cirrhitus maculatus* of Lacépède has been referred to *Cirrhitichthys* by Dr. Günther, as well as Dr. Bleeker, on account of the presence of "a very small patch of teeth anteriorly on each palatine bone." In other respects, that species perfectly agrees with most of the species retained under the name of *Cirrhitus* by those gentlemen. Its physiognomy is entirely similar to theirs, and quite different from that of a typical *Cirrhitichthys*. We therefore retain that species in the genus *Cirrhitus*, not regarding the extension of a few of the teeth on the palatine bones as entitling it to generic distinction, and certainly not to be grouped with *Cirrhitichthys*. The name *Cirrhitichthys* could in no case be accepted for the *Cirrhitus maculatus*, as it is the type and only species placed by Commerson and Lacépède in their genus; it must therefore always retain that name, and if isolated from others, they must receive a new generic appellation, and not it.

#### Subgenus CIRRHITICHTHYS.

##### 1. CIRRHITICHTHYS GRAPHIDOPTERUS Bleeker.

*Cirrhitichthys graphidopterus* Bleeker, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, 1853, p. 106.

*Habitat.* Amboyna.

##### 2. CIRRHITICHTHYS OXYRHYNCHUS Bleeker.

*Cirrhitichthys oxyrhynchus* Bleeker, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, deel xv., 1858, p. 205.

*Habita.* Goram.

##### 3. CIRRHITICHTHYS OXYCEPHALUS Bleeker.

*Cirrhitichthys oxycephalus* Bleeker, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, deel viii., 1855, p. 408.

*Habitat.* Amboyna.

#### Subgenus CIRRHITOPSIS.

##### 4. CIRRHITOPSIS AUREUS Gill.

*Cirrhites aureus* Temm. et Schlegel, *Fauna Japonica, Pisces*, p. 15, pl. 7. fig. 2. *Cirrhitichthys aureus* Bleeker.

*Habitat.* Japan and China.

#### OXYCIRRHITES Bleeker.

##### *Synonymy.*

*Oxycirrhites* Bleeker, *Achtste Bijdrage tot de kennis der Vischfauna von Amboina*, p. 39; in *Acta Societatis Indo-Nederlandicæ*, vol. ii., 1856—7.

*Rostrum acutissimum, productum. Dentes canini nulli.*

Body elongated, compressed and about five times as long as high. Scales large. Head very acute, nearly twice as long as high, with the nape convex; concave between the occiput and snout. Cheeks and opercular bones scaly. Preoperculum dentated, and with its angle obtusely rounded. Operculum armed with a flat spine. Anterior nostrils each furnished with a divided cirrhus. Mouth almost prolonged into a tube. Jaws equal; the upper produced more than an eye's diameter beyond the snout, dentated on their ascending and descending branches. Teeth pluriserial on each jaw, preceded by a row of larger ones, but no canines. Front of the vomer with a semilunar band of small ones; palatine none. Branchiostegal rays 6—6. Dorsal fin with ten spines, the third, fourth and fifth of which are longest, and the first and penultimate shortest; 1862.]

soft portion acute and elevated in front, low and rounded behind. Anal fin with three spines, the second of which is elongated; soft portion rounded before and behind, and with seven or eight rays. Caudal fin emarginated and with pointed lobes. Pectoral fins irregularly rhomboidal, and with none of its entire rays produced.

*Type.* *Oxycirrhites typus* Bleeker.

This genus is almost peculiar among fishes by the extension of the intermaxillary bones and the armature of their ascending branches. It also differs from *Cirrhitichthys* and *Cirrhites* by the more elongated body and head, and the form of the caudal.

A single species is known.

**OXYCIRRHITES TYPUS** Bleeker.

*Oxycirrhites typus* Bleeker, Achtste Bijdrage tot de kennis der Vischfauna von Amboine, p. 40, in Acta Societatis Indo-Nederlandicæ, vol. ii.

*Habitat.* Amboyna and Isle de France.

#### Subfamily HAPLODACTYLINÆ Günther.

*Haplodactyliformes* Bleeker.

*Haplodactylina* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii., p. 434.

Teeth compressed, trenchant and lanceolate, or tricuspidate. Dorsal fin nearly equally divided into spinous and soft; the former with fourteen to seventeen spines. Ventral fins generally with the second branched ray longest. Caudal fin truncated or emarginated.

The vertebral column is composed of an increased number of vertebrae, Richardson having found sixteen abdominal and eighteen caudal ones in the *Dactylosargus arctidens*. Günther, however, adopts the correctness of that number.

This subfamily is distinguished principally by the dentition; the physiognomy of its representatives is also rather peculiar. The group is divisible among three genera, which may be thus distinguished.

Teeth of jaws compressed, tricuspidate or lanceolate.

Vertebrae  $\frac{10+x}{14+y}$  ..... HAPLODACTYLINÆ.

Vomerine teeth present.

Teeth in both jaws tricuspid ..... Haplodactylus.

Teeth in both jaws sublanceolate, or with lateral

lobes small ..... Dactylosargus.

Vomerine teeth obsolete. Teeth tricuspid in jaws... Crinodus.

#### HAPLODACTYLUS Cuv. et Val.

*Synonymy.*

*Aplodactylus* Cuv. et Val. Histoire Naturelle des Poissons, vol. viii., p. 476, 1831.

*Aplodactylus* Guichenot.

*Haplodactylus* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii., p. 434.

*Dentes tricuspidati et velutinae in maxillis ambobis; in maxilla superiori tricuspidati, triseriati; inferiori biseriati. Dentes vomerini velutini.*

Body oblong, highest above or behind the ventral fins, covered with small scales. Head scarcely longer than high, with the profile behind the eyes obliquely straight or little concave, before eyes very oblique and high. Eyes high and mostly anterior. Preorbital bones higher than long. Preoperculum with an entire membranous border.

Mouth small, transverse and terminal. Teeth villiform or cardiform in each

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jaw, preceded in the upper by three rows of tricuspidate teeth, and in the lower by two rows. The tricuspidate teeth have the cusps rounded, and the median longest. Front of vomer with villiform teeth. Anterior dorsal fin convex, declining in a straight line behind and with fifteen or sixteen spines, the last of which are very short. Anal fin with three spines, the first two of which are very short, and with seven or eight branched rays, which very rapidly diminish in size.

*Type.* *Haplodactylus punctatus* Cuv. et Val.

The genus *Haplodactylus*, as here defined, has the same limits given to it by Cuvier and Valenciennes and by Guichenot. Two species that have since been referred to it by Sir John Richardson and Dr. Günther, have been abstracted from it, and are considered to be the types of as many distinct genera. The diagnosis given by Dr. Günther to *Haplodactylus* is indeed equivalent to ours, but his *Haplodactylus arctidens* and *H. lophodon* do not correspond to his definition. The correctness of the elimination of these two species is confirmed by their geographical distribution. The typical *Haplodactyli* are, as far as known, peculiar to the temperate salt waters of western South America. The other two species are inhabitants of the Australian seas.

Four forms have been described as distinct, but the specific differences of all of them have not yet been fully demonstrated. Dr. Günther has united the *Haplodactylus punctatus* and *H. reginæ*, but, if the figure of the latter is correct, it is apparently a very good species. The species appear to be distinguished by the following characters; but it will be necessary to confirm them, and they must be accepted with reserve:

Secondary color or markings dark.

1. Body brownish gray, covered with irregular, brown vermiculated markings; fins thickly spotted. A. III. 8. *H. vermiculatus*.
  2. Body brownish red above, irregularly dotted with black. A. III. 8; first three dorsal spines short and graduated, much shorter than the fourth?.....*H. reginæ*.
  3. Body brownish above, dotted all over with blackish. A. III. 7; first four dorsal spines regularly graduated to the fifth.....*H. punctatus*.
- Spots or dots whitish, on a yellowish ground. A. III. 7.....*H. guttatus*.

1. *HAPLODACTYLUS PUNCTATUS* Cuv. et Val., Günther.

*Aplodactylus punctatus* Cuv. et Val., Hist. Nat. des Poissons, tome viii., p. 477, pl. 242.

*Habitat.* Chili.

2. *HAPLODACTYLUS REGINÆ* Val.

*Aplodactylus reginæ* (Val.) Gray, Historia Fisica y política de Chile, *Zoologia*, tomo ii., p. 158, lam. 1, fig. 2.

*Haplodactylus punctatus* p. Günther, Catalogue of the Acanthopterygian Fishes, vol. ii., p. 434.

*Habitat.* Chili.

3. *HAPLODACTYLUS VERMICULATUS* Gay, Günther.

*Aplodactylus vermiculatus* Gay, Op. cit. tomo ii., p. 159, lam. 1, fig. 1.

*Habitat.* Chili (Valparaíso.)

4. *HAPLODACTYLUS GUTTATUS* Gay, Günther.

*Aplodactylus guttatus* Gay, Op. cit., tomo ii., p. 160.

*Habitat.* Chili.

#### DACTYLOSARGUS Gill.

##### *Synonymy.*

*Aplodactylus* sp. Richardson.

*Haplodactylus* sp. Günther.

1862.]

*Dentes omnes in maxillis tricuspidati, vel lanceolati, lobis externis parvis, in seriebus externis majores. Dentes vomerini velutini.*

Body oblong, highest above or behind the ventral fins, covered with small scales. Head scarcely longer than high, with the profile behind the eyes obliquely straight, or little concave, and in front very oblique. Preorbital bones as high or higher than long. Eyes elevated and mostly anterior. Preoperculum with an entire membranous border. Mouth small, transverse and terminal. Teeth in the old, narrow, thin and little cuspidate, arranged in a band on each jaw; the teeth of outer rows are largest. Front of vomer with a small patch of villiform teeth slightly extending on the palatine bones. Branchiostegal rays six on each side. Dorsal fin convex and with sixteen spines, the last of which are small. Anal fin with three spines and eight branched rays.

This genus is nearly allied to the genuine *Haplodactyli*, but is distinguished by the trilobation of all the teeth, and not only the large ones of the external rows as in *Haplodactylus*. One species has been well described, and perhaps another indicated.

DACTYLOSARGUS ARCTIDENS Gill.

*Aplodactylus arctidens* Richardson, Proc. Zoological Society of London, 1839, p. 96.

*Habitat.* Port Arthur.

The following species is referred to the genus *Dactylosargus* with doubt, being only known through the description of Parkinson :

DACTYLOSARGUS MEANDRATUS Gill.

*Sciæna meandrata* Parkinson MSS.

*Aplodactylus meandratus* Richardson, Transactions of the Zoological Society, vol. iii., p. 83.

*Habitat.* New Zealand.

CRINODUS Gill.

*Synonymy.*

*Haplodactylus* sp. *Günther*.

*Dentes tricuspidati in maxilla superiori pluriseriati, uniseriati in inferiori. Vomer inermis.*

Body oblong, highest above or behind the ventral fins, covered with rather small scales. Head little longer than high, with the forehead flattened, and the snout obtusely rounded and projecting. Eyes elevated and mostly anterior. Preoperculum entire and with a membranous margin. Mouth narrow, horizontal, and situated beneath the snout. Teeth elongated and tricuspidate, with the terminal lobe largest, arranged in a band on the upper jaw, and uniserial on the lower : palate unarmed. Branchiostegal rays five on each side. Dorsal fin with its spinous portion convex, and with about seventeen spines, the last of which are short. Anal with three graduated spines and six branched rays.

*Crinodus* appears to be decidedly different from either *Haplodactylus* or *Arctidens*, the snout being more protuberant, the teeth of the lower jaw confined to one row, and only five branchiostegal rays being present on each side.

This also is represented by a single known species.

CRINODUS LOPHODON Gill.

*Haplodactylus lophodon* *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii., p. 435.

*Habitat.* Coast of New South Wales.

Subfamily CHIRONENEMATINÆ Gill.

Teeth acutely conical and small. Dorsal fin with its spinous portion generally more or less longer than the soft, and with thirteen to fifteen spines, the

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membrane behind each of which is deeply and acutely notched. Ventral generally obtuse or rounded. Caudal fin truncated or subtruncated.

*Chironemus* appears to be entitled to take rank as the type of a distinct group of Cirrhitoids, its physiognomy being quite different from that of any other division; the characters above given are sufficient to distinguish it, and they will doubtless be found to be accompanied by others of more importance when the family shall have been fully investigated.

#### CHIRONEMUS Cuv. et Val.

##### *Synonymy.*

*Chironemus Cuv. et Val.*, Histoire Naturelle des Poissons, vol. iii., p. 78.

*Threpterus Richardson*, Proc. Zoological Society of London, 1850, p. 68; *ib.* in Annals and Magazine of Natural History, vol. vii., p. 284, 1851.

*Chironemus Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii., p. 76.

Body oblong, highest above or before the ventral fins. Scales rather large. Head moderate, subconical and longer than high. Occipito-nasal profile nearly straight; snout scarcely convex. Crown, forehead and cheeks naked. Operculum, suboperculum and interoperculum scaly. Preoperculum entire, nearly vertical or slightly oblique behind and rounded at its angle; operculum with two spines. Eyes anterior. Suborbital bones narrow. Anterior nostrils with a membranous appendage. Mouth oblique, moderate. Supramaxillary bones ending near the vertical of the anterior borders of the orbits. Teeth generally villiform, in a band on each jaw and on the front of the vomer. Branchiostegal rays 6, 6. Dorsal fin commencing above or little before the bases of the pectorals, with its spinous portion longer than the soft, convex and with fourteen or fifteen spines, the penultimate of which is lower than the soft portion; its membrane is deeply notched behind each spine. Anal fin short, with three spines and six or seven branched rays. Caudal fin entire or convex. Pectoral fins with its inferior simple rays produced, and the intervening membrane deeply notched.

*Type.* *Chironemus georgianus Cuv. et Val.*

With Dr. Günther, we have, for the present, retained the *Threpterus maculosus* of Sir John Richardson and the *Chironemus marmoratus* of the former gentleman in this genus to which both have been referred. It is quite probable, however, that the genus may be hereafter found not to be homogenous, and that *Threpterus* may be re-established, but with quite different characters from those assigned to it by its founder, who named it from a misconception of its true relations, and did not perceive its affinity to the Cuvierian *Chironemi*.

The principal distinctive characters of the three species combined under this generic designation are as follows:

Second simple pectoral ray produced to the anal; soft dorsal half as long as spinous.....	<i>C. georgianus</i> .
None of the pectoral rays much produced beyond others.	
Teeth of jaws nearly uniserial; soft dorsal two thirds as long as spinous.....	<i>C. maculosus</i> .
Teeth of jaws villiform, in a broad band; soft dorsal rather shorter than spinous.....	<i>C. marmoratus</i> .

Not having been able to examine any of the species of the genus, we are not prepared to state what may be the value of those characters, or whether they are entitled to be regarded as more than specific. The type of the genus is very imperfectly known, having been only described by Cuvier and Valenciennes from a much injured specimen.

The three species are confined to the Australian seas.

1. *CHIRONEMUS GEORGIANUS*, Cuv. et Val.  
*Chironemus georgianus* Cuv. et Val. Hist. Nat. de Poissons, tome iii., p. 78.  
*Habitat.* King George's Sound.
2. *CHIRONEMUS MACULOSUS*, Günther.  
*Threpterus maculosus* Richardson, Proc. Zoological Society, 1850, p. 70.  
 pl. 2, figs. 1, 2,  
*Habitat.* King George's Sound.
3. *CHIRONEMUS MARMORATUS*, Günther.  
*Chironemus marmoratus* Günther, Catalogue of Acanthopterygian Fishes,  
 vol. ii., p. 76.  
*Habitat.* Western coast of Australia.

#### Subfamily LATRIDINÆ Gill.

Teeth acutely conical and generally small. Dorsal fin with its spinous and soft portions subequal or one not much longer than the other; the spinous portion has from fifteen to twenty-three spines, behind which the membrane is notched. Ventral fins generally acutely angulated, the first branched ray being the longest. Caudal fin with the angles more or less obliquely produced and acute or rounded. The vertebral column is composed of a moderately increased number of vertebræ, all those examined having fourteen abdominal and twenty caudal.

This subfamily appears to be a very natural one, all the species having the same general physiognomy, and equally differing from the representatives of the other groups of Cirrhitoids. The genera are rather numerous; their principal distinctive characters are given in the following synopsis. Several species have been retained provisionally in genera to which they apparently do not belong,—the descriptions alone of their several describers not being sufficiently characteristic to enable one to positively allocate them.

Ventral fins angulated, the first branched ray being longest;

caudal with its lobes produced; dorsal not acutely

notched behind each spine. .... LATRIDINÆ.

I. Branchiostegal rays 5 or 6. .... LATRIDES.

A. Anal fin nearly coterminous with dorsal, and with  
 more than 30 rays.

Vomerine teeth ..... Latris.

Vomerine teeth obsolete. .... Latridopsis.

AA. Anal fin with 30 branched rays or less.

B. Teeth only in the upper jaw. .... Mendosoma.

BB. Teeth in both jaws.

C. Spinous dorsal convex or arched.

D. Branchiostegal rays VI.

1. Head high and much decurved. Anal  
 oblong and nearly uniformly high. .... Dactylopagrus.

2. Head conic. Anal oblong. Dorsal  
 and anal spines robust. .... Acantholatriss.

3. Head conic. Anal short, produced  
 at its anterior angle, and when ex-  
 panded with the rayed margin ver-  
 tically truncated or emarginated. .... Chirodactylus.

DD. Branchiostegal rays V. Scales small  
 (L. l. 75.). .... Chilodactylus.

CC. Spinous dorsal elevated in front, preceded  
 by three graduated spines and obliquely  
 incurved behind. .... Goniistius.

II. Branchiostegal rays III. .... NEMATODACTYLI.  
 Teeth of jaws uniserial. .... Nematodactylus.

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## LATRIDOPSIS Gill.

*Synonymy.**Latris Richardson.**Cheilodactylus* sp. *Richardson.**Pinna analis* dorsali coterminalis, radii 30 plusve. *Palatum* edentulum.

Body subfusiform, highest above the ventral fins; caudal peduncle slender. Scales of moderate size. Head compressed, short and conical in profile, with the occipito-nasal outline straight. Eyes moderate, above the rostro-opercular line, submedian and remote from the snout. Scales on the head above and laterally. Preoperculum vertical behind. Mouth small. Teeth only the jaws, where they are small and pluriserial in front. Branchiostegal rays 6—6. Dorsal fin nearly equally divided; the anterior portion convex and with about seventeen spines, the last of which are very low. Anal fin long, with three small spines and about thirty or more rays, coterminial with the soft dorsal. Pectoral fins rounded and with its simple rays not produced.

*Type.* *Latridopsis ciliaris* Gill.*Syn.* *Latris ciliaris* *Richardson.*

The present genus and *Latris* are pre-eminently distinguished from all the other members of this family by the many-rayed anal fin, which is quite long and coterminial with the dorsal fin. The physiognomy is also quite dissimilar to that of other *Latridinæ*, and would itself sufficiently distinguish them. The only difference from *Latris* appears to be the absence of teeth on the front of the vomer. As this is unaccompanied by any other modification of importance, it may be urged that, as in the case of *Cirrhitus*, the two might be combined. The absolute presence or absence of teeth on the palate appears, however, to be of greater value than the slight extension of a patch on neighboring bones, and we have therefore considered the absence of the vomerine teeth as a character which generically distinguishes the *Latris ciliaris* from the type of that genus. The dentition of the present genera does not appear to have any analogy to that of the Theraponoids, where the presence or absence of palatine teeth appears to be dependent on age, the teeth being deciduous.

LATRIDOPSIS CILIARIS Gill.

*Anthias ciliaris* *Bloch*, *Systema Ichthyologiae*, *Schneid. ed.*, p. 310.*Sciæna ciliaris* *Forster.**Latris ciliaris* *Richardson.**Habitat.* New Zealand.

LATRIS Richardson.

*Synonymy.**Latris Richardson*, *Transactions of the Zoological Society of London*, vol. iii., p. 106.*Chilodactylus* *Richardson.**Pinna analis* dorsali coterminalis, radii 25 plusve. *Dentes* vomerini.

Body subfusiform, highest at the ventral fins. Scales of moderate size. Head compressed, short and conical laterally, with the occipito-nasal profile nearly straight. Eyes moderate, above the rostro-opercular line, submedian and remote from the snout. Scales on the superior surface and the sides. Preoperculum vertical behind. Mouth small. Teeth present on the jaws and front of vomer; pluriserial at the symphysis. Branchiostegal rays 6—6. Dorsal fin nearly equally divided into spinous and articulated; the former is convex and has about seventeen spines, the last of which become very low. Anal fin long and coterminial with articulated portion of the dorsal, provided with three small spines and thirty or more rays. Pectoral fin with none of its simply articulated rays produced.

One species of this genus is known; its relations are discussed in the remarks on *Latridopsis*.

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**LATRIS HECATEIA** Rich.

*Latris hecateia* Rich., Proc. Zoological Society of London 1839, p. 98 ;  
Trans. Zool. Soc., vol. iii. p. 106, pl. 6, fig. 1.

*Cheilodactylus hecateius* Rich., Proc. Zool. Soc. 1850, p. 67.

*Habitat.* Van Diemen's Land.

**MENDOSOMA** Gay.*Synonymy.*

*Mendosoma* Gay, Historia Fisica y Politica de Chili, *Zoologia*, tomo ii., p. 212, 1848.

*Mendosoma* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii., p. 83.

*Dentes* maxilla superiori solum.

Body fusiform, highest above or behind the ventral fins, with a slender caudal peduncle. Scales of moderate size. Head rather small, much compressed, acutely conical in profile, slightly depressed above the eyes. Eyes large; pupil intersected by the rostro-opercular line. Scales covering the head on the sides and above. Preoperculum angulated, with posterior margin vertical. Mouth moderate; jaws subequal. Teeth small and pluriserial, present only on the upper jaw. Branchiostegal rays six. Dorsal unequally divided, the spinous being longer than the soft, convex and highest in front of the middle, and sustained by about twenty-two spines; soft portion much higher than the last spines. Anal fin oblong, and little shorter than the soft dorsal, with its three spines moderate and the eighteen rays gradually decreasing. Pectoral fins rounded and with none of the rays produced.

*Type.* *Mendosoma lineatum* Gay.

*Mendosoma* is the only known representative of the Cirrhitoids in which the teeth are confined to the upper jaw. The physiognomy is somewhat similar to that of *Chirodactylus* or *Goniistius*, but from both of them it differs especially by the length and nearly uniform height of the anal fin and the less produced simple rays of the pectoral fins.

Three forms have been described as so many species, but the only clear characters are those relating to the colors. Whether the difference of coloration is not only one of degree and has not been exaggerated remains to be discovered. The diagnostic phrases below inserted are extracted from Gay's work.

**MENDOSOMA LINEATUM** (Gay.)

*Mendosoma lineata* Gay, Historia Fisica y Politica de Chile, *Zoologia*, tomo ii., p. 212, lam. 5, fig. 2.

*M.* corpore oblongo; dorso et lateribus virescentibus, lineis fuscis longitudinalibus; ventre pallide albo; pinnis fuscis, caudali solum nigro-maculatis emarginata.

D. XXII. I. 24. A. III. 18.

*Habitat.* Coast of Chili.

**MENDOSOMA CÆRULESCENS** Gay.

*Mendosoma cærulescens* Gay, op. cit., p. 215.

*M.* corpore elongato; supra cæruleo, infra cinero, ita pinnis omnibus.

*Habitat.* Coast of Chili.

**MENDOSOMA FERNANDEZIANUM** (Gay.)

*Mendosoma fernandezianus* Gay, op. cit., p. 216.

*M.* corpore subovata, supra subgriseo, infra argentata; pinnis omnibus nigrescentibus; lateribus lineis fuscis distinctis,

*Habitat.* Coast of the Island of Juan Fernandez.

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## DACTYLOSPARUS Gill.

*Synonymy.*Sparus sp. *Parkinson.*Cheilodactylus sp. *Cuv. et Val., Richardson.*Chilodactylus sp. *Günther.*

Body highest and arched above the ventral fins, convex behind, and with the caudal peduncle very slender. Scales of moderate size. Head moderate, with the crown arched and the profile much decurved. Eyes elevated above the rostro-opercular line and nearer the nape than the snout; preorbital bones very high; cheeks scaly. Preoperculum vertical behind, and with its angle broadly rounded. Mouth moderate. Teeth villiform on each jaw, preceded by a row of larger conical ones. Branchiostegal rays 6, 6. Dorsal fin with its spinous and soft portions nearly equally long and high; the former is convex near the middle, and scarcely lower than the soft part behind, with seven spines. Anal fin oblong, with its three spines moderate, and its soft rays subequal. Pectoral fins with one of its simply articulated rays much produced.

*Type.* *Dactylosparus carponemus* Gill.*Syn.* *Cheilodactylus carponemus* *Cuv. et Val.*

*Dactylosparus* has quite a different aspect from most of the Latridinæ, and, as the new name indicates, has a considerable analogical resemblance to a Sparoid, the head being high and much decurved from the nape. The anal fin of the typical species at least has considerably more numerous rays than that of most of the allied genera, and the dorsal is nearly entire. Perhaps the type may be the only known species.

## DACTYLOSPARUS CARPONEMUS Gill.

*Sparus carponemus* *Parkinson* MSS.*Cheilodactylus carponemus* *Cuv. et Val.*, Hist. Nat. des Poissons, tome v. p. 362, pl. 128.

D. XVII. 31. A. III. 19. P. 17.

*Habitat.* Coasts of Australia and New Zealand.

A fish found at Van Diemen's Land was at first referred to the *Cheilodactylus carponemus* of *Cuv. et Val.* as a variety by Sir John Richardson, but was afterwards distinguished as a peculiar species, under the name of *C. aspersus*. It is certainly very distinct, and indeed scarcely appears to be congeneric with the *C. carponemus*, differing from it in the short anal, the much stronger spines and the decided notch between the spinous and soft portions of the dorsal fin as well as by the elevated preorbital bones. The *Cheilodactylus macropterus* of Richardson appears to be most nearly related to his *C. aspersus*. In the present condition of our knowledge we will not venture to propose a distinct genus, but simply enumerate them in an appendix to *Dactylosparus*, under the names bestowed on them by Richardson.

## CHEILODACTYLUS ASPERSUS Richardson.

*Cheilodactylus carponemus* *Richardson*, Transactions of the Zoological Society of London, vol. iii. p. 99.Not *Cheilodactylus carponemus* *Cuv. et Val.*, from whom, however, the radial formula is copied.*Cheilodactylus aspersus* *Richardson*, Proc. Zoological Society, 1850, p. 64.D. XVIII. 27. A. III. 11. P. 8 | 7. Scales 55—57  $\frac{6}{15}$ . (B. 6.)*Habitat.* Van Diemen's Land.

## CHEILODACTYLUS MACROPTERUS Richardson.

*Scæna macroptera* *Forster.**Cichla macroptera* *Bloch*, Systema Ichthyologiæ, Schneid. ed., p. 342.*Cheilodactylus macropterus* *Richardson*, Proc. Zoological Society, 1850, p. 62.

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D. XVII. 26. A. III. 14. P. 9 | 6. Scales  $55 \frac{6}{17}$  Günther. (B. 6.)

*Habitat.* Australia (Port Arthur, Port Essington) and New Zealand.

### CHILODACTYLUS (Lacépède.)

*Chilodactylus Lacépède*, Histoire Naturelle des Poissons, tom. v. p. 6.

*Trichopterus Gronovius*, Catalogue of Fish collected and described by L. T.

Gronow, now in the British Museum, p. 162, 1854.

*Cynædus* sp. *Gronovius*, Zoophylacium.

*Pteronemus Van der Hæren*, Handbook of Zoology, vol. ii. p. 177.

*Ossa branchiostegalia* 5—5.

Body highest and arched above the ventral fins, and with a moderate caudal peduncle. Scales small. Head moderate, apparently with the crown arched and the profile decurved; crown and sides of the head scaly. Preoperculum vertical behind. Operculum with two blunt points separated by an emargination. Mouth moderate. Teeth on both of the jaws villiform. Branchiostegal rays five on each side. Dorsal fin with its spinous and soft parts nearly equal in length; the former has eighteen or nineteen spines, is convex near the middle, and little lower behind than the soft part. Anal fin short, with its three spines moderate and its soft rays rapidly diminishing in length. Pectoral fins with one of the articulated rays much produced.

*Type.* *Chilodactylus fasciatus Lacépède*.

The genus *Chilodactylus*, as now characterized, is distinguished by the form of the head and the presence of only five branchiostegal rays. Its scales are also in the type rather smaller than those of the allied genera. There is perhaps not more than one species.

### CHILODACTYLUS FASCIATUS Lacépède.

*Cynædus* sp. *Gronov.*, Zoophylacium p. 64, No. 221, pl. x. fig. 1.

*Cheilodactylus fasciatus Lacépède*, Hist. Nat. des Poissons, tom. v. p. 6, pl. 1, fig. 1.

*Trichopterus indicus Gronovius*, Catalogue, *Gray* ed. p. 162.

*Pteronemus fasciatus Van der Hoeven*, Handbook of Zoology vol. ii. p. 177.

D. XVIII. 23. A. III. 11. Scales 75.

*Hab.* Cape of Good Hope.

The following species may provisionally be retained here; it differs from *Chilodactylus fasciatus* by the larger size of the scales and the brevity of the simple pectoral rays.

*Chilodactylus brachydactylus Cuv. et Val.*

*Cheilodactylus brachydactylus Cuv. et Val.*, Hist. Nat. des Poissons, tome v. p. 361.

(B. V.) D. XVII.—XVIII. 31. A. III. 9. Scales 50 6-13.

*Hab.* Cape of Good Hope.

A species discovered in King George's Sound has been described as approaching to *C. carponemus* in shape, but rather more elongated in the body, and with a more arched spinous dorsal, the situation of the eyes nearer the snout, the abbreviated simple pectoral rays and the naked cheeks. "The disk of the preoperculum is broad, that of the interoperculum fully equal to it, and both these bones and the cheeks are scaleless in the specimen, which has sustained some damage in the head, but not apparently in these places," (Richardson.) If the cheeks are really naked in a normal condition, the species is so distinguished from every other species of the group of Latridæ. It doubtless does not belong to the genus, but it cannot well be characterized until better known. Perhaps the *Cheilodactylus brachydactylus* belongs to the same genus.

### CHILODACTYLUS NIGRICANS.

*Cheilodactylus nigricans Richardson*, Proc. Zoological Society 1850, p. 63.

*Hab.* Australia.

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## ACANTHOLATRIS Gill.

*Synonymy.*

*Chætodon* sp. *Carmichæl.*

*Cheilodactylus* sp. *Cuv. et Val., &c.*

*Chilodactylus* sp. *Günther.*

*Caput conicum. Pinna analis o'longa spinis tribus robustis et radiis circa duodecim paulo decreseentibus.*

Body oblong and subfusiform, highest above the ventral fins, and with the caudal peduncle slender. Scales moderate or large. Head rather small, conical and with the profile nearly straight. Eyes mostly above the rostro-opercular horizon, and nearly intermediate between the snout and nape. Preoperculum subvertical behind. Mouth small. Jaws nearly equal. Lips thick. Teeth pluriserial in each jaw. Branchiostegal rays six. Dorsal fin with its spinous portion rather longer than the soft, arched and with about seventeen stout spines, as high or higher than the soft dorsal. Anal fin oblong, with three robust spines and twelve rays which very slowly diminish in length. Pectoral fin with a simple ray considerably produced.

*Type. Acantholatrís monodactylus Gill.*

This genus is distinguished by the nearly uniform height of the anal, the strong spines of the dorsal and anal and the conical head. It appears to be most nearly allied to *Chirodactylus* and *Chilodactylus*, but differs especially from the first in the development of the anal fin and the strength of the spines, and from the second by the larger scales and the presence of six branchiostegal rays.

The only species of the genus that is well known is the one described by Carmichæl in his treatise on the Fishes of Tristan d'Acunha.

## ACANTHOLATRIS MONODACTYLUS Gill.

*Chætodon monodactylus Carmichæl*, Transactions of the Linnæan Society, vol. xii. p. 300, pl. 21.

*Cheilodactylus Carmichælis Cuv. et Val.*, Hist. Nat. des Poissons, tome v. p. 360; *ib.* tome ix. p. 489.

*Chilodactylus Carmichælis Cuv.* Regne Animal, ed. ill., Poissons, pl. 31. fig. 2.

*Chilodactylus monodactylus Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 81.

*Hab.* Coast of Chili.

## CHIRODACTYLUS Gill.

*Synonymy.*

*Chilodactylus auct.*

*Caput conicum. Pinna analis ad angulum anticum multo producta, spinis tribus et radiis 7—10.*

Body highest above the ventral fins, declining quite rapidly towards the slender caudal peduncle. Scales of moderate size. Head rather small, much compressed, presenting in profile a conical appearance, with the profile oblique and nearly straight. Eyes on or just above the rostro-opercular line, and mostly anterior. Cheeks and crown scaly. Preoperculum extended below, with the posterior margin vertical. Mouth small. Lower jaw shorter than the upper. Lips well developed. Teeth on each of the jaws pluriserial in front. Branchiostegal rays 6—6. Dorsal fin with its spinous and soft portions nearly equally long. The former is convex and highest near the middle, and much lower behind than the soft part. Anal fin short, with its three spines moderately produced at its anterior angle and rapidly diminishing behind, so that the rayed margin is nearly vertical. Pectoral fins with one of the simply articulated rays moderately produced.

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*Type. Chirodactylus Antonii Gill.*

This genus differs chiefly from *Chilodactylus* by the form of the head and the presence of six branchiostegal rays.

*Chirodactylus* is distinguished by the conical head, the convex outline of the spinous portion of the dorsal fin and the form of the anal. Two species are known of the genus; a third, described by Dr. Günther, is provisionally referred to it, which differs from the first two by the depth of the preorbital bones and the consequent position of the eyes and the brevity of the third anal spine. It appears to have the form of the anal characteristic of the genus, the length of the second soft anal ray equalling three inches three lines in a fish twenty seven inches long. The species may be thus distinguished.

*Synopsis.*

Eye nearer the snout than the end of the operculum.

Anal fin III. 7..... *C. antonii.*

Anal fin III. 10..... *C. variegatus.*

Eye rather nearer the end of operculum than to the snout.

Anal fin III. 9..... *C. grandis.*

The typical species of the genus are inhabitants of the Chilian seas, while the *C. grandis* is a native of the Southern African seas.

*CHIRODACTYLUS ANTONII Gill.*

*Chilodactylus antonii Cuv. et Val., Hist. Nat. des Poissons, tome ix. p. 494. Hab. Chili.*

*CHIRODACTYLUS VARIEGATUS Gill.*

*Chilodactylus variegatus Cuv. et Val., Hist. Nat. des Poissons, tome ix. p. 494.*

*Chilodactylus tschudii Müll. et Troschel, Horæ Ichthyologicæ vol. iii. p. 25.*

*Chilodactylus cinctus Tschudii, Fauna Peruviana, Ichthyologia, p. 15, taf. 2. Hab. Chili and Peru.*

*CHILODACTYLUS GRANDIS Günther.*

*Chilodactylus grandis Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 79.*

## GONISTIIUS Gill.

*Synonymy.*

*Chilodactylus sp. auct.*

*Pteronemus sp. Van Der Hoeven.*

Pinna dorsalis spinis primis tribus parvis, quarto elongata; postice incurvata.

Body highest before the ventral fins, declining rapidly under the second dorsal to the slender caudal peduncle; ante dorsal region obliquely convex and carinated. Scales of moderate size. Head rather small, much compressed, with the profile oblique and nearly straight or slightly incurved. Old individuals have a pair of tubercles on the forehead and another on the snout. Eyes below, nearly on a line with the posterior termination of the operculum or suboperculum. Cheeks and crown scaly. Preoperculum posteriorly vertical and entire. Operculum spiniform behind and deeply emarginated above. Mouth small. Lower jaw shorter and received within the upper. Lips well developed and free. Teeth on each of the jaws, pluriserial in front, uniserial on the sides. Branchiostegal rays six on each side. Dorsal fin with its spinous and soft portions nearly equally long; the former has about seventeen spines, the first three of which are very small and graduated; the fourth is longest, and the outline behind is slightly incurved towards the soft part; the latter is of a nearly uniform height, exceeding the last spinous rays. Anal fin short, nearly under the middle of the soft portion of the dorsal, provided with three small spines produced at its anterior angle, and with about eight or nine

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rays, the posterior of which rapidly diminish in length, so that the rayed margin is subvertical. Pectoral fins with the simply articulated inferior rays moderate, and moderately elongated.

*Type.* *Goniistius zonatus* Gill.

This genus is proposed for species of Oriental and Australian fishes that have been referred by previous naturalists to the genus *Chilodactylus*, from which they appear to differ sufficiently to authorize their separation. They are readily distinguished from all the other *Chilodactyli* of Cuvier by the structure and outline of the dorsal fin, the size and form of the head, and the entire physiognomy. They agree with the *Chirodactyli* in the form of the anal fin.

Three species have been described, one of which has been long known and is now taken as the type of the genus. The most distinctive characters of the respective species are exhibited in the following analytical table :

Body with 7 to 10 oblique bands.

Head not banded, unicolor. Scales 60 ————— 9  
16 G. *zonatus*.

Head with a nearly vertical band below the eye. Scales  
9

54 ————— 17 G. *quadricornis*.

Body with a blackish longitudinal band on the back ascending to the apex of the spinous dorsal; bands on and behind the head. Scales 63..... G. *gibbosus*.

1. *GONIISTIUS ZONATUS* Gill.

*Cheilodactylus zonatus* Cuv. et Val., Hist. Nat. des Poissons, tome v. p. 365, pl. 129.

*Chilodactylus zonatus* Günther, Catalogue of the Acanthopterygian Fishes, &c. vol. ii. p. 82.

*Hab.* Japanese and Chinese seas.

2. *GONIISTIUS GIBBOSUS* Gill.

*Cheilodactylus gibbosus* Richardson, Proc. of the Zoological Society of London 1850, p. 65, pl. 2, figs. 3, 4.

*Hab.* Coast of West Australia.

3. *GONIISTIUS QUADRICORNIS* Gill.

*Chilodactylus quadricornis* Günther, Catalogue of the Acanthopterygian Fishes, vol. ii. p. 83.

*Hab.* Sea of Japan.

Group *NEMATODACTYLI* Gill.

*LATRIDINÆ* radiis branchiostegalibus tribus; caput plerumque nudum.

Branchiostegal rays three. Head mostly or entirely naked.

*NEMATODACTYLUS* (Richardson.)

*Synonymy.*

*Nemadactylus* Richardson, Proceedings Zoological Society, 1839, p. 98; *Id.* Transactions of the Zoological Society, vol. iii. p. 116.

Dentes maxillis uniseriati, parvi.

Body robust, fusiform, highest behind the ventral fins. Scales thin and of moderate size. Head rather small, with the outlines above and below slightly curved to the snout. Eyes mostly anterior, on or scarcely above the rostro-opercular line. Crown and forehead only scaly; cheeks and opercula naked. Opercular bones unarmed. Preoperculum nearly vertical behind. Teeth  
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uniseriate on each jaw. Branchiostegal rays only three on each side. Dorsal fin nearly equally divided; its spinous portion convex and with seventeen spines, the last of which are lower than the second part. Anal fin oblong, with three moderate spines and about fifteen gradually decreasing rays. Pectoral fins with one of its simple rays produced beyond the rest.

The genus *Nematodactylus* is distinguished from all the other representatives of the family by the presence of only three branchiostegal rays. Notwithstanding this anomalous character, its resemblance to the Latridinæ, and especially to *Chirodactylus* and the allied genera, is such that scarcely a doubt can be entertained as to the affinity of the genus to the rest of the subfamily. Another characteristic feature of the genus is the nudity of the cheeks.

Only one species is known.

*NEMATODACTYLUS CONCINNUS* (Rich.)

*Nematodactylus concinnus* Richardson, Transactions of the Zoological Society, vol. iii. p. 116, pl. 4, fig. 2.

*Habitat.* Port Arthur, Van Diemen's Land.

### Description of a new species of *CIRRHITUS*.

#### *CIRRHITUS ALTERNATUS* Gill.

The form is similar to that of the typical species of the genus. The region of greatest height is above the ventral fins, and there equals three-tenths (3-10) of the total length; thence the back is slowly decurved towards the caudal peduncle; the height behind the dorsal equals an eighth and that at the lowest part of the peduncle a tenth of the length. The thickness at the pectoral region is between a fifth and sixth of the length.

The head is very obliquely decurved, and is longer than high; it nearly equals the height (29-100) to the end of the bony projection of the operculum, and the membranous portion extends two fractions beyond (31-100.) The distance from the snout to the nape equals 23-100 of the total length, and is as great as the height at the latter region; the height at the pupil equals 18-100 of the length. The interorbital region is channelled or concave. The distance between the orbital ridges is less than the diameter of the eye ( $4\frac{1}{2}$ -100.) The eye is moderate, the diameter being nearly a fourth of the head's length (7-100 of the total), and is greater than the height of the preorbital, which is about a fifth of the head's length (6-100.) The snout exceeds a third of the same (11-100.) The preoperculum has a convex margin, which is delicately serrated above the interoperculum. The preorbital is entirely concealed in the integuments and entire, and equals in height the diameter of the eye. The cheeks are covered with very small scales; the preopercular border naked; the operculum and suboperculum have three rows of scales, larger than those of the body; the interoperculum three in one row; the operculum two in the lower row and two smaller ones in an upper. The postnasal fringe has two larger filaments and several smaller ones.

The cleft of the mouth has a semi-elliptical contour, and is moderate, the supramaxillary bones ending under the posterior border of the pupil. The canine teeth are well developed, two being in the front of the upper towards the sides, and six to eight in the lower in front, while on each side of the lower are also two larger ones. The band of villiform teeth is quite broad in each jaw. The front of the vomer only has a narrow lambdoidal band, and the palatines are unarmed.

The dorsal fin commences over the end of the bony operculum and the axilla of the pectoral, or nearly with the third tenth (32-100) of the total length. The spinous portion covers three-tenths (31-100) of the length, and is convex; the first spine equals a twentieth (5-100) of the total length, and is less than half as long as the third to the sixth inclusive, they equalling a ninth (11-100) of

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the same; the ninth spine equals 7-100 of the same. The membrane is not acutely notched, and is penicilligerous behind each spine. The soft portion, inclusive of its spine, exceeds a fifth (21-100) of the length, is higher in front than the spinous and declines little in height.

The anal fin commences nearly under the first soft dorsal ray and at the posterior half of the length (53-100); the entire base equals 13-100 of the total length, and the soft portion, inclusive of its spine, an eleventh (9-100); the latter is much higher than long, and vertical truncated behind when expanded; the second soft or first branched ray is nearly twice as long as the base of the soft part (17-100). The membrane behind the first and second spines is acutely notched; the length of the first spine nearly equals a twelfth (8-100), that of the second an eighth (12-100) of the total length, and is greater than that of the third.

The caudal fin truncated behind and forms nearly a fifth (19-100) of the length.

The pectoral fins are well developed, but none of the rays are much elongated, the second and third simple rays from the branched being about equal, not a quarter (23-100) of the length, and not much larger than the fourth, which exceeds a fifth (21-100) of the same. There are seven simple rays, the membrane below each of which, except the uppermost, is very deeply and acutely notched.

The ventral fins are inserted nearly at the vertical, between the fourth and fifth dorsal spines, and extend backwards to the anus, the length nearly equaling a sixth of the total (17-100); the spine equals a tenth (10) of the same; the first ray is longest and about a quarter longer than the inner.

The branched rays of the dorsal are divided from the middle, and the posterior branch again divided; those of the anal are dichotomous, both branches being divided, as are also those of the caudal. Those of the pectorals are unequally branched, like those of the dorsal, the lower branch only being divided. The central rays of the ventrals are thrice divided; the others are more or less unequally branched.

The scales are large, there being only forty along the lateral line; above are four rows, and below ten. The obliquity is such that a row from the front of the dorsal fall behind the anus.

D. IX. I. 10  $\frac{1}{1}$ . A. III. 5  $\frac{1}{1}$ . C. 6. 1. 7. 6. 1. 5. P. 1. 6 | 1. 6. V. I. 5. Scales 40  $\frac{4}{10}$

The color is grayish or light purplish, apparent on the back in five spots, the first of which is below the third to fifth spine; the second below the seventh and eighth; the third below the second to fifth soft rays; the fourth unpaired and behind the dorsal, and the fifth at the base of the caudal; below the lateral line are as many more under the superior row, and these alternate below with as many bands as broad as the intervals. The intervals between the spots on the back, especially the last, are band-like. The spinous part of the dorsal is purple, with two lighter longitudinal bands; the soft part is also purplish at the base. The rays of the caudal and anal are sometimes spotted. The head is purple, and the chin is marked with three purple spots, forming a triangle. The bands are much darker on the back.

Body—Total length from snout to caudal, 5 $\frac{1}{2}$ .....	100
Greatest height.....	30
Height at caudal peduncle behind.....	12 $\frac{1}{2}$
“ “ “ in middle.....	10
Thickness of body at pectoral region.....	18
Head—Length from snout to opercular angle.....	29
“ “ “ opercular membrane.....	31
“ “ “ nape.....	23
Width at operculum.....	18
“ “ eyes.....	14
“ “ between orbits.....	4 $\frac{1}{2}$

Height of preorbital.....	6
Eye—Diameter.....	7
Distance from snout.....	11
Dorsal—Distance from snout.....	32
Length to base of last spine.....	31
“ of soft portion.....	21
Anal—Distance from snout.....	53
Length.....	13
Length of 1st spine.....	8
Length of 2d spine.....	12
Caudal—Length of middle ray.....	19
“ outermost rays.....	19
Pectoral—Length of 2d and 3d simple rays.....	23
“ 4th simple ray.....	21
Ventral—Length of 1st ray.....	17
“ spine.....	10½

A single specimen of this species, in very fine condition, is contained in the Smithsonian museum, and was obtained at Honolulu (Sandwich Islands), by the Rev. W. H. Pease. It differs from the other species chiefly in color and the size of the scales, resembling in the last respect the *Cirrhitus maculatus*. It is nearly related to that species, but differs not only in color, but in the smooth palatine bones, and would consequently be placed in a different genus by Bleeker and Günther.

#### On the limits and arrangement of the Family of SCOMBROIDES.

BY THEODORE GILL.

The family of Scombroideæ, as established by Cuvier, was a very heterogenous group, containing many dissimilar forms which certainly cannot, in the present state of our knowledge, be characterized or distinguished by any decisive diagnosis, nor is one of the characters given by Cuvier himself either peculiar to his family or applicable to all its constituents. Various attempts have been made to distribute the species referred to the Cuvierian family among natural groups. The most recent of these, and the most valuable on account of the knowledge of the authors, are those of Drs. Bleeker and Günther. Neither of those naturalists appear to have been successful in giving an entirely natural arrangement of the family. Dr. Bleeker has not characterized his groups. Dr. Günther has distinguished his by the number of vertebræ and the comparative extent of the dorsal fins. The following arrangement is a sketch of one which it is proposed to shortly publish in more detail. The family thus established comprises parts of Dr. Günther's Trichiuridæ and Scomberidæ, as the characters given to the former are equally applicable to some of the genera of the latter.

#### Family SCOMBROIDÆ (Cuv.)

- A. Body fusiform and moderately elongated. First dorsal with less than 25 spines.
  - B. Spinous dorsal abbreviated and widely separated from the soft. Pectorals at the horizon of the eyes.....SCOMBRINÆ.
    - a. Teeth on the palatine arcade.....Scomber.
    - b. No teeth on the palate.....Auxis.
  - BB. Spinous dorsal contiguous to the soft, variable. Pectorals equidistant from the back and breast, or nearer the latter.....ORYZININÆ.
- C. Tail with cutaneous keel on each side.

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- D. Dorsal spines not more than 22.
- a. Vomer unarmed.
    - a1. Dorsal and anal finlets 6. Corslet not scaly. First dorsal XIV.....Gymnosarda.
    - a2. Dorsal finlets 8—9. Anal 7—9. Corslet with very small scales. D. XI.—XIII.....Orycnopsis.
    - Corslet with larger scales. D. XVIII.—XXII.....Sarda.
  - aa. Vomer and palatines dentigerous.
    - b. Teeth of jaws rather small. Corslet on the sides before formed by larger scales. D. XII.—XV.
      - Lateral line simple.....Orycnus.
      - Lateral line double.....Grammatorycnus.
    - bb. Teeth of jaws strong. Corslet obsolete and body generally partly naked.
      - Teeth compressed, nearly equal in each jaw. Dorsal and anal finlets similar, 7—10. D. XIV.—XVI. (XX.).....Cybium.
      - Teeth conic, much larger in the lower. Dorsal and anal finlets 4—5. D. XII...Lepidocybium.
      - Teeth conic, subequal. Dorsal and anal finlets 8—9. D. XV.—XVIII.....Apodontis.
  - DD. Dorsal spines 25.....Acanthocybium.
- CC. Tail not keeled.
- a. Ventrals I. 5.
    - a1. Dorsal and anal finlets developed.
      - 1. Lateral line present.
        - Dorsal and anal finlets 6. Lateral line abruptly decurved behind the last spines.....Thyrsites.
        - Dorsal finlets 5; anal 4. Lateral line nearly straight.....Thyrsitops.
      - 2. Lateral line obsolete. Skin with spinigerous or stellate tubercles.....Ruvettus.
    - a2. Dorsal and anal fins undivided.....Epiannula.
  - aa. Ventrals represented chiefly by the spines.
    - Preoperculum unarmed. Dorsal and anal finlets 2.....Prometheus.
    - Preoperculum spinigerous at its angle. Dorsal and anal finlets none.....Dicrotus.
- AA. Body very long, (height much less than a tenth of the length.) First dorsal with numerous spines.....GEMPYLINÆ.
- Spinous dorsal XXX., XXXI. Ventrals minute, I. 5.....Gempylus.

The types of the respective genera are the following:

SCOMBRINÆ (Bon.) Sw.

1. Scomber (*L.*) *Scomber scombrus L.*
2. Auxis (*Cuv.*) *Scomber Rochei Risso.*

ORYCNINÆ Gill.

3. Orycnus (*Cuv.*) *Scomber alatunga L. S. thynnus L.*
4. Grammatorycnus (*Gill.*) *Thynnus bilineatus Rüppell.*
5. Gymnosarda (*Gill.*) *Thynnus unicolor Rüppell.*

6. *Orycnopsis* (Gill.) *Scomber unicolor* Geoffroy.
7. *Sarda* (Cuv. 1829.) *Scomber pelamys* Brünnich.
8. *Cybium* (Cuv.) *Scomber commersonii* Lacépède.
9. *Lepidocybium* (Gill.) *Cybium flavobrunneum* Smith.
10. *Apodontis* (Bennett.) *Apolectus immunis* Bennett.
11. *Acanthocybium* (Gill.) *Cybium sara* Bennett.
12. *Thyrsites* (Cuv.) *Scomber atun* Euphrasen.
13. *Thrysitops* (Gill.) *Thyrsites lepidopoides* Cuv. et Val.
14. *Ruvettus* (Cocco.) *Ruvettus pretiosus* Cocco.
15. *Epinnula* (Poey.) *Epinnula magistralis* Poey.
16. *Prometheus* (Lowe.) *Gempylus prometheus* Cuv. et Val.
17. *Dicrotus* (Günther.) *Dicrotus armatus* Günther.

## GEMPYLINÆ Gill.

18. *Gempylus* (Cuv. 1829) *Gempylus serpens* Cuv.

Thus limited, the family Scombroideæ appears to be a very natural one. The *Lepturoideæ* appear to be represented by four genera:

1. *Lepturus* (Artedi.) *Trichiurus lepturus* Linn.
2. *Enpleurogrammus* (Gill.) *Trichiurus muticus* Gray.
3. *Lepidopus* (Gouan.)
4. *Aphanopus* (Lowe.)

The other genera included in the family of Scombroids by Dr. Günther may be variously distributed.

*Naucrates* Raf., *Cubiceps* Lowe, *Neptomenus* Gthr., *Platystethus* Gthr. and possibly *Elacate* Cuv., appear to belong to the family of Carangoids.

*Echeneis* (L.) is the representative of a peculiar family.

*Gasteroschisma* Rich. and *Nomeus* Cuv. we also believe to represent a distinct family.

*Direma* (Temm. et Schlegel) belongs to the family of Embiotocoids, as has been shown by Mr. Brevoort, and is very closely allied to *Embiotoca* and *Phanerodon furcatus*.

The group of *Cyttina* is equivalent to the family of Zenoidæ Lowe, and is well entitled to rank as such. It is divisible into two subfamilies and five genera:

## ZEINÆ (Bon.)

1. *Zeus* (Artedi.) *Zeus faber* Linn.
2. *Zenopsis* (Gill.) *Zeus nebulosus* Temm. et Schlegel.
3. *Cyttus* (Günther.) *Capros australis* Richardson.
4. *Cyttopsis* (Gill.) *Zeus roseus* Lowe.

## OREOSOMATINÆ.

5. *Oreosoma* (Cuv. et Val.) *Oreosoma atlanticum* Cuv.

*Zenopsis* is distinguished by the presence of osseous plates at the base of the dorsal, and of three anal spines, &c. The *Zeus ocellatus* of Storer is a member. The genus *Cyttopsis* has no plates at the bases of the fins, but several intervene between the ventral fins and the anus, and each ventral has a spine and eight branched rays.

The Stromateina appear to be entitled to family rank as much as the Carangoids. The genera are the following:

1. *Stromateus* (Artedi.) *Stromateus fiatola* L.
2. *Chondroplites* (Gill.) *Stromateus atous* Cuv. et Val.
3. *Stromateoides* (Bleeker.) *Stromateus cinereus* Bloch.
4. *Apolectus* (Cuv. et Val.) *Stromateus niger* Bloch.
5. *Peprilus* (Cuv.) *Sternoptyx Gardenii* (Bloch) Schneider.
6. *Poronotus* (Gill.) *Stromateus triacanthus* Peck.

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Nearly allied to the preceding are the Centrolophinae, with the genera *Centrolophus* Lac., *Leirus* Lowe and *Palinurichthys* Gill, Blkr., (= *Pammelas* Gthr.) Closely connected to the Centrolophinae are the genera *Schedophilus* Cocco and *Hoplocoryphus* Gill, (type *Schedophilus maculatus* Gthr.)

*Brama* and *Taractes* appear to belong to a peculiar family.

*Pteraclis* Gronovius and *Pterocombus* Fries, the latter of which has been overlooked by Dr. Günther, seem to constitute a distinct group.

*Diana* Risso and *Luvarus* Raf. (= *Ausonia* Risso) probably also constitute a distinct family, as well as *Lampris Retzius*. Mene is more related to *Equula*.

*Coryphæna* is the type of a peculiar family early established. The genus *Lampugus* is probably, as Bonaparte and Günther have believed, identical with it. Valenciennes has announced\* a discovery of M. Dussumier proving that the interparietal crest of the male is much more elevated than that of the female, while Dr. Günther considers the elevation of the crest as the accompaniment of mature age.

Several forms referred by Dr. Günther to his family of Carangidæ should be also withdrawn. They are *Pammelas* Gthr., which is nearly allied to *Centrolophus*, *Psettus* Com., *Platix* Cuv. et Val., *Zanclus* Com., *Capros* L., *Antigonia* Lowe, *Equula* Cuv. and *Gazza* Rüppell, as well as the group Kurtina.

*Capros* and *Antigonia* form a family already established by Mr. Lowe; to it also belongs the genus *Hypsinothus* (Temm. et Schlegel), included by Günther in the group of Chætodontina and family of Chætodontidæ.

*Equula* and *Gazza* represent another peculiar family (Equuloidæ Blkr.); the *Equula longimanus* of Cantor, is the type of a distinct genus (*Clara* Gill), distinguished by the composition of the fins (D. X. 15. A. IV. 13), the large scales, entire preoperculum and long pectorals.

It is, perhaps, also somewhat doubtful whether *Psenes* (Cuv. et Val.) belongs to the Carangoids, but it would be premature to separate them until better known. The *Trachinotus anomalus* of Temminck and Schlegel referred to *Psenes* differs by the presence of seven branchiostegal rays and of only six dorsal spines; it may be called *Psenopsis anomalus*. The genus has a superficial resemblance to *Crius* or *Palinurichthys*.

### Descriptions of new species of ALEPIDOSAUROIDÆ.

BY THEODORE GILL.

In this paper are described two new species of the family of Alepidosauroids, both of which are found in the waters of Western North America, and a third from the Caribbean Sea is indicated. They all belong to that subgenus or genus whose members have a spine and twelve branched rays in each of the ventral fins, and of which the only other known species has been very recently described by M. Poey in his "Memorias Sobre la Historia Natural de la Isla de Cuba." The three species appear to agree in all other respects with *Alepidosaurus*, and have the same elevated dorsal fin.

The family of Alepidosauroidæ, including the species now described, appears to include seven species, but they require to be critically examined and redescribed, as the descriptions hitherto published are not sufficiently characteristic to establish their distinction. Two (*Alepidosaurus ferox* Lowe and *A. azureus* Val.) are inhabitants of Madeira, while a third (*A. Richardsonii* Blkr.) is found at New Zealand.

The family of Alepidosauroids still appears to me to be more nearly allied to the Lepturoidæ than Siluroidæ, as has been urged by Mr. Lowe, with whom Sir John Richardson, and perhaps Parnell alone of all the native naturalists of Britain, can well contest the palm of excellence as a scientific

\* Cuv. et Val. Hist. Nat. des Poissons. tome xxi. p. 8.

ichthyologist. On another occasion, I will give my reasons for the retention of this family near the Acanthopteri and against the supposed affinity of its members to either the Salmonoids to which Valenciennes has referred them, or the Siluroids, to which Günther has lately approximated them.

The species herein described, as well as the *Alepisaurus altivel's* of Poey, or those Alepidosauroids, whose ventrals have each a spine and twelve branched rays, may at least be placed in a separate subgenus, to which the name of CAULOPUS may be given. The number of ventral rays appear to be constant, and as there is rarely so wide an interval as that of between nine and thirteen in the same natural genus, its title to such distinction or even generic rank appears to be good.

ALEPIDOSAURUS (CAULOPUS) BOREALIS Gill.

The head has the form and outlines common to the other members of the tribe. The superior surface is flat and declines in a nearly uniform line to the snout, and is sculptured as usual. The height at the vertical of the preopercular margin enters nearly four times and a half (44-100) in the length; the width at the same region nearly equals a fourth (24-100) of the same; thence it regularly diminishes to the pointed snout.

The eyes are circular and normally large, a diameter entering eighteen-hundredths (18-100) times in the head's length. The distance of the eye from the snout equals two-fifths (40-100) of the length.

The nostrils are nearer to the eyes than to the snout, and are situated at the twenty-third-hundredth (23-100) of the length. The operculum is of a rhomboidal form; above it is straight, and its length exceeds a quarter of the head's; its longest diameter, from the centre of radiation to the postero-inferior angle margin, equals three-tenths of the same; its posterior margin is nearly vertical, or rather parallel with the preoperculum; the anterior curved upwards from the inferior. Its surface has about eighteen prominent striæ or ridges, besides additional smaller ones.

The coalescent inferior opercular bone is divided into two parts by an elevated stria or ridge, commencing above the articulation of the lower jaw; the part above that ridge is *vertically semi-hastiform*, or irregularly triangular, with an oblique emarginated base or posterior side; from its angle of radiation above the lower jaw, about nine striæ radiate; its least diameter, *from the apex to the base* or posterior oblique margin, equals an eleventh (9-100) of the head's length; its greatest, behind the preoperculum, exceeds twice the latter (19-100), while that of its posterior oblique side equals only about an eighth (12-100) of the head. The inferior portion, besides the upper dividing ridge, has one under it continued to the margin, and the whole surface has coarse radiating striæ or ridges, *the upper of which are interrupted behind by the anterior of two or three ridges parallel with the posterior border.*

The lower jaw is robust, and its length is equal to three-fourths of the head's. Its upper outline is slightly arched or convex. Its greatest height is under the last median trenchant small teeth of the sides, where it equals an eighth of the length of the head.

The teeth of the intermaxillary bones are very small, acute and numerous, and continued to the angle of the mouth. There are about three very large and nearly equal vomerine teeth, which are slender and considerably curved. The length of the hinder equals a seventh (15-100) of the head's length; one is unpaired, while the two behind are nearly opposite.

The large palatine teeth are shaped like the vomerine and equal in length nearly a tenth of the head's; there are in our specimen one on the left and two on the right side. The succeeding small trenchant teeth commence considerably behind, the first being scarcely before the anterior border of the orbit; they are not contiguous, and rapidly increase in size, are scarcely carinated, and the posterior border is slightly recurved. There are about six. The

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lower jaw has, *first*, in front, on each side, two small teeth, then behind a larger, slender, conical and recurved one. Each species has three on the right and four on the left, (*normally* ?); *thirdly*, about six small, slender, nearly straight ones; *fourthly*, three large, slender, compressed and curved trenchant ones, and *behind* ten or twelve small, trenchant ones. The large dentary teeth are slender and moderately curved; the length is four times greater than the height, and nearly equals a twelfth of the head's length. The posterior small trenchant teeth are separated by considerable intervals.

The dorsal fin has about thirty-four rays, the first of which is rather stout, and anteriorly has a prominent compressed ridge, crenulated in front; the distance between the first and second equals about three-fourths of that between the second and third.

The ventral fins are as long as the head, and each is composed of a slender spine, crenulated on its external edge, and of twelve rays divided nearly to the base; the external branches of the last are also more or less deeply divided.

Head—Length ( $7\frac{1}{2}$ inches).....	100
Height at preoperculum.....	44
Width at preoperculum.....	24
Eye—Distance from snout.....	40
Diameter of eye.....	18
Nostril—Distance from snout.....	23
Lower jaw—Length.....	75
Greatest height.....	13
Intermaxillary bones—Length of posterior processes.....	15
Operculum—Length of upper margin.....	25
Greatest length.....	30
Height.....	26
Infraoperculum—Length.....	29
Length of shortest ray above the superior horizontal ridge.....	10
Teeth—Length of posterior vomerine tooth.....	15
Width “ “ “ “.....	3
Length of large posterior dentary tooth.....	8
Width “ “ “ “.....	2

This species is probably nearly allied to the *Alepidosaurus* (*Caulopus*) *altivelis* (Poey) of Cuba, but is distinguished by the *length of the ventral fins*, which appear to be at least equal to the head, and from others by the form and sculpture of the opercular pieces, as well as by the relative proportion and dimensions of the other parts of the head. A single specimen was obtained in Puget's Sound, by Dr. C. B. Kennerly, the Naturalist of the Northwestern Boundary Survey, under the command of A. Campbell, Commissioner. The head, dorsal, caudal and ventral fins were only preserved. The reflection will naturally arise, whether the individual captured there was not a wanderer from more southern waters. The discovery of a species of the family in such northern waters is a discovery of no slight interest.

A plate illustrative of the species will be published in the work on the Fishes of Western North America.

#### ALEPIDOSAURUS (CAULOPUS) SERRA Gill.

The head has the typical generic form, and constitutes about a sixth of the total length. The upper surface is flat, and declines in nearly a straight line to the snout. The height at the preopercular border equals two-fifths (40-100) of the length. Its width at the same place, or above the preoperculum, exceeds a fifth (22-100) of the same, or half of the height; thence, the width regularly decreases towards the pointed snout.

The eyes are of the usual size, the diameter entering about five and half 1862.] 9

times (18-100) in the head's length; they are nearly central, the distance from the snout exceeding the height, (two-fifths (43-100) of the length.)

The nostrils are within the posterior half of the interval between the snout and orbit. The operculum is oblong, and has a somewhat trapezoidal form; its superior margin advances obliquely upwards; its posterior subtruncated and nearly parallel with the preoperculum; its inferior nearly straight and parallel with the upper margin for half of the length of the operculum, and then curved upwards to the centre of radiation, or from the posterior inferior angle to the angle of radiation, it nearly describes the segment of a circle. Its length above nearly equals four-tenths (39-100), and its greatest exceeds three-tenths (33-100) of the head's length; its greatest height is less than a fifth (18-100). Its radiating striæ and ridges are moderately developed, most distinct and distant on the median and superior surface, and finest most approximated and curved beneath. There are about twenty-four, of which half terminate behind.

The coalescent inter- and subopercular bones are divided into two portions, an upper and lower; the upper is nearly equally *triangular*, with its apex above the articulation of the lower jaw, and its base *lunately emarginated* and below the operculum; it has from ten to fourteen radiating striæ or slight ridges; its least diameter, from the apex to the base, equals an eighth of the head's length; the sides nearly twice as much (23-100). The inferior portion is defined above by a straight ridge from the centre of radiation to the end, and scarcely passes beyond the operculum; its greatest length equals three-tenths of the head's; its surface above is *wrinkled parallel with the oblique posterior margin*, and has *slight radiating striæ on its lower half*.

The form of the lower jaw and the dentition offer important characters. The lower jaw forms three-quarters of the head's total length; its superior outline is nearly straight; its height is somewhat greatest under the second large tooth, but behind is subequal; its height there equals a tenth of the head's length.

The teeth of the intermaxillary bones are of normal size, very small, acute and numerous. The large vomerine teeth\* are greatly developed and stout; the curve of the posterior is moderate. The length equals an eighth of the head's, and is three times longer than wide. The posterior or large palatine teeth behind have nearly straight posterior borders. The length nearly equals a twelfth of the head's or three-fourths of the palatine. The smaller teeth behind are contiguous at their bases, oblique, broad and with the posterior margin nearly straight or slightly convex near the base. Each has a median ridge on the surface, which is more distinct towards the tip. There are about nine such teeth.

The slender and elongated tooth of the front of each branch of the lower jaw is moderately curved; then follow about twelve slender conical ones; then three large dagger-shaped ones. The latter are robust; the posterior margin is at first straight and then slightly curved forwards to the tip; the posterior tooth has a length equalling half of the hinder vomerine (6½-100), and its width at the base 2½.

The posterior smaller teeth are broad and contiguous at their bases; the anterior border is curved very obliquely backwards, and the posterior is nearly straight. There are from thirteen to fifteen. Each one is carinated along the middle.

Of the dorsal fin, only the roots of the first few rays are not preserved, from which it appears that the first must have originated nearly over the postero-superior angle of the operculum; the ventrals have been also mostly destroyed, but enough is retained to show that there were the usual number of rays,—one spinous and twelve-branched.

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\* Only the two posterior ones are present in the specimen.

Head—Length (8 inches).....	100
Height at preoperculum.....	40
Width “ “.....	22
Eyes—Distance from snout.....	43
Diameter of eye.....	18
Lower jaw—Length.....	75
Greatest height.....	10
Intermaxillary bones—Length of posterior processes.....	12
Operculum—Length of upper margin.....	29
Greatest length.....	33
Height.....	18
Infraoperculum—Length.....	30
Length of shortest ray above the superior longitudinal ridge.....	12
Length of its angular processes about.....	22
Teeth—Length of posterior vomerine tooth.....	14½
Width “ “ “.....	3¼
Length of largest dentary tooth.....	9
Width “ “ “.....	3

The present species differs from the *Caulopus borealis* by the oblong operculum, the nearly equal triangular shape of the coalescent infraopercular bone above the dividing ridge, but with an oblique excavation at its base which describes nearly the third of a circle, as well as the sculpture of the portion below the dividing ridge. The vomerine teeth are stronger but less elongated, and the palatine approximated and not curved.

This fish was discovered at Monterey, Lower California, by Mr. A. S. Taylor, and the head as well as the caudal and ventral fins, all considerably mutilated and “sun-dried,” were preserved and forwarded to the Smithsonian Institution, in whose museum they are now contained. The notes of Mr. Taylor describe it as an “eel-like fish,” “shaped something like a Barracouta” (*Sphyrana*) and apparently “a female (?)” It was “caught near Monterey Rocks, 19 April, 1859.” Its weight was seven pounds; the length “from snout to end of tail four feet,” circumference round the belly seven inches; it had “simple viscera; the gall bladder, three inches long, was filled with transparent green gall; it had two simple straight guts; the female (?) organs of the roe (not impregnated) white and four inches long.” It was “evidently in very poor condition.”

The species is “called ‘serra,’ or saw fish, by the Lower Californians, but it is a very rare species.” The specific name given to it has the advantage of at the same time perpetuating the popular name and of being classical and describing one of the peculiarities of the palatine dentition, which distinguishes it from the *A. (C.) borealis*.

#### ALEPIDOSAURUS (CAULOPUS) POEYI Gill.

A species at least very nearly related to the *A. (C.) serra*, is found in the Caribbean Sea. It has been noticed in M. Poey’s “*Conspectus Piscium Cubensium*” as perhaps a new species, or, perhaps, the other sex (sp. nova? an *sexus alter?*) of his *Alepisaurus altivelis*. That professor has kindly sent to me outlines of both the *Alepisaurus altivelis* and the doubtful form, and I find that the dimensions of the latter and the present almost exactly agree in the height of the head, length of the snout, size of the eyes, and depth of the lower jaw. There appears, however, if full reliance is to be placed in the figure, to be some difference in the opercular bones, that portion of the coalescent, inferior, opercular piece, which is above the longitudinal dividing ridge, being much wider towards the upper angle of the preoperculum, and not deeply excavated on its oblique base, thus approaching the *A. (C.) borealis*; the operculum itself appears to be less long, its longest ray being little more than 1862.]

a third (31-100) of the head's length. The head itself is not so large, forming only a seventh of the total length. Finally, the first dorsal spine is represented as being nearly over the axilla of the pectoral fin. M. Poey distinguishes it further from his *A. altivelis* in his correspondence as follows :

"Le 337 diffère du 619 par 15 fois la hauteur dans la longueur totale, au lieu de 13. La tête 7 fois au lieu de  $6\frac{1}{2}$ . De la base de la pectorale à la base de la ventrale, il y a la même distance que jusqu'à l'anale, moins  $\frac{1}{2}$ , au lieu de moins  $\frac{1}{4}$ . Premier rayon-dorsal  $\frac{1}{2}$  de l'autre au lieu de  $\frac{1}{2}$ . Le 2e égal le 1er. Le 4e est le plus grand. Du 6e au 24 tous sont hauts, et égaux, au lieu que chez 619 le 2-22 sont hauts, égaux. D. 41. Lobe sup. caudal prolongé, lobes séparés, trois rayons au milieu. Ventr. d'épassant l'anus et la hauteur du corps. Couleur de la dorsale uniforme. Je n'ai pas noté dans 619 que la 1er rayon fut raboteux, à la dorsale."

In honor of the gentleman who has thus distinguished the species, it may take the name of *ALEPIDOSAURUS* (*CAULOPUS*) *POEYI*.

On a new Species of *PRIACANTHUS* discovered in Narragansett Bay, R. I.

BY THEODORE GILL.

During a recent visit to Philadelphia, I discovered in the Museum of the Academy of Natural Sciences, a species of *Priacanthus*, which was at once discovered to be most nearly allied to a species of Japan. In the same bottle was a note confirming the label and giving the following information: "From Mr. Philip Caswell; taken at Cananicut Ferry, Narragansett Bay, Sept., 1860. Color like Gold Fish." I am assured by Dr. Bridges, one of the principal ichthyologists of Philadelphia, that he is himself conversant with the circumstances of its discovery, and that there can be no doubt of the fact of its having been found in Rhode Island as well as *Sarothrodus maculo-cinctus* and *Hyphorhodus flavicauda*, described in a previous number of these Proceedings, from the same State.

The species may be named

*PRIACANTHUS ALTUS* GILL.

The height of the body equals about a half of the total length, inclusive of the caudal fin. The head forms more than a third of the same. The diameter of the eye in the young specimens is contained  $2\frac{1}{2}$  times in the head's length. The posterior nasal aperture is a long curved slit. The angle of the preoperculum is armed with a strong spine passing beyond the branchial aperture. The caudal fin truncated; the spines of the dorsal and anal fins longitudinally striated. The scales are proportionally large. The whole body is rough.

D. X. 11. A. III. 9-  
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The body appears to have been reddish or rose colored; behind and at the pectoral region, the color is plumbeous, but perhaps accidentally so. The dorsal fin has its spinous portion punctulated with very numerous blackish dots, and with two rows of large roundish clear spots, besides a row of smaller basal ones and one of similar small spots near the margin; the diameter of the large spots nearly equals the space between adjoining spines. The soft portion of the dorsal, as well as the anal and caudal fins, are more or less dotted with blackish; the spinous portion of the anal also so thickly covered as to be blackish. The pectoral fins are entirely blackish, the dots being densely crowded.

The specimen is little more than an inch (1 1-5) in length.

[March,

There can be no doubt as to the validity of this species, as it widely differs in the number of its rays from all except one otherspecies of *Priacanthus*, and especially from the formerly known American ones. The only species which resembles it in the number of the rays of the fins is a Japanese species—the *Priacanthus nipponius* of Cuvier and Valenciennes, and the Fauna Japonica. In other respects also the Japanese and North American species are closely related. The form is nearly similar but the height even greater in ours than in the *Priacanthus nipponius*, and consequently exceeding that of any other known species of the genus; the scales of the body and head are very rough; the ventral fins in the young, at least, entirely blackish; the spinous portion of the anal fin is also very dark. It is probable that the species undergoes a change of color somewhat similar to the *Priacanthus nipponius*.

The discovery of three new species of fishes on the coast of Rhode Island, all representing forms almost entirely confined to warmer seas, in such rapid succession, is an event of no little interest and importance. The specimens obtained were all young; single examples only were found of the *Sarothrodus* (*Chætodon* auct.) *maculo-cinctus* and the *Priacanthus*, and two of the *Hyporhodus flavicauda*. They were all doubtless brought to the New England shores by the Gulf Stream, which runs near the Rhode Island coast, and in which the traveller often finds small fishes, as well as other animals, of which the Isopod Crustacean, described below by Dr. Stimpson, is an example. None of the three species of fishes previously mentioned have yet been seen in the West Indian seas, where they will undoubtedly be hereafter found. It is important also to compare the discovery of these fishes on our own northern shores with the discovery on the Scandinavian and Greenland coasts of forms equally characteristic of the tropics. In another article I will allude to the analogy between the denizens of the Carribean and Japanese seas.

#### On an oceanic ISOPOD found near the south-eastern shores of Massachusetts.

BY WM. STIMPSON.

In the summer of 1859, while cruising among the south-eastern islands of Massachusetts in company with my friends Dr. Slack and Mr. Ordway, we approached the shores of the beautiful island of Martha's Vineyard—the Isle of Wight of New England. When becalmed in the Vineyard Sound north of Gay Head, we were occupied in observing the small medusæ and other pelagic animals which appeared near the surface of the water. Among them we noticed some pretty blue isopods quite new to our shores, which reminded me of forms which I had met with in the temperate parts of both great oceans. They were swimming at the surface and could be easily distinguished from the deck of our boat, even at some distance, by the ripple they made in their progress. Several of them were caught, and found to be *Idothea* of that oceanic type which has the habits of the miniature sailors *Physalia*, *Veilella* and *Janthina*, which are occasionally cast upon our south-eastern shores. It proves to be

#### IDOTHEA ROBUSTA Kr.

Body strongly convex, two and two-thirds as long as broad, and broadest at the fifth thoracic segment; lateral outline convex at the thorax, but somewhat concave at the abdomen. Surface pubescent. Inner antennæ reaching to the penultimate joint of the peduncle of the outer ones, which are less than one-half the length of the body. Thoracic segments protuberant, and laterally somewhat rugose; their epimera large, distinct and rather sharply projecting. Abdomen strongly three-jointed, with partial separation of a 1862.]

fourth joint, as in other species of the group. Extremity of the abdomen truncated, or slightly excavated. Color in life deep blue beneath the silvery or pearly pubescence.

Length 0·8; greatest breadth 0·29 inch.

Its nearest ally is *I. margaritacea* Dana, found in the ocean between Australia and New Zealand, in which the abdomen is regularly rounded at the extremity, while in our species there is a well-marked angle on either side.

On the West African genus *HEMICHROMIS* and descriptions of new species in the Museums of the Academy and Smithsonian Institution.

BY THEODORE GILL.

Mr. P. DuChaillu, the African traveller, obtained among other objects of natural history, specimens of several species of fishes, one of which is a new form of Peters' genus *Hemichromis*.

The genus *Hemichromis* was proposed, in 1857, by Dr. Peters for Chromoids, having the habit of *Chromis* or *Tilapia*, and with a row of conic, brown tipped teeth in each jaw, the two median of which in the upper were considerably larger, and also with an interior row of smaller teeth in the upper jaw. The only species was obtained in Guinea by Pel.

Recently, M. August Duméril has described and figured a species as a new generic type under the name of *Chromichthys elongatus* Guichenot. It agrees in every respect with *Hemichromis*, except in the presence of only one row of teeth in the upper jaw. As, however, the inner row of *Hemichromis* is formed by very small teeth, it is probable that it has been overlooked by Guichenot and Duméril, and that their species is therefore a genuine *Hemichromis*. That genus will then embrace four species, which may be distinguished as follows:

*HEMICHROMIS FASCIATUS* Peters.

*Hemichromis fasciatus* Peters, Monatsberichte der Königlichen Preuss. Akademie die Wissenschaften zu Berlin, 1857, p. 403.

"Fasciis transversis fuscis sex, macula operculari nigra; pinna dorsali et anali oblique fasciatis, albo marginatis; pinna caudali supra infraque albo marginata; pinnis ventralibus externe fuscis."

D. XIV. 11—12. A. III. 9—10.

Habitat. Guinea. (Peters.)

*HEMICHROMIS AURITUS* Gill.

Fasciis quinque, latere medio expansis, macula operculari nigra, margaritacea supra infraque marginata; pinnis ventralibus externe fusco-purpureis.

D. XIV. 11. A. III. 8.

Habitat. Gaboon River?

*HEMICHROMIS BIMACULATUS* Gill.

Unicolor, macula corporis latere unica et operculi apice nigris.

D. XIV. 1.  $8\frac{1}{1}$ . A. III.  $6\frac{1}{1}$ . Squam. ser.  $25\frac{3}{9}$ .

*HEMICHROMIS ELONGATUS* Gill.

*Chromichthys elongatus* (Guich.) Dum., Archives du Museum, tome x. p. 257, pl. xxii. fig. 3.

Fasciis quinque (macula operculari nulla): squamis buccis quinqueseriatis.

D. XIII. 9. A. III. 8.

Habitat. Gaboon River.

[March,



## HEMICHROMIS AURITUS Gill.

The body is oblong and arched from the interorbital region to the end of the dorsal, both of which are at the same horizon; the height is greatest under the seventh dorsal spine where it nearly equals three-tenths ( $\cdot 29$ ) of the length; behind the dorsal fin, it exceeds an eighth ( $\cdot 13$ ), and at the lowest part nearly equals a ninth ( $\cdot 11$ ) of the length. The greatest thickness is nearly equal to a seventh of the length.

The head forms three-tenths ( $\cdot 30$ ) of the total length; its height at the preopercular margin bears a proportion to the same length of 23-100, and at the pupil of 18-100. The profile above is perfectly rectilinear, and little oblique along the intermaxillary groove, from the region above the pupil to the symphysis of the jaw. The snout is acutely conical and nearly equals a third of the head's length (9-100 of total.) The preorbital bone is highest behind, and exceeds half the diameter of the eye, while between that point and the nostrils it equals the same half. The preoperculum is vertical behind, slightly prominent at its angle and obliquely curved forwards. The operculum forms less than a third (9-30) of the head's length, and its angle is rounded. The subopercular border behind is nearly vertical, and has a shallow emargination, while below it is very obliquely rounded; the height of the operculum and suboperculum combined exceeds half (16-30) of the head's length. The interorbital region is flattened, and the sinus for the pedicles of the intermaxillary bones is indicated by a semielliptical outline, terminating at the vertical of the front border of the pupil.

The teeth are tipped with brown and in a regular row in each jaw, about twenty-five on each side in the upper (25 I. I. 25), and sixteen in the lower (16-3, 4)-16; the two front teeth of the upper are two or three times as long as the others, and that on each side is also rather larger than the others. The three or four teeth on each at the front are somewhat larger and separated from the others. The second series of small teeth, which are also tipped with brown, is separated by a wide interval in front, but gradually approaches the outer row towards the side.

The dorsal fin commences over the end of the operculum; its base is one and a half times longer than the head ( $\cdot 41\frac{1}{2}$  of length); the spinous portion exceeds the head's length ( $\cdot 31$ ), and the soft is considerably less than half as long ( $\cdot 13\frac{1}{2}$ ). The spines rapidly and regularly increase in a curved line from the first to the fifth, and behind the latter very slowly increase towards the last; the first spine nearly equals the lesser height of the preorbital bone ( $\cdot 3\frac{1}{2}$ ), and is much less than half as long as the fifth ( $\cdot 8$ ) and less than a third as long as the last one ( $\cdot 11$ ). The soft portion is acuminate at the middle or sixth ray, which exceeds by half the length of the longest spine as well as the last ray.

The anal fin commences under the third ray of the dorsal fin, and ends under or nearly under or slightly behind its last; its base exceeds an eighth ( $\cdot 12$ ) of the total length; the three spines regularly increase ( $\cdot 4$ ;  $\cdot 7\frac{1}{2}$ ;  $\cdot 9$ ) towards the soft part; the latter is acuminate like the dorsal, its longest ray equaling that of the dorsal ( $\cdot 16$ ), and twice the length of its last ray ( $\cdot 8$ ).

The caudal fin, when expanded, is almost truncated, the median rays forming almost a fifth ( $\cdot 19$ ), and the longest quite equalling a fifth ( $\cdot 20$ ) of the total length.

The pectoral fins are slender and equal the longest dorsal and anal rays ( $\cdot 16$ ). The ventral fins are immediately behind the vertical of the lower axillæ of the pectorals. The spine equals a third ( $\cdot 10$ ) of the head's length, and is as long as the fifth ray; the first ray is simply bifurcated, and equals  $\cdot 23$  of the total length; the other rays doubly or triply subdivided.

The scales are nearly equal, except on the abdomen, where they are much smaller. There are twenty-five oblique rows, and at its deepest portion thirteen longitudinal rows, three of which are above and nine below the lateral

line, while on the caudal peduncle there are seven rows, three above and three below. The anterior portion of the lateral line runs along eighteen scales, and the posterior along nine. A row from the front of the anus would end above, near the seventh dorsal spine. The scales of the cheeks are in three regular rows, without including those in the limb.

D. XIV. 11. A. III. 8. C. 3. I. 7. 7. I. 3. P. I. 1. 13. V. I. 5.

The color of alcoholic specimens is purplish brown above, fading into lighter on the sides, where margaritaceous spots on each scale form faint, interrupted longitudinal lines. The sides have five ovate black spots terminating in lighter processes above and below, and forming indistinct vertical bands. The first is above the base of the pectoral fin; the second on the seventh to ninth oblique rows of scales; the third above the spines of the anal fin; the fourth nearly behind the fins, and the fifth at the base of the caudal. The head is uniform and like the body, except at the angle of the operculum, where there is a rhomboidal black spot, and bordered before and behind, below the angle, with margaritaceous. The fins are immaculate; the ventrals only having the external half dark purple.

This species is closely allied to the *Hemichromis fasciatus* of Peters, but is distinguished from it by the uniform color of the fins, the presence of only five vertical bands, the margaritaceous margination of the opercular spot and the presence of only eight anal rays, the last two of which are simple, but entirely separated. Dr. Peters attributes to his species the formula for the

3  
scales 28 —, I do not know whether this indicates the actual number of rows  
9

or the sum of those pierced for the two parts of the lateral line. If the latter is the case, it would nearly agree with the *H. auritus*.

Specimens of this species were obtained by Mr. DuChaillu in the Gaboon River,\* and are preserved in the Museums of the Academy of Natural Sciences of Philadelphia and of the Smithsonian Institution.

Length from snout to end of median caudal rays $4\frac{1}{2}$ .....	100
Body—Greatest height .....	29
Height behind dorsal fin .....	13
Height of caudal peduncle .....	11
Length “ “ .....	$10\frac{1}{2}$
Greatest thickness .....	$13\frac{1}{2}$
Head—Length laterally .....	30
Height at preopercular margin .....	23
“ “ pupil .....	18
“ of preorbital end of jaw .....	$4\frac{1}{2}$
“ “ near nostril .....	$3\frac{3}{4}$
Length of snout .....	9

\* Many specimens of a new Cyprinodont allied to the African *Poecilia* of A. Dumeril were also collected. It may be called *Epiplatys sexfasciatus* Gill. Allied to *E. homalonatus*, but the head above is *oblong*, with the snout transversely semicircular and the lower jaw little but uniformly prominent. The caudal peduncle is not constricted, and its length equals the height behind the dorsal.

3  
D. 3. 7. (3. 8.) A. 3. 12. Scales 28 —,  
5

The color is reddish, with six bands below the lateral line; 1st, behind the pectoral; 2d, close before the ventral; 3d, close before the anal; 4th, over ninth to eleventh anal rays; 5th, behind dorsal; 6th, at end of caudal peduncle.

The name of *Epiplatys* is proposed for the present species and the *Poecilia omalonata*, *P. spylargyreia* and *P. spilanchen* of A. Dumeril, which differ from the true *Poecilia*? *P. vivipara* Schneid., *P. Surinamensis* Val.) by the longer anal, whose hinder portion is opposite to the dorsal, &c. *Mollinesia* is distinguished by the difference of the sexes and the large dorsal.

[March,

Length of front operculum.....	9
Height of operculum and suboperculum.....	16
Width of interorbital area.....	8 $\frac{1}{2}$
Eye—Diameter.....	7 $\frac{1}{2}$
Dorsal—Origin from snout.....	32
Length of base.....	31+13 $\frac{1}{2}$
Height at first spine.....	3 $\frac{1}{3}$
“ “ fifth spine.....	8
“ “ last spine.....	11
“ “ longest ray.....	16
“ “ last ray.....	9
Anal—Origin from snout.....	57
Length of base.....	12
Height at first spine.....	4
“ “ second spine.....	7 $\frac{1}{2}$
“ “ third spine.....	9
“ “ longest ray.....	11
“ “ last ray.....	8
Caudal—Length of median rays.....	19
“ “ longest rays.....	20
Pectoral—Length.....	16
Ventral—Length of spine.....	10
“ “ first ray.....	23
“ “ fifth ray.....	10

## HEMICHROMIS BIMACULATUS Gill.

The form is similar to that of its congeners, and is highest under the fifth and sixth dorsal spines, the height there somewhat exceeding a quarter ( $\cdot 26$ ) of the extreme length; that of the caudal peduncle, behind the anal fin, equals half of the greatest height, and that of the lowest part exceeds a ninth ( $\cdot 11\frac{1}{2}$ ) of the total length, and is considerably greater than the length of the peduncle. The thickness of the body at the pectoral region equals half the height ( $\cdot 13$ ).

The head forms three-tenths ( $\cdot 30$ ) of the length; its height at the preopercular margin exceeds a fifth ( $\cdot 22$ ), and that at the pupil nearly equals a sixth ( $\cdot 16$ ) of the total length of the fish. The length of the snout equals an eleventh ( $\cdot 9$ ) of the same, and exceeds twice the height of the preorbital bone ( $\cdot 4$ ). The length of the operculum is twice as great as the height of preorbital ( $\cdot 8$ ). The eyes are oval, and the longitudinal diameter equals the length of the operculum ( $\cdot 8$ ), and is greater than the width of the forehead between them; the latter is plain, the emargination for the intermaxillary processes being very shallow and extending little beyond the anterior borders of the orbits. The mouth is small and oblique; the supramaxillars extend backwards to the anterior borders of the orbits.

The larger teeth are moderate, uniserial and nearly or quite contiguous in each jaw; there are about twenty on each side in the upper and seventeen in the lower jaw, besides the two larger on each side in front in the upper and one equal in size to the rest, but removed backwards on each side in the lower; the teeth of the inner, small, transverse row of the upper jaw are well developed, but much smaller than the outer, and two to four on each side separated by a wide interval from those of the opposite side.

The dorsal fin commences over the base of the pectoral, or at a distance from the snout exceeding the head's length ( $\cdot 31$ ); its spinous portion equals  $\cdot 28$  of the total length, and its soft nearly an eighth ( $\cdot 12$ ); the former increases in a gradually curved line towards the soft portion, the first spine being very short ( $\cdot 2\frac{1}{2}$ ), the fourth more than twice as long ( $\cdot 6$ ), and the last nearly four times as long ( $\cdot 09$ ). The soft portion is produced at the median



This is a very distinct species, readily distinguished by the small mouth and short intermaxillary processes, as well as by its dimensions and the color.

A single specimen is in the collection of the Smithsonian Institution, to which it has been transferred from the former National Institute of the City of Washington. There is no indication of locality, but it is probable that it was sent from Liberia. With it are three other species, a foetal *Rhinobatus*, a new *Clarias*\* and a new *Mormyroid*,† all in a poor state of preservation.

Three African genera of Chromoids appear to be now known, all of which differ from the American ones. All have a regular form, interrupted lateral line, large scales and three anal spines. They may be briefly distinguished as follows :

TILAPIA A. Smith, A. Duméril.

*Chromis* Heckel, Müller, Peters, Günther, (nec Cuv.)

? *Coptodon* Gervais. (? = *Haligenes* Gthr.)

Corpus ovatum; caput breve; dentes apicibus oblique expansis, uni vel biemarginatis, in maxilla superiori triseriales, inferiori biseriales.

*Type.* Tilapia nilotica.

HALIGENES Günther.

Corpus ovatum; caput breve; dentes apicibus oblique expansis, uni vel biemarginatis; in maxilla superiori biseriales, serie interna minores, inferiori uniseriales.

*Type.* Haligenes Tristrami Günther.

HEMICHROMIS Peters.

Corpus oblongum; caput oblongo-conicum, acutum; dentes conici, apicibus nigri, in maxilla superiori biseriales, serie interna minuti, inferiori uniseriales.

*Type.* Hemichromis fasciatus Peters.

\* *Clarias leviceps* Gill.—Height at anus a tenth of length; head (laterally) a sixth; its breadth an eighth; the surface smooth; maxillary barbels twice as long as head.

D. 86. A. 61.

† *Marcusenius brachyistius* Gill.—The height in front of the anal fin equals a fifth of the length, exclusive of the caudal, and scarcely exceeds the length of the head. The distance of the short dorsal from the snout is three and a half times (.69) greater than the head's length; the anal has about ten rays before and four behind the dorsal. The pectorals are shorter than the head (.15) and scarcely extend as far as the bases of the ventrals. The head is decurved and the snout convex. All the teeth (about six in each jaw) are emarginated.

D. II. 1. 14. A. II. 1. 24. Scales 50; between ventrals and lateral line 10 rows; in

front of anal  $\frac{1}{9}$ .

Widely distinguished from its congeners (*M. anguilloides*, *M. Tuckeyi* and *M. zambanense*) by the radial and scale formulæ.

The Mormyroids are divisible as follows:

- I. Dorsal very long. Vomer covered by anterior processes of palatine bones; cerebellum entirely concealed above. . . . . MORMYRINÆ.  
     Muzzle tubuliform (*M. caschive* Has.) . . . . . Mormyrus.  
     Muzzle obtuse (*M. Hasselquistii* Geoff.) . . . . . Mormyroides.
- II. Dorsal more or less abbreviated. Vomer uncovered. Cerebellum and quadrigeminal bodies more or less exposed above. . . . . PETROCEPHALINÆ.  
     A. Snout not produced; mouth not continued to vertical of eyes.  
         a. Anal (25—50), not more than twice as long as dorsal  
             Lower jaw prominent, *M. anguilloides* L. . . . . Mormyrops.  
             Upper jaw longer, (*M. cyprinoides* L.) . . . . . Marcusenius.  
         b. Anal three times as long as dorsal.  
             Palatal teeth *pisiform* (*M. dorsalis* Geoff.) . . . . . Hyperopisus.  
     B. Snout produced. Mouth under eye, (*M. bane* Val.) . . . . . Petrocephalus.

1862.]

Catalogue of the Fishes of Lower California in the Smithsonian Institution,  
collected by Mr. J. Xantus.

BY THEODORE GILL.

PART I.

Mr. John Xantus, when stationed at Cape St. Lucas, Lower California, as a tidal observer for the coast survey, brought together a very large collection of objects of natural history, among which is a most excellent series of the fishes of the coast. The collections were formed under the auspices and direction of the Smithsonian Institution, to which the species were sent from time to time and deposited in its museum. By permission of the Secretary of the Institution, I propose to give a preliminary synopsis of the species discovered on that coast, embracing descriptions of the numerous new species. At a future time I trust that I shall be enabled to publish a more complete monograph accompanied by figures of the various species. The following descriptions are, however, pertinent, and will enable naturalists, in most cases, to readily identify the species. The Pomacentroids are the only ones, I believe, concerning which there can be doubt, but I think that I have succeeded in giving them, also, their distinctive characters after an examination of many species.

In the final part of this catalogue, the peculiarities of the Fauna of Lower California will be discussed, and its relations to that of other regions. Some species are common to even the temperate seas of South America and the West Indies, but a very large proportion of those discovered are new.

Family LABROIDÆ (Cuv.) Bleeker.

Subfamily LABRINÆ (Bon.) Gill.

The representatives of the Labrinæ found in the California waters belong to the "group" of Julidina, characterized by Dr. Günther in his excellent Synopsis of the Labroid Genera. The course of the lateral line appears to be more important than the number of spines, and, consequently, we may associate those Labroids with an interrupted or suddenly deflected line (except Gomphosinæ) in one subfamily, (Xirichthyinæ) and provisionally refer the rest of the Julidina, the Hypsigenina and Labrina of Dr. Günther to one subfamily, (Labrinæ) as I know of no important characters coincident with the number of dorsal spines.

Only one species of the Labrinæ inhabiting the California coast has been hitherto described. It is the *Semicossyphus pulcher* Gthr. (*Labrus pulcher* Ayres.) Two new species are now described, both of which belong to the genus *Harpe* (Lac.) or *Cossyphus* Cuv., (not Fabricius.)

Genus HARPE Lac.

This may be retained as by Lacépède for those species whose median dorsal and anal rays become much extended in the adult. The *Cossyphus axillaris* Cuv. et Val. &c., may be then referred to a new genus (*Lepidaplois*) distinguished by the nearly uniform anal.

HARPE DIPLOTÆNIA Gill.

The greatest height, inclusive of the scaly sheath of the dorsal fin, equals a fourth of the length from the snout to the end of the median caudal rays. The head scarcely exceeds the height; its profile is not or very little gibbous in the adult. The preoperculum is entire or scarcely crenulated; its posterior margin is vertical, and its angle obliquely rounded. The eye is subcircular, contained about six times in the head's length, and distant from the snout about two diameters and-a-half. The height of the preorbital bone equals half the length of the snout. The mouth is moderate, the supramaxillary bone ending

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nearly under the posterior nostril. The four canine front teeth of the upper jaw are conoid, and of nearly equal size, the two median curved slightly forwards, and the external downwards and sideways; *the four of the lower jaw have nearly the same inclination forwards*; the two median are about half as long as the external, contiguous to them, and themselves inclining towards each other. Behind the canine teeth are small granular ones.

The acuminate dorsal and anal fins increase in length with the age of the fish, and in the adult the former extends nearly to, and the latter beyond the median caudal rays, while the external rays of the caudal are twice as long as the median. The ventrals of the adult are also elongated, and extend to the third anal spine. The pectorals are as long as the head in front of the operculum.

The scales are moderately large, there being thirty-three along the lateral line, five rows above, at the origin of the dorsal fin, and twelve rows beneath. On the caudal peduncles there are four rows above, and five beneath.

#### D. XII. 11. A. III. 13.

The color is brownish yellow, reticulated on the trunk with a dark brownish hue, which margins each scale. A dark band commences behind the snout, obliquely tends towards the eye, and behind is divided into two, the upper of which runs along the oculo-scapular groove, is continued high on the side, and nearly joins the corresponding one on the back of the caudal peduncle; the lower one crosses the operculum at its angle, and on the caudal peduncle runs along the lateral line, but ceases before the end of the latter, and alternates with two spots behind the base of the caudal fin. A band less distinct runs on the head from the angle of the mouth, and passes close above the angle of the preoperculum. The pectoral fins are immaculate and yellowish; the spinous dorsal has its postspinal tips orange; the posterior parts of the dorsal and anal as well as of the caudal are yellowish, while the rest is darker. The first ray of the ventrals is orange.

Two specimens of this species were sent to the Smithsonian Institution by Mr. Xantus; one is in spirits and is nearly nine inches long. The dorsal extend back to the end of the caudal scales; the anal to the base of the lower caudal rays; the external caudal rays are scarcely produced; the ventrals do not extend to the anus. The other is about sixteen inches long; the dorsal ends rather behind the caudal scales, while the anal is much produced, and extends as far back as the posterior caudal margin; the external caudal rays of the naked part of the caudal are nearly twice as long as the others.

#### HARPE PECTORALLIS Gill.

The greatest height is little more than a third of the length. The head is contained about three times and a third in the same length, and in the young is symmetrical and conical, the profile being nearly straight, but in the adult the forehead is very gibbous above the eyes. The preoperculum is either entire or very slightly crenulated, vertical behind, and with its angle obliquely rounded and curved forwards. The eye is subcircular, and its diameter a little less than a sixth of the head's length; it is distant two and-a-half times its diameter from the snout; the height of the preorbital bone equals half the length of the snout. The mouth is moderate, the supramaxillary bone ending nearly under the posterior nostril. The four large teeth of the upper jaw are nearly equal in size; the median are approximated and curved outwards, and are separated by a diastema from the external, each of which is curved downwards and outwards. Of the front teeth of the lower jaw, the two median are *very small, nearly vertical, and separated by a diastema from the external*, which are as large as those of the upper and directed forwards. Behind the large teeth is a band of granular ones.

The summits or angles of all the fins, except the pectoral, become elongated with advancing age, so that, finally, the dorsal extends backwards nearly to, 1862.]

and the anal beyond the median caudal rays; the external caudal rays increase, and become twice as long as the median, and the ventral extend backwards nearly as far as the base of the anal. The pectorals are constant in their proportion, and equal the length of the head exclusive of the operculum.

5 4  
D. XII. 11. A. III. 13. Scales 32—33 — —.  
12 5

When dried, the color is brownish-yellow, and reticulated, the margin of each scale being darker. The terminal halves of the posterior dorsal and anal fins, as well as of the shorter caudal rays, are orange; the largest caudal rays, and the anterior borders of the dorsal and anal are reddish; the rest of these fins, as well as the ventrals, are darker. The pectorals are orange, with its tip marked by a large dark spot.

"When alive, a yellow patch of the size of a half dollar is just behind the side (pectoral) fins. Head, tail, and all the fins bright red, with the tips black and yellow. Whole body bright blue."

It is allied to *Iarpe rufus*—*Cossyphus rufus* Gthr., or *Cossyphus bodianus* Cuv.

There are three specimens in the collection:—

1st. One a foot long from the snout to the concavity of the caudal, beyond which the external rays project about an inch; the dorsal extends little beyond the scaly sheath of the caudal, and the anal to the middle of the external rays; the ventrals reach the anal. The forehead is not gibbous.

2d. One sixteen inches long to the concavity of the caudal fin, of which the exposed parts of the external rays are twice as long as those of the others; the dorsal extends backward nearly to, and the anal beyond the caudal margin; the ventrals pass the middle of the base of the anal. The hump of the forehead exceeds by a half the eye's diameter.

3d. An old specimen, two feet long, with the caudal lobes rather more produced, but the dorsal, anal and ventrals rather less than in the second. The hump on the forehead is very elevated, and twice the diameter of the eye.

### Subfamily XIRICHTHYINAE Gill.

#### Group JULIDES.

#### Genus JULIS (Cuv.) Günther.\*

##### JULIS LUCASANUS Gill.<sup>1</sup>

The height at its highest part equals a fifth (19-20) of the total length. The head is oblong, moderately decurved in front of the eyes, and forms nearly a quarter of the total length; its height above the preopercular margin nearly equals two-thirds (15-24) of its own length, and over the pupil, a half (12-24). The length of the snout equals a third and is about twice as great as the height of the preorbital. The diameter of the eye equals a quarter of the head's length. The interorbital area is nearly arched transversely, and its shortest width exceeds the diameter of the orbit.

The dorsal fin commences nearly over the bases of the ventral fins, and is

\* The *Julis modestus* of Girard (*Halichæres californicus* Gther) belongs to this genus. The description by Girard of this species, as well as most others, is very defective, the characters being chiefly vague or generic. The *Julis modestus* has an oblong, acutely

2 3  
conic head; D. VIII. 14; scales 26 — —. Lin. lat. ant. 20; the tubes of the lateral lines  
10 3

simple and straight.

I have not seen the *Julis semicinctus* of Ayres, but on account of its height and the presence of nine dorsal spines, am inclined to refer it to *Halichæres*, or rather *Chærojulis*, the former name being preoccupied for a genus of Scals. Ayres, like Girard, may have mistaken the number of spines, but it may be assumed that he is correct.

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nearly uniform at its respective parts, the soft being rather higher than the spinous.

The anal fin commences at or close before the middle of the length.

The caudal, when expanded, is truncated, and forms a sixth ( $\cdot 17$ ) of the total length.

The pectorals have very oblique bases, and equal in length the height of the body, ( $\cdot 19$ ). The ventrals are inserted somewhat before the lower axilla of the pectoral, from which each is separated by a space equal to the base of the pectoral. The length equals an eleventh of the total.

The tubules of the lateral line are generally more or less trifid (rarely quadrifid) on each scale.

1  
D. VIII. 13. A. III. 10  $\frac{1}{1}$ . Scales 25.

The color of the upper half, except a lighter band below the dorsal fin, is dark purplish, and abruptly separated from the light brownish or rose of the lower half. The soft portion of the dorsal is margined with whitish; the rest, as well as almost the whole of the spinous portion, is dark. The basal half of the anal is light brownish, and the margined half whitish. The caudal has above and below a narrow marginal line of whitish and a submarginal purplish band; the rest is yellowish. The upper axilla of the pectorals has a dark purple dot.

Many specimens of this species, the largest of which is three inches long, were obtained by Mr. Xantus.

#### Group *XIRICHTHYÆ*.

This group, embracing the *Xirichthyinae* with an interrupted line, is represented by a number of genera which may be briefly characterized as follows:

##### I. Dorsal spines 9 (10).

###### A. First two spines forming a distinct fin.

Cheeks with small scales.....Novacula.

Cheeks naked (*Xirichthys pavo* C. V.).....Iniistius.

###### B. Dorsal fin continuous.

###### C. Cheeks naked.

###### $\alpha$ . Scales large.

Ventrals thoracic.....*Xirichthys*.

Ventrals subjugular (*Xir. tæniurus* C. V.).....*Malacocentrus*.

$\beta$ . Scales small (*Xir. microlepidotus* C. V.).....*Cymolutes Gthr.*

##### CC. Cheeks with large scales.

###### $\alpha$ . Supramaxillars normal.

###### 1. Head and eyes moderate.

Dorsal and anal acutely angulated near end.....*Cheilinus*.

Dorsal and anal angulated at end (*Cheil. arena-*  
*tus* C. V.).....*Oxycheilinus*.

###### 2. Head very large; eyes small (*Cheil. undulatus* C. V.).....*Crassilabrus*.

$\beta$ . Supramaxillars prolonged behind by a membranous extension.....*Epibulus*.

##### II. Dorsal spines 11.....*Cirrhilabrus*.

There is another genus (*Doratonotus* Gthr.) which is said to have the spinous portion of the dorsal strongly depressed in the middle. It has as yet been only indicated. The *Xirichthys altipinnis* of Rüppell has a similar depression of the dorsal.

#### *XIRICHTHYS MUNDICEPS* Gill.

The greatest height close behind the ventral fins nearly equals a quarter (23-100) of the total length; the elevation above the axis is nearly uniform at the spinous dorsal, but under the soft is slowly decurved to the caudal peduncle. [1862.]

duncle; the preanal region is nearly horizontal, but behind is nearly rectilinear and slowly trends upwards to the caudal. The height of the caudal peduncle equals a tenth ( $\cdot 10$ ) of the total length.

The head is scarcely longer than high, and curved from the dorsal to the eyes; it is laterally rhomboid, the profile in front of the eyes descending downwards in a nearly straight and oblique line at an angle of about  $43^\circ$  to the longitudinal axis of the body, and nearly parallel with the preoperculum. The length from the snout to the end of the subopercular membrane constitutes a quarter of the total, and is a fifth greater than the height at the vertical margin of the preoperculum. The snout (from the orbit to the symphysis of the intermaxillaries) is more than a third ( $\cdot 27$ ) of the head's length, and nearly twice ( $\cdot 5$ ) as great as the oblique height of the preorbital. The eye is moderate, the diameter being contained between five and six ( $4\frac{1}{2}$ - $25$ ) times in the length of the head; the distance from the profile equals two-thirds of that diameter; that from the lower margin of the preoperculum nearly ( $\cdot 8$ - $\cdot 9$ ) equals the distance from the snout.

The preoperculum is rounded at its angle, vertical behind and horizontal below. The operculum equals the depth of the preorbital, and the suboperculum extends nearly an eye's diameter, the distance between the end of the subopercular membrane and the preoperculum equalling the height of the operculum behind the latter.

The dorsal fin commences nearly over the middle of the operculum, or more than a fifth ( $\cdot 21$ ) of the total from the snout; the spinous portion occupies a quarter ( $\cdot 25$ ), and the articulate much more than a quarter ( $\cdot 29$ ) of the total length. The spinous portion is nearly uniform, the first spine nearly equaling the diameter of the orbit ( $\cdot 4$ ) and the second and following exceeding it, ( $\cdot 5$ - $\cdot 6$ ): the whole fin almost imperceptibly increases towards the middle of the soft part. The articulated rays are not branched, the last only being divided at its base.

The anal fin commences behind the second fifth of the length and nearly under the ninth dorsal spine; its base equals a third ( $\cdot 33$ ) of the total length: its height is nearly uniform.

The caudal is scarcely convex, and forms a sixth ( $\cdot 17\frac{1}{2}$ ) of the length.

The pectoral fins extend nearly to the vertical of the anus, and equal in length a sixth ( $\cdot 16$ ) of the total length.

The ventrals are inserted under the lower axilla of the pectoral, and the length equals an eleventh ( $\cdot 9$ ) of the total; they are acutely pointed, the first ray being considerably longest.

The scales are in twenty-four oblique transverse rows; at the region of greatest height in ten longitudinal ones, ( $\frac{1}{9}$ ) and on the caudal peduncle in seven ( $\frac{3}{9}$ ) rows.

The lateral line is composed of simple tubules; its elevated part runs through nineteen and its caudal portion through five scales.

D. IX.  $\frac{1}{1}$  -  $\frac{1}{9}$  - A. III.  $\frac{1}{1}$  - Scales  $24 - \frac{1}{8}$  - Lat. line  $19 - \frac{3}{3}$ .

The color is uniform flesh-colored tinged with brown.

Total length,	$3\frac{1}{2}$	100
Body—Height over ventrals.....		23
"    of tail.....		10
Width.....		8
Head—Length.....		25
Width.....		9
Height at preoperculum.....		20
Height of preorbital.....		5
Length of operculum.....		10

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Orbit—Diameter.....	4 $\frac{1}{2}$
Distance from snout.....	9
"    "    profile.....	3
"    above preoperculum.....	8
Dorsal—Distance from snout.....	21
Length of spinous part.....	25
soft part.....	29
Anal—Distance from snout.....	42
Length.....	33
Caudal—Length.....	17 $\frac{1}{2}$
Pectoral—Length.....	16
Ventral—Length.....	9

Numerous specimens were obtained by Mr. Xantus, but most of them are very small; the largest is less than four inches long.

### Genus INIISTIUS Gill.

#### INIISTIUS MUNDICORPUS Gill.

This species has the same form of the head and body as *Iniistius pavo*. The greatest height equals three-tenths (.30) of the length and that of the caudal peduncle a ninth (.11) of the same. The head forms less than three-tenths (.28) of the length, and is equal to the height over the preoperculum. The eye is small, its diameter entering seven times (.4) in the head's length; it is distant a diameter from the profile. The height of the preorbital equals a tenth (.10) of the total length. The front teeth of the upper and lower jaws are nearly equal, and those of the latter are received between those of the former. The anterior occipital spine equals the length of the pectoral and nearly a fifth (.19) of the total. The ventrals exceed a seventh (.15) of the length and are inserted entirely under the upper angle of the base of the pectoral. The caudal scarcely forms a seventh (.14) of the length.

D. II. VII. 22, 19 —. A. 3, 11 —. C. 2, 5, 5, 2. P. 2, 10. V. I. 5. Scales

2 3 2  
24 —. 25 inclusive of large one on caudal, — behind occipital fin; at anus—  
10 10 8

The body is yellowish or brownish and entirely immaculate. The dorsal alone has several oblique bars between its rays.

One specimen, nearly ten inches long, was obtained by Mr. Xantus at Cape St. Lucas, and is now in the Museum of the Smithsonian Institution. The right front tooth of the lower jaw is deflected forwards horizontally.

### Family POMACENTROIDÆ.

#### Genus EUSCHISTODUS Gill.\*

This name is appropriated to a group of Pomacentroids having nearly the same physiognomy as *Hypsypops*, but the teeth, instead of being entire, are very

\* A second species of this genus is an inhabitant of Panama, where it was discovered by Capt. J. M. Dow.

The forehead is transversely convex but not arched, the profile in front less steep, the preorbital higher behind, and the caudal peduncle shorter than in *Euschistodus declivifrons*.  
D. XIII. 12. A. II. 10.

4 3  
Scales 26 — —, L. I. 21.  
10 3

The color is uniformly chocolate or purplish brown; the bases of the pectorals with falciform black line pointed below.

The species may be named *Euschistodus concolor*.

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deeply and acutely notched. The genus *Glyphidodon*, whose teeth are emarginated, have also a short conic head and low (or narrow) preorbital bones.

*EUSCHISTODUS DECLIVIFRONS* Gill.

The region of greatest height is at the sixth dorsal spine; the height there, exclusive of the dorsal sheath,  $\cdot 45\frac{1}{2}$  of the total length; behind the vertical fins the height equals  $\cdot 18$ , and at the lowest portion of the caudal peduncle  $\cdot 15$  of the length.

The outline from the dorsal fin to the nape is convex and very oblique, then rectilinear, and at an angle of  $50^\circ$  to the axis as far as the interorbital region, which is transversely convex; in front the profile is also nearly rectilinear and at an angle of about  $73^\circ$ ; the snout, or rather jaw, is convex or curved inwards. The length of the head forms a quarter of the length, inclusive of the median caudal rays, and equals the height at the vertical of the pupil, but is a sixth less than that at the vertical of the preoperculum. The nape is above the hinder margin of the orbit. The length of the snout exceeds a third ( $9\cdot 25$ ) of the head's, and is twice as great as the greatest depth of the preorbital bone and nearly three times ( $9-3\frac{1}{2}$ ) as great as the depth at the angle of the mouth. The preoperculum is entirely vertical behind, horizontal below and obtusely angulated. The operculum forms about a third of the head's length ( $8\frac{1}{2}$ ); the operculum and suboperculum together are two and a third times ( $20-8\frac{1}{2}$ ) higher than the length of the operculum. The eye is contained nearly three times ( $9\cdot 25$ ) in the length of the head, and the interorbital area is transversely arched and exceeds the eye's diameter.

The mouth is small and its periphery semioval; the lower jaw is considerably shorter than the upper. The supramaxillary bone ends under the anterior margin of the orbit. The lower lip has a free margin, but it is partially attached at the symphysis.

The dorsal fin commences at the vertical from the upper axilla of the pectoral fin; its spinous portion nearly equals two-fifths ( $\cdot 39$ ) and its soft a seventh ( $\cdot 14$ ) of the total length; the spines progressively increase in a curved line towards the fifth, the first spine equalling half the length of the ventral spine ( $\cdot 51\frac{1}{2}$ ); the fifth, from its base, much exceeds ( $\cdot 13$ ), and on its exposed part nearly equals ( $\cdot 10$ ) twice its length; thence they diminish towards the last, which equals the length of the exposed part of the fifth. The soft part at its middle equals the height immediately behind the fin ( $\cdot 18$ ) and is much more than twice as great as the length of the last ray ( $\cdot 7$ ).

The anal fin begins under the penultimate spine, and its soft part is similar to and opposite the corresponding part of the dorsal. The length of the first spine nearly equals that of the first dorsal one ( $\cdot 5$ ), and the second is twice as long ( $\cdot 11$ ).

The caudal fin is emarginated and its lobes rounded; its median rays form  $\cdot 18$  of the total length and are a quarter less than the longest ( $\cdot 25$ ). The pectorals are rounded at the angles and equal in length  $\cdot 22$  of the total. The ventral fins are inserted a little behind the bases of the pectorals. The spine equals the second anal ( $\cdot 11$ ) and is half as long as the first and longest ray ( $=\cdot 22$ ) and equal to the internal ( $\cdot 11$ ).

The scales are arranged at the region of greatest height in fifteen rows ( $\frac{4}{10}$ ) and on the caudal peduncle in seven ( $\frac{3}{3}$ ). There are twenty-six obliquely transverse rows, and twenty-one are perforated for the upper part of the lateral line. The scales of the cheeks are in three rows.

The formula for the fins and scales are as follows:

D. XIII. 12. A. II. 12. C. 5. I. 7. 6. I. 4. P. I. 1. 17. V. I. 5. Scales  
 $\begin{array}{c} 4 \\ 25-26 \end{array} - \begin{array}{c} 3 \\ 10 \end{array} - \begin{array}{c} 3 \\ 3 \end{array} \text{ L. l. sup. } 20-21.$

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The color is greenish, tinged with brassy and with lighter areas in the centres of the scales on the sides, which form faint, uninterrupted lines. There are six transverse dorsal bands; the first almost obsolete before the dorsal fin; the second under the third to fifth spine; the third under sixth to eighth; the fourth under the tenth to twelfth; the fifth under the anterior half of the soft portion, and the sixth behind the fin.

Length from snout to end of median caudal rays ( $3\frac{1}{2}$ ).....	100
Body—Greatest height.....	43, $45\frac{1}{2}$
Height behind vertical fins.....	18
“ of caudal peduncle.....	15
Greatest thickness.....	17
Head—Length laterally.....	25
Height at preopercular margin.....	30
“ at pupil.....	25
“ of preorbital at end of jaw.....	$3\frac{1}{2}$
“ “ at highest part.....	$4\frac{1}{2}$
Length of snout.....	9
Length of operculum.....	$8\frac{1}{2}$
Height of operculum and suboperculum.....	20
Width of interorbital area.....	$9\frac{1}{2}$
Eye—Diameter.....	9
Dorsal—Origin from snout.....	$27\frac{1}{2}$
Length of base.....	39—14
Height at first spine.....	$5\frac{1}{2}$
“ “ fifth spine.....	(10)—13
“ “ last spine.....	8, 10
“ “ longest ray.....	18
“ “ last ray.....	7
Anal—Origin from snout.....	57
Length of base.....	19
Height at first spine.....	5
“ “ second spine.....	11
“ “ longest ray.....	18
“ “ last ray.....	$7\frac{1}{2}$
Caudal—Length of median rays.....	18
“ “ longest ray.....	25
Pectoral—Length.....	22
Ventral—Length of spine.....	11
“ “ first ray.....	22

Seven specimens of this species, varying between nearly two and four inches were obtained by Mr. Xantus.

#### Genus HYPSTYPOPS Gill.

This genus, framed for *Glyphidodonte*, with elevated preorbital bones and entire teeth, is rather allied to *Pomacentrus* than to *Glyphidodon*, the technical character bringing its species in the latter genus, being of less real value than the dentition or development of the suborbital bones.

#### HYPSTYPOPS DORSALIS Gill.

The height much exceeds a third ( $\cdot 37$ ) of the extreme length. The head is rather depressed in front of the nape and very steep in front of the eyes; it forms nearly a quarter ( $\cdot 23$ ) of the total length; its height at the vertical of the preoperculum much exceeds the length ( $\cdot 28$ ), and that at the pupil is less ( $\cdot 21$ ). The length of the snout equals two-fifths of the latter height ( $\cdot 8\frac{1}{2}$ ), is about a quarter more than the height of the preorbital bone ( $\cdot 6$ ), which itself is not much less than the diameter of the eye ( $\cdot 7$ ). The preoperculum is perfectly entire, and the teeth of the jaws truncated.

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The dorsal fin commences above the first scale of the lateral line; its greatest height equals or exceeds a quarter of the length ( $\cdot 26$ ). The caudal has acute lobes, forming more than a quarter ( $\cdot 27$ ) of the length, while the median rays scarcely equal a sixth ( $\cdot 16$ ) of the same. The pectorals and ventrals are nearly equally long and exceed a quarter ( $\cdot 21$ — $\cdot 22$ ) of the length; the latter are inserted immediately behind the former. The dorsal and anal are densely scaly.

3      2  
D. XII. 13.   A. II. 11.   Scales  $26 \frac{3}{10} - \frac{2}{3}$ .   Lat. line 21.

The color of the entire fish is a deep purplish brown, relieved on the back by two blue spots on each side, as in *Pomacentrus quadrigutta*, (under the fourth spine and under the third or fourth ray,) close behind the dorsal by a transverse linear spot, and on or just above the first scale of the lateral line by another spot. A blue line extends from the snout to the front of the orbit, and a spot exists above before the middle of the orbit. Another blue line crosses the preorbital and passes under the eye. There are also a few other blue dots scattered on the head.

A single specimen of this species, four inches long, was sent by Mr. Xantus to the Smithsonian Institution.

#### Genus POMACENTRUS Lac.

##### POMACENTRUS RECTIFRÆNUM Gill.

The height equals a third ( $\cdot 34$ ) of the total length, inclusive of the entire caudal. The head is regularly decurved from the nape and forms nearly a quarter ( $\cdot 23$ ) of the total length; its height at the preopercular margin exceeds the length ( $\cdot 24$ ) and is rarely a quarter greater than that of the pupil ( $\cdot 19$ ). The length of the snout exceeds a third ( $\cdot 8$ ) of the head's, is greater than the diameter of the eye ( $\cdot 7$ ), which itself is more than twice as great as the height of the entire preorbital ( $\cdot 3$ ) at the angle of the mouth. The preoperculum is finely dented and vertical behind. The teeth are entire.

The dorsal commences above the upper axilla of the pectoral; the greatest height exceeds a fifth ( $\cdot 21$ ) of the total length, and equals the length of the pectoral ( $\cdot 21$ ). The ventrals are inserted behind the pectorals, and equal a quarter of the length. The caudal forms about a quarter of the extreme length, and the inner rays exceed a sixth ( $\cdot 16$ ) of the same.

3      2  
D. XII. 16.   A. II. 15.   Scales  $25 \frac{3}{10} - \frac{2}{3}$ .   Lat. line 21.

The color is a deep chestnut, dotted with light blue on each scale on the back and tail, and on the sides with a faint crescentiform line, parallel with the border of each scale. The head has two blue lines diverging from the snout and passing over the eyes to each side of the dorsal; there is an oblique one on the preorbital and also a suborbital line, as well as one below the suborbital chain. Another proceeds backwards from the upper angle of the orbit. A black spot, bordered by blue, is more or less developed behind the dorsal. The dorsal, anal and pectoral are very dark, and the first two dotted with blue.

There are six specimens in the collection of the Smithsonian Institution. The pattern is similar, but not equally vivid in all. There is no indication of a dorsal ocellus.

The following two species were at first supposed to be varieties of one species of *Pomacentrus*, but, as there are no gradations, and as they differ slightly in pattern of coloration as well as the presence of a dorsal ocellus, it is improbable that such is the case.

##### POMACENTRUS FLAVILATUS Gill.

This species differs from the preceding by the presence of a very distinct

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ocellus on the anterior half of the soft part of the dorsal fin, which also advances downwards as far as the lateral line. The color of the body, below the lateral line, is yellowish brown, with an indistinct dot on each scale; the caudal, pectoral, ventral and anal fins as well as the dorsal fin behind are also yellowish, the external ventral ray and margin of the anal before being darker.

One specimen, about three inches long, was discovered at Cape St. Lucas by Mr. Xantus and sent to the Smithsonian Institution.

#### POMACENTRUS BAIRDII Gill.

This species has the hinder and lower part of its length colored like the preceding, but there is no trace of an ocellus, and the base of the soft part of the dorsal is blue. The ventral fins are also very light. The blue lines from the snout end over the pupils; a transverse line, a third of the interorbital area, exists on that area, and behind it are two short parallel longitudinal lines. There are three blue spots on the suborbital chain and one behind the angle of the mouth. The scales below are not dotted with blue in the middle.

Two specimens, rather less than an inch long, are in the collection of the Smithsonian Institution. The preopercular serrature is almost obsolete.

#### POMACENTRUS QUADRIGUTTA Gill.

The present species differs from *P. rectifrenum* by the greater portion of each scale being blue; the presence of two distant blue spots on the back, one below the end of the dorsal fin, and another at the end of the base of the anal; the color of the head above more like that of *P. Bairdii*. The ventrals are dark as in *P. rectifrenum*, edged, like the anal, with blue.

Many specimens, less than an inch long, were obtained and sent by Mr. Xantus to the Smithsonian Institution. The preopercular serrature is very faint.

#### Genus CHROMIS Cuv.

Furcaria was established by M. Poey for two species of Pomacentroids found along the Cuban coast, which were supposed to be distinguished from all others by seven branchiostegal rays and the unequal teeth. M. Poey has kindly sent to the Smithsonian Institution two specimens of the type of his genus, the *Furcaria puncta*, and, after a careful examination but without dissection, I have been unable to count a number so unprecedented and remarkable for a Pomacentroid, and have only discovered five. The name might, however, be retained for the group which differs from the typical species of *Chromis* or *Heliases* by the presence of only twelve dorsal spines.\*

#### CHROMIS (FURCARIA) ATRILOBATA Gill.

The form is probably nearly similar to that of *Furcaria puncta*, but the only specimen sent to the Smithsonian Institution by Mr. Xantus is much injured and shrivelled up, although preserved in alcohol. The greatest height is esti-

\* Another type of the Pomacentroids characterized by a band of conical teeth in each jaw is *Dascyllus* Cuv. (*Tetradrachmum* Cantor). An elegant undescribed species is found at the Sandwich Islands, from which specimens were sent to the Smithsonian Institution by Mr. W. H. Pease. It may be called *Dascyllus albisella*; it has the form of *Dascyllus marginatus* Ehr.; its height exceeds half the entire length. The head forms nearly a quarter of the same. Its forehead before the eye is vertical. The dorsal spine regularly decreases from the second to the last, the second equalling the length of the head and about twice as long as the last. The soft parts of the dorsal and anal are arched.

D. XII. 16. A. II. 15.

5 2

Scales 27—, —. Lat. line 18—19.

12 3

The color is dark grayish, with a transverse white band descending half way down from the middle of the back below the dorsal fin, between its fifth and tenth spines. All the fins, except the pectorals, are very dark.

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mated to have been about three-tenths of the extreme length, *inclusive of the caudal lobes*; that at the origin of the anal fin equals a quarter of the length. The height behind the dorsal and anal exceeds an eighth ( $\cdot 13$ ) of the total length, as well as the length (behind it) of the caudal peduncle, while the least height of the latter equals an eleventh ( $\cdot 9$ ) of the length.

The head forms more than a fifth ( $\cdot 21\frac{1}{2}$ ) of the extreme length, and is longer than high; the height at the upper angle of the preoperculum  $\cdot 19$ , and that at the pupil  $\cdot 17$  of the same length. The diameter of the eye is contained three and a half times ( $\cdot 6$ ) in the head's length, equals the snout and is twice as great as the height of the very oblique preorbital. The forehead and snout above are nearly rectilinear, and the former between the eyes is transversely arched and as wide as the diameter of the eye. The preoperculum is oblique behind and scarcely emarginated at its lower half, has its angle rounded and its inferior margin slightly ascending. The mouth is small and very oblique. The teeth are conic and curved, continued to the angles of the mouth and larger in front; behind is a transverse row of smaller ones.

The dorsal fin commences above the bases of the ventrals; its spinous portion is rather elevated, and its last spines rather shorter than the preceding; its base much exceeds a quarter ( $\cdot 28$ ) of the length; that of the soft nearly equals a seventh ( $\cdot 14$ ) of the length; at its middle the height nearly equals an eighth ( $\cdot 13$ ), and behind a tenth ( $\cdot 10$ ) of the length.

The anal, like that of *Furcaria puncta*, has its second spine as long as the succeeding rays, which are nearly uniform or even slightly increase towards the last.\*

The caudal forms more than a quarter ( $\cdot 27$ ) of the *extreme* length, the lobes, especially the upper, being prolonged and pointed, while the median rays only equal a tenth ( $\cdot 10$ ) of the length.

The pectorals are rather long ( $\cdot 18$ ) and bluntly angulated. The ventrals have the first ray filiform and equal to the pectorals; its base is behind that of the pectorals.

The scales have been mostly rubbed off in the single specimen in the museum. Those on the cheeks are triserial.

1  
D. XII. 11— A. II. 12.

1 4  
Scales 32—33— Lat. line sup. 21, (inf. 17!)

10  
The color is dark green. The dorsal blackish, except the hinder portion, (last four or five rays,) which is colorless. The caudal has its margins above and below black.

A single specimen was sent to the Institution by Mr. Xantus. It is in poor condition and slightly less than four inches long.

Genus GLYPHIDODON Lac.

GLYPHIDODON TROSCHELI Gill.

The form is similar to that of *Glyphidodon saxatilis* (Lac.) and its allies. The height equals half the length, exclusive of the caudal. The head forms a third of the same length and is as long as it is high close behind the eyes. The eye has a diameter nearly equal to a third of the head's length, is separated by a diameter from the muzzle, and the same distance from its fellow. The interorbital area is transversely convex. The preorbital bone is nearly parallel with the straight suborbitals. The preoperculum has a vertical posterior and horizontal inferior border, and its angle is obtuse or rounded.

The dorsal begins over the base of the lower rays of the pectorals. The pec-

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\* *Furcaria cyanea* is represented by Poey with the anal acuminate at the middle like the dorsal.



torals and ventrals are nearly equal and almost as long as the head. The ventrals are inserted nearly as far back as the vertical of the third dorsal spine. The entire caudal equals the length of the head; the median rays equal about two-thirds of the longest.

D. XIII. 12. A. II. 13.

4 3

Scales 25—, —. L. 1. 20.

10 3

The color is light green or purplish; five rather narrow vertical bands cross the body; the *first* commences under or close before the front of the dorsal; the *second*, under the space between the third and fifth spine; the *third*, between the seventh and ninth; the *fourth*, under the thirteenth spine, and the *fifth* is close behind the dorsal and anal. The fins are immaculate, the external portions of the ventrals darker.

This species is apparently very common at Cape St. Lucas, Mr. Xantus having sent to the Smithsonian Institution about one hundred specimens, most of which are, however, very young; the largest are three or four inches long.

I dedicate the species to Dr. Troschel, who, by his annual reports on herpetology, ichthyology and malacology, as well as by the original memoirs published by him alone and in conjunction with the great J. Müller, has much contributed to the advancement of those departments of science.

#### On some new and little known American ANURA.

BY E. D. COPE.

##### *Hylodes dimidiatus*.

Form ranine. Head not broader than body, muzzle rather acute, depressed at the tip. Nostrils lateral. Eye of moderate size, twice the extent of the round tympanic membrane. Internal nares small, less than ostia pharyngea; vomerine teeth posterior to them, in two rather abruptly curved series; their inner extremities directed backwards, widely separated, their outer reaching the maxillary margin. Tongue oval, without posterior notch. Skin smooth above and below, except upon the posterior femoral region. A narrow dermal fold from the superciliary region nearly to the groin. Posterior lateral region rugulose. Digital pallettes well developed: no rudimentary membrane between posterior digits. Two metatarsal tubercles, that at the base of the least digit elongate; sole smooth. Palm tuberculous, two metacarpal warts, no tarsal dermal fold. Humerus three-fourths the length of tarsus, which is half as long as the tibia, which is longer than the femur. Length of head and body 1 in. 9 l. Antebrachium  $4\frac{1}{2}$  l. Tarsus and longest digit 1 in. 3 l. Hinder extremity, from groin, 2 in. 9 l.

Above brownish or pinkish gray, beneath yellowish. A black band passes from the end of the muzzle across the tympanic disc, beneath the lateral dermal fold, to about the middle of the side. A yellowish line on superior labial margin, indistinct anteriorly. A black, white-bordered spot on the crural region, sometimes one on each side of the end of the coccyx. Inner faces of extremities marbled; superior surfaces cross-banded. A very narrow white line extends from the end of the muzzle to the terminal coccygeal region. Some white spots on the posterior femoral surface.

*Habitat*.—Eastern Cuba. Mus. Smithsonian (No. 5099) Mr. Wright Coll. Mus. Acad. Philada.

This species exhibits much resemblance to Dr. Günther's *Cystignathus albilabris* in external form.

##### *Hylodes lentus*.

Form stout, depressed; posterior extremities short. Head not so wide as 1861.]

the body; muzzle prominent, rounded. Tympanic disc round, half the size of the eye. Nostrils lateral. Internal nares large, equal to ostia of eustachian tubes. Behind these are placed the two curved series of vomerine teeth, which extend nearly from the maxillary wall; their inner extremities are directed backwards, and are separated by a slight interval. Tongue elongate oval, entire. Without granulations above, below, or upon the sides. Pallettes moderately developed. Palms tuberculous; three warts in the posterior series, of which the median is much the largest. Soles with small tubercles, two small posterior metatarsals, the inner elongate, acute. Heel reaching orbit, when directed forward. Length of head and body 1 in. 6 l. Hinder extremity 1 in. 11 l. Tarsus, to end of digit, 1 in. 1 l. Antebrachium  $4\frac{1}{2}$  l.

Beneath whitish, immaculate. Above dark chestnut, a light band on each side from posterior margin of the orbit to crural region; between these, on the vertex, the sides and extremities, the ground is coarsely marbled with whitish or yellowish.

*Habitat*.—St. Thomas. Mus. Smithsonian. Rüse Coll.

This species differs from its near ally, the *martinicensis*, in the greater length of the series of vomerine teeth and in coloration. The posterior extremities are much shorter than in the *dimidiatus*.

#### *Hylodes auriculatus*.

Size small: head as wide as, or wider than, the body. Muzzle rounded. Nostrils lateral. Tympanic disc circular, one-fourth the size of the eye. Tongue elongate, obcordate, with a small emargination. Vomerine teeth in two oblique series, which commence opposite the inner margin of the posterior nares, and converge posteriorly, though the extremities are widely removed. Above sparsely rugose; belly and femora beneath, granulate. Digital pallettes well developed. Anterior extremity reaching to groin. Heel nearly to end of the muzzle. Total length 10 l. Hinder extremity 1 in. 3 l.

Above light gray, loreal region black; a black line descends from orbit to near the shoulder, which crosses the upper part of the tympanum. A blackish band between the eyes, a chevron-shaped one between the scapulae. Hinder extremities dark, shaded on their posterior faces. Beneath yellowish, mental and lower labial region varied with brown.

*Habitat*.—Eastern Cuba. Mus. Smithsonian, (No. 5207.) Philadelphia Academy.

This species is allied to *H. martinicensis*, but has a broader head, longer extremities, and rougher skin: it is also much smaller.

#### *Hylodes cuneatus*.

Hyliform: head large, broader than the body. Muzzle elongate, acute. Tympanic disc round, half the size of the eye. Internal nares smaller than eustachian ostia; the latter are transverse. Vomerine teeth in two curved series, which begin opposite, and much behind the external border of the internal nares, and converge posteriorly, leaving an interval. Tongue elongate oval, rounded posteriorly, slightly nicked. Skin of the superior surfaces, except that of the muzzle, granulated; beneath everywhere smooth. A slight dermal fold extends from the end of the muzzle to the end of the coccyx, and another, very delicate, commences behind each orbit, and descends upon the side, then ascends towards the iliac region. Palm tubercular, two large metacarpal tubercles. Sole smooth, two metatarsal warts, the external not prominent. Heel extending nearly to extremity of muzzle. Length of head and body 1 in. 7 l. Hinder extremity 2 in. 6 l. Width of posterior gular region 7 l.

Above blackish gray. Muzzle lighter as far as the abrupt commencement of the darker between the eyes. A light line, from anterior border of orbit to labial commissure, and one from the posterior border to the tympanum. A light band from each supercilium to the coccygeal region. Extremities indistinctly

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banded with brown. Beneath whitish, very minutely punctulaerd with brown, except upon the abdomen. *Var.*, almost entirely black: the head a little narrower.

*Habitat*.—Eastern Cuba. Mus. Smithsonian, (No. 5202, *var.* 5202 $\frac{1}{2}$ .)

*Hylodes planirostris*.

Head as wide as, or wider, than the body, longer than broad; the lateral outlines curved; the end of the muzzle abruptly truncated. Ostia pharyngea oval. Vomerine teeth in two long curved series, which commence behind and opposite to the external border of inner nares; they are separated by a considerable space medially. Tongue elongate, oval, slightly nicked. A subgular vocal sack. Tympanum half the size of the eye. Skin smooth above and below; sides rugose. Heel reaching the orbit. Digital pallettes small. Two metacarpal, two metatarsal tubercles. Brachium longer than or equal to ante-brachium. Length of head and body 11 l. Muzzle, to canthus oris, 4 l. Hinder extremity 1 in. 9 l.

General color reddish brown. The loreal region, a band between the eyes, one above the tympanum, and some dorsal spots, darker. Beneath light brownish.

*Habitat*.—New Providence Island, Bahamas. Mus. Salem. From Frederick Putnam, Esq.

*Hylodes hallowellii*.

Head and body rather elongate. Muzzle thick, prominent. Canthus rostralis obsolete. Tympanic disc half the size of the eye. Vomerine teeth much behind the internal nares, in two short, transverse, slightly curved series. Tongue thick, elongate, oval, entire. Ostia pharyngea round, a little larger than internal nares. Skin of the under surfaces smooth; sides rugulose, with a few tubercles; a few rugosities on the posterior dorsal region, and some folds upon its borders. A strong fold from the orbit above and behind the tympanum. Numerous delicate folds upon the anterior face of the femur; a posterior tarsal fold. Palm smooth, a large median metacarpal tubercle, and a very prominent elongate one on the base of the inner digit. A rudimentary web between all the toes of the hinder extremity; the metacarpal tubercles two, small, the internal narrow. Femora very stout. Heel extending to the orbit. Length of head and body 1 in. 6 l. Width of head at canthus oris 6 l. Length of hinder extremity 2 in. 3 l.

Above grayish brown, with a reddish tinge. A light band between the eyes, from which one descends on the end of the muzzle to the labial border. A light line from the nostril to the labial border, two from the anterior border of the orbit, and one from the posterior. A dark shade upon the occiput. Chin, thorax, sides and inner borders of extremities marbled with brown. Two brown bands on the tibia; one broad and several narrow bands on the femur.

*Habitat*.—Near Carthagena, New Granada. Mus. Smithsonian, (No. 4343.) From Lieut. Michler's Expedition.

A near ally of *H. fitzingerii* Schmidt, with which it ought, perhaps, to be removed from this genus.

It is dedicated to the memory of the late Dr. Edward Hallowell, whom the author holds in grateful and respectful recollection.

The genus *Hylodes*, as understood by Duméril, embraces twenty-three species, including those here described. They naturally associate themselves round several types, forming the following groups. 1. *Craugastor Cope*. Toes very slightly webbed. Vomerine teeth in two short, transverse series behind the internal nares. Skin of the abdomen smooth. *H. hallowellii* and *fitzingerii*. 2. *Hylodes Fitz*. Toes entirely free. Vomerine teeth in two short, oblique series behind the internal nares. Skin of the belly (typically, granular. *H. martinicensis*, *auriculatus*, *?conspicillatus*) *?parvus* (belly smooth.) 3. *Lithodytes Fitz*. Toes free. Vomerine teeth in 1862.]

two, often elongate, curved series behind the posterior nares. Skin of abdomen smooth. *H. lineatus*, *lentus*, *cuneatus*, *luteolus*, *planirostris*, *dimidiatus*. This group connects with *Hylodes* proper through *H. cuneatus*. 4. *Euhyas Fitz.* Toes free. Vomerine teeth in two elongate, angularly curved series, which are medially directed posteriorly and in contact, forming a zigzag line behind the anterior nares. Abdomen smooth or granular. *H. ricordii*, *oxyrhynchus*. The dentition of this group is nearly approached by that of *H. (Lithodytes) lentus*. 5. *Batrachyla Bell.* Toes free. Vomerine teeth in two straight oblique groups between the posterior nares. Abdomen smooth: *a. Tympanum* round. *Batrachyla. H. leptopus*, *longipes. b. Tympanum* vertically elliptic. *Halophila Gird. H. heros, chryseus,\* dorsalis, vitianus, corrugatus.*

*Hylodes laticeps* is perhaps the type of a distinct genus. *Rana capitata Leconte* bears some resemblance to it.

#### *Phyllobates limbatus.*

Size very small; form ranine. Head not wider than the body. Muzzle rather acute. Skin smooth below, slightly granular upon the lateral, gluteal and occipital regions. Tympanic disc two-thirds the size of the orbit. Nostril lateral, its position one-third the distance from the muzzle to the orbit. Internal nares much smaller than ostia pharyngea. Tongue elongate, subcylindrical, entire. Palms and soles granular; outer metatarsal tubercle very small. A delicate dermal fold on the median line of the back. Heel scarcely reaching the orbit. Length of head and body  $5\frac{1}{2}$  l. Hinder extremity 8 l.

Above, chestnut. A white line extends from the end of the muzzle to the knee joint; beneath this a broad, black band extends to the same position. Upper surfaces of posterior extremities and anal region blackish brown. Under surfaces and anterior extremities yellowish, the hinder limbs and sides of abdomen spotted with brown. A dark line on humerus. Upper lip yellow.

*Habitat.*—Eastern Cuba. Mus. Smithsonian, (No. 5206.) Mr. Chas. Wright's Coll. Acad. Philada.

This is, perhaps, the smallest frog known, and is a very prettily marked one. Suspicions of immaturity have been removed by careful examination of the six specimens at our disposal.

*Hyla andersonii Baird*, Proc. Acad. Nat. Sci. Phila., 1854, p. 61.

In proportions and general appearance similar to the *Hyla arborea* of Europe. The skin of the upper surface of the body and extremities is smooth, minutely corrugated; that of the throat, belly, and under surfaces of the femora, is areolated. A cutaneous fold across the breast, and one across the throat. Tympanum about one-third the size of the eye. Tongue broad, slightly emarginate. Vomerine teeth in two oblique series between the internal nares, each directed inward and backward.

*Coloration in life.* The whole upper surface a rather deep pea green, paler upon the sides and the margin of the upper lip. A narrow band of purplish brown commences at the external nares, passes through the eye and including the tympanum, loses its inferior border a little beyond the insertion of the humerus. The color becomes paler upon the sides, where it is of an ashy mulberry tint, and extends as far as the origin of the femur. Anterior to this point it is margined below by large irregular spots of a beautiful saffron, which are continued upon the anterior and posterior surfaces of the femur, and the whole inferior surface of the tibia, upon a ground of a paler shade of the same color. The supero-anterior surface of the tarsus, the three inner toes and the webs of the external,—also a small area behind the humerus, the posterior surface of the latter, the infero-anterior face of the fore-arm and the inner

\**Halophila vitiensis* Gir., Proc. Acad. Nat. Sci. Phila. 1853, Oct. nec. *H. vitianus* Dum., Ann. Sci. Nat. 1853, June, 1853.

finger, are tinted and spotted in the same manner. The superior surfaces of the femur, tibia, humerus and fore-arm, are of the same color as the back, that of the humerus separated from the green of the jaws by an isthmus of the purplish shade, and that of the tibia separated anteriorly from the saffron of its lower surface by a band of mulberry. The green of the back and extremities is everywhere margined with pure white, except posteriorly on the femur and tibia, and anteriorly on the former, where saffron takes its place. The green crosses the rictus and forms an oval spot upon each side of the throat. The borders of the latter and the chin are tinged with mulberry. Beneath whitish flesh color. The exposed surfaces of the anterior and posterior extremities, where not green, are of a shade intermediate between mulberry and chocolate.

Length of head and body 1 in. 8 l. Femur 8 l. Tibia 9 l. Tarsus and foot, to the end of the longest toe,  $12\frac{1}{2}$  l.

The following are the differences which I discover upon a comparison of this species with many specimens of the *Hyla arborea* of Europe. The head is relatively broader and more obtuse. The vomerine teeth are in two oblique lines, not in symmetrical fasciculi. In coloration we notice, first, the *arborea* is entirely destitute of the saffron spots and shades so distinct in the *andersonii*. Second, the carpus and tarsus of the latter are destitute of any green shade or band so usual in the *arborea*. Third, the green is bordered with white, not yellow, and the green of the extremities is much more distinctly bordered than in the *arborea*. Fourth, the lateral band, and that on the anterior face of the tibia, is of an impure mulberry shade, instead of brown or greenish.

I am indebted to Dr. Jos. Leidy for a beautiful specimen of this frog. It was found in a cedar swamp, near the town of Jackson, in New Jersey, sixteen miles east of Philadelphia. Without careful examination of the specimen, he supposed it to be the *viridis* of the Southern States, from its great resemblance to that species, and presented it as such, at the meeting of the Academy the same evening. (Vid. Proc. Acad. for July, p. 305.) At the same time Baltimore was given as its northern limit upon the authority of Dr. Uhler of that place. As Dr. Holbrook gives lat.  $33^{\circ}$  as the most northern habitat known to him, it would be interesting to receive specimens from Baltimore, as there is a possibility of the supposed *viridis* being the *andersonii*.

*Lysapsus limellum*.\*

*Char. gen.*—Family Hyliidæ of Günther. Anterior extremities free. Interior digit opposite the three external. Proximal phalanx of external, posterior digit entirely free from that of the second; all the digits broadly palmate. Pallettes slightly developed. Vomerine teeth in two fasciculi. Tongue broad, slightly free, nearly entire. Skin rugose above, not smooth below.

This genus is related to *Litoria*, but differs from it, and from most, if not all, other genera of *Opisthoglossa platydactyla*, in the freedom of the basal phalanx of the external digit.

*Char. specif.*—Head as wide as the body. Muzzle acute, with rounded outlines. Canthus rostralis none. Nostrils vertical. Tympanic disc half the size of the eye. Internal nares smaller than ostia pharyngea tubarum eustachii. Vomerine teeth in two well-separated fasciculi, near to and behind the nares. Tongue very broad, subtriangular, obtusely emarginate and slightly free posteriorly. Inferior surface of limbs smooth, of body areolate or transversely plicate, except on the middle of the thorax. Upper surfaces as far as interior orbital region, minutely and firmly rugose, resembling shagreen. Palms not tubercular; basal phalanges thickened. Hinder extremities very long, knee reaching nearly to tympanum. Palm smooth, a small acute cuneiform tubercle at the base of the internal digit. External digit longer than the third.

\**Lima*, a file, shagreen.

Palmaria extending to the palmettes. No dermal folds, except on the posterior face of tarsus. Humerus shorter than antebrachium; tarsus less than half the length of tibia. Length of head and body 9 l. Hinder extremities 16 l.

Above dark reddish brown, a dark spot on the occiput. Two narrow yellowish lines on each side, one from the orbit, one from the tympanum. A light line from the orbit to the angle of the mouth. Two broad oblique bands across the femur, three from the tibia. A brown band extends from one popliteal region to the other, without interruption, on the (?) perinaeum. Beneath pale rusty; small brown spots on lower labial region.

*Habitat*.—Paraguay. Taken on river. Mus. Smithsonian, (No. 5494.)

This species has probably the habits of *Rana*. It evidently possesses great power in the hinder extremities. The formation of these, and of the anterior members, remind us of *Pseudis*.

#### *Cystignathus podicipinus*.

Tympanum distinct, half the size of the eye. Posterior digits with margins as wide as a phalanx, which unite at their bases, forming a slight web. A tarsal fold continuous with that of the internal digit, except where interrupted by a spur-like tubercle. Tarsus half as long as tibiae. Anterior digits free; first digit longer than the second and fourth; an elongate tubercle at its base; an oval median palmar tubercle; inferior articular tubercles moderate. Head narrow. Muzzle rounded, a little prominent. Tongue oval, submarginate. Vomerine teeth in two short, separate rows, much behind, and within the marginal line of the posterior nares. Skin smooth above, except a few minute warts on the coccygeal region. Lateral and postanal region verrucose. Total length of head and body 21 l. Anterior extremity 10 l. Posterior extremity 2 in. 3 l. Foot and tarsus 14 l.

Above brown, an elongate, darker triangular spot between the eyes. A yellowish line extends beneath the eye to the angle of the mouth. Femora indistinctly banded, posteriorly marbled with blackish. Tibiae with three brown bands. Beneath yellowish brown, with numerous yellow spots.

*Habitat*.—Paraguay. Mus. Smithsonian, (No. 5831.) Philada. Acad.

This species differs from the other *Cystignathi*, with margined toes and vomerine teeth behind the nares, in having the latter in straight series, instead of curved. It differs from *C. ocellatus* and many species with simple digits, in wanting the discoidal folding of the thoracic and abdominal integument.

#### *Cystignathus poecilochilus*.

Tympanum half the size of the eye. Head rather depressed. Muzzle short, not prominent. Tongue oval, submarginate posteriorly. Vomerine teeth in two well-separated curved series behind the internal nares, the outer extremities of the former on a line with the middle of the latter. A pectoral, lateral, abdominal fold, enclosing the thoracic integument, as a disc. A dermal fold from the posterior border of each orbit to the groin. The heel extended reaches the nostril. Toes not margined, slightly webbed at the base; their subarticular knobs very prominent. Sole smooth. Internal anterior digit shorter than the third, and longer than the fourth. A large palmar tubercle; an elongate one at the base of the internal digit. Length of head and body 1 in. 10 l. Anterior extremity 10 l. Hinder extremities 2 in. 9 l.

Color of superior surfaces chestnut brown; the sides rather darker, delicately marbled next to the pure white abdomen.

A brown band on the extremity of each canthus rostralis reaching the labial commissure; another beneath the anterior part of the orbit. Lips marbled with white and brownish. A narrow brown band above and behind the tympanum. Some light-bordered brown spots on the anterior face of the femur

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and posterior face of the tibia. A light line on the posterior face of each femur.

*Habitat*.—Near Turbo, New Granada. Mus. Smithsonian, (No. 4347.) Acad., Philadelphia.

The fewness of the dermal plicæ, the less prominence of the muzzle, and the want of spots on the back, separate this species from the *fuscus*. In *tæniatus* there are no folds, and the vomerine teeth are in fasciculi.

*Pseudacris feriarum*. *Helocetes feriarum* Baird, Proc. Acad. Nat. Sci. Phila. 1854, p. 61.

The differences between *Pseudacris Fitz* and *Helocetes* Baird, do not seem obvious. The present species was described from specimens found near Carlisle, Penna. I have found it abundant near Gloucester, New Jersey, and in the valley of Trough Creek, in the southern part of Huntingdon Co., Pa.

*Phrynocerus testudiniceps*.

Top of the head plane, the profile of the muzzle descending from the nasal process of the frontal bone at an obtuse angle. Space between the orbits slightly concave, wider than the diameter of the orbit. Temporal ridge not prominent. Dermo-ossification roofing over the temporal fossæ, as in *Spix's* figure of *Rana scutata*, but not enclosing the tympanum posteriorly or inferiorly. Its posterior border is nuchal, continuous, concave; it is further behind the orbit than the end of the muzzle is anterior to the latter. Tympanum vertically oval, longest diameter equal to the length of the third phalanx of the third anterior digit. Vomerine teeth in separate transverse series anterior to the inner margin of the internal nares. Anterior digits free; posterior fully webbed, except the extent of the last two phalanges of the median.

Skin (in a stuffed specimen) without folds, but with obtuse warts. Length of head and body 7 in. Head 1 in. 9 l. Tarsus and longest toe 3 in. 9 l. Breadth of jaws on the gular region, 2 in. 9 l.

Above bright yellowish and brownish green, marbled with black. Sides and inferior surfaces of extremities without marbling. Subanal region blackish, spotted with yellow. Belly and gular region whitish, a few black vermiculations on the latter.

*Habitat*.—Panama. Mus. Academy, Philadelphia. Lieut. Fields.

*Phrynocerus\** appears to be a name applicable to the *Ranid* genus, which differs from *Ceratophrys*, in wanting a dorsal dermo-osseous shield. Whether the *P. testudiniceps* truly belongs to it, is yet uncertain. It is remarkable in the relatively small head, plane profile, and anterior position of orbits.

*Bufo hæmatiticus*.

Form slender. No bony ridges on the superior surface of the head. Muzzle short, high, angular; canthus rostralis a sharply-defined right angle, continuous with a fold on the eyelid, the paratoid gland, and the side nearly to the groin. Nostrils latero-vertical. Mouth large, its commissure directed obliquely downward. Tongue elongate, oval, extensively free. Ostia pharyngea smaller than internal nares. Tympanic disc vertical, elliptic, one-fourth the extent of the eye. Paratoid gland lateral, smooth, elongate, angular externally. Anterior extremities slender, reaching beyond the posterior face of the femur. Palmar tubercles few, one large, oval, median. Hinder extremities slender; heel reaching to the orbit. Sole smooth; three metatarsal tubercles all slightly developed, especially the median. Palmure of the toes slight. Skin everywhere smooth, except a few granulations on the occiput. Length of head and body 1 in. 6 l. Hinder extremities 1 in. 10 l.

Above fawn brown, tinged with pink. Sides of the head and body, beneath the lateral fold, red-brown, brighter posteriorly. A pale spot anterior to and beneath the eye. Two black, white-bordered spots on the interscapular region, arranged *en chevron*; two similar sacral spots. Small spots on the femur,

\*Bibron, Tschudi, Classif. der Batrachier, p. 44.

and larger ones near the middle of the tibiæ, black, white-bordered. Extremities shaded with pink. Belly and gular region pinkish brown. Digits tipped with pink.

*Var. lachrymans.* Skin minutely glandular above, lateral fold strong, extending to the groin. Above pink, without dorsal spots. Spots on the tibiæ not white-bordered. A pink spot beneath and in front of the eye. Gular region yellowish.

*Habitat.*—Region of the Truando, New Granada. Mus. Smithsonian, (No. 4344.) Acad. Philada.

This curious toad is further removed from the *Bufo vulgaris* than the types of many genera are from each other, but it is difficult to seize upon special characters upon which to base a generic diagnosis, without further investigation. Its general form is similar to that of *B. gracilis* Gird. It is in some degree allied to *Otilophus margaritifer*, but, besides wanting the cranial crests, the spines of the dorsal vertebræ are not developed in the same manner.

#### *Bufo politus.*

Head without any osseous ridges; canthus rostralis none, profile of muzzle gradually descending nearly to the lip. Emargination of the latter broad. Nostrils transverse, vertical. Skin of the whole body smooth, shining, without rugosities or spines; abdomen areolated, most coarsely posteriorly. Extremities stout, toes fully webbed, soles smooth, without tubercles except that formed by the first cuneiform bone, which is very prominent, oblique, conic, yellow, not brown tipped. A tarsal ridge, no fold. Fingers free; palm smooth, a large indistinct median callosity; a tubercle at the base of the thumb. Tympanum one-fourth the size of the eye, narrowed above; paratoid immediately above it, oval, moderate. A series of flat glands on each side of the back symmetrically arranged. Glands also on the superior surfaces of the humerus, antebrachium, femur and tibia: three on the last remarkably large. Length of muzzle to sternum 7 l.; sternum to vent 1 in. 10 l.; anterior extremity 1 in. 10 l.; posterior extremity 3 in. Above olive brown, the glands bordered with deep brown. Inner faces of the extremities straw colored with large brown spots. Beneath bright yellow with variously inosculating black bands. Palms and soles slate color.

This curious toad resembles the *B. leschenaultii* D. and B., from Guiana, in some respects, but differs in many points—as the round canthus rostralis, palmated toes, and color. It may be related to *B. trifolium* Tsch., but the characters of that species are little known. *B. politus* has been taken near Greytown, Nicaragua, by Dr. Caldwell (coll. No. 191) and sent to the Museum of the Smithsonian Institution, (No. 5600.)

Fifty-nine species of toads of the genus *Bufo* have been described, including those of the present article.

#### *Bufo coniferus.*

Muzzle prominent, its superior outline only sloping from the concavity of the ridge of the canthus rostralis. This is very prominent, and forms two parallel ridges on the upper surface of the muzzle. It unites with the supraorbital ridge a distance anterior to the orbit, from which angle a strong ridge descends in front of the eye. Supraorbital ridges perfectly straight, a little longer than their distance apart anteriorly. They diverge slightly posteriorly, where each sends off a strong ridge two-thirds its length, slightly directed inward. A strong postorbital ridge, from which a short prominent supratympanic takes its origin. Tympanum distinct, half the size of the eye. Eustachian ostia as large as posterior nares. Tongue very elongate, widened and rounded posteriorly, free for one-third its length. Anterior extremity slender, the distal end of antebrachium reaching the femur at the groin. Palm smooth, one large flat median metacarpal tubercle; one narrow elongate on inner border of the base of the

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internal digit. Fourth digit longer than second. Hinder extremity elongate, no tarsal fold; the digital web extensive, very repand: sole smooth. Two large flat oval metatarsal tubercles, the internal marginal. Skin of under surfaces granular, spinulose on the thorax. Extremities with acute tubercles above. Dorsal region with obtuse tubercles. Numerous elongate conic warts on the sides, largest on a fold from the paratoid gland to the groin; such are also found beneath it anteriorly, and upon the angle of the jaws. The paratoid gland is lateral and very small,—not more than half the extent of the upper eyelid—and is studded with conic warts. Above and behind it is a deep depression. Length of head and body three inches; breadth across gular region 1 in. 1 line. Length of posterior extremity (along anterior face,) 4 inches.

Above brownish gray with a few large dark-brown spots, which do not interrupt a median line. Extremities dark spotted; a light band between the eyes, and one from the eye to the angle of the mouth.

*Habitat*.—Turbo region, New Grauada. Mus. Smithsonian, (No. 4335.) Discovered by Mr. Arthur Schott, of Lieut. Michler's Expedition.

This species is allied to various others of the section of the genus characterized by the presence of an occipital process to the supraorbital ridge; which embraces in America, *Bufones lentiginosus*, *ocellatus*, *nebulifer*, *dorbignyi*, *veraguensis*, and perhaps *sternosignatus*. It nearly approaches the *veraguensis* *Schmidt*, but differs, first, in the distinctness of the tympanum and large ostia pharyngea; second, in the very small paratoid gland; third, in the absence of ridge from lower margin of eye towards paratoid; fourth, in the less freedom of the tongue. In *nebulifer* the front is more declive, the canthus rostrales less concave, the paratoids larger, the conical warts absent, the soles and palms tuberculous.

April 1st, 1862.

Mr. LEA, President, in the Chair.

Thirty-three members present.

A paper was presented for publication entitled

Synopsis of the North American Forms of Colymbidæ, and Podicipidæ, by Elliott Coues, which was referred to a Committee.

Mr. Warner made some remarks on the resemblance existing between organic forms and certain figures produced by optical, acoustic and electrical experiments; also, on the relations existing between these forms and figures and certain mathematical lines mentioned in a pamphlet on organic morphology, published by him.

April 8th, 1862.

Vice-President BRIDGES in the Chair.

Twenty-three members present.

A paper was presented for publication entitled

Descriptions of certain species of diurnal Lepidoptera, etc., by Wm. H. Edwards, which was referred to a Committee.

Dr. Slack called the attention of the members to a colored cast of the head of a gorilla, which he characterized as a new species under the name of *Gorilla* 1862.]

castaneiceps. The principal external specific character is, that upon the top of the head there exists a circular patch of reddish hairs; the hairs covering the belly, in the original specimen, were thick and long, and the hairs of the forearm were retroverted; the skull presents important differences from that of the ordinary gorilla.

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*April 15th, 1862.*

Mr. LEA, President, in the Chair.

Thirty-nine members present.

The following papers were presented for publication :

On the Classification and Synonymy of recent species of Pholadidæ, by George W. Tryon, Jr.

Description of a new genus (*Trypanostoma*) of the family Melanidæ, and of forty-five new species, by Isaac Lea.

On *Neosorex albigenis*, and on *Lacerta echinata* and *Tiliqua dura*, by E. D. Cope.

Which were severally referred to Committees.

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*April 22d, 1862.*

Mr. LEA, President, in the Chair.

Forty members present.

The following papers were presented for publication :

Descriptions of two new species of Vespertilionidæ, by Harrison Allen, M. D.

Catalogue of North American Mollusca in the collection of the Academy, by W. G. Binney, and G. W. Tryon, Jr.

On a New Genus of Fishes allied to *Aulorhynchus*, etc.; Remarks on the relations of the Genera and other groups of Cuban Fishes; and Catalogue of the Fishes of Lower California, in the Museum of the Smithsonian Institution, by Theodore Gill.

Description of ten new species of Unionidæ, etc., and Descriptions of two new species of Exotic Uniones, etc., by Isaac Lea.

Contributions to Neotropical Saurology, by E. D. Cope.

Which were severally referred to Committees.

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*April 29th, 1862.*

Mr. LEA, President, in the Chair.

Thirty-three members present.

Dr. Leidy presented a paper entitled

Notes upon the Descriptions of new plants from Texas, by S. B. Buckley, etc., by Asa Gray, which was referred to a Committee.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings.

[April,

Notes upon the "Description of New Plants from Texas, by S. B. Buckley," published in the Proceedings of the Academy of Natural Sciences of Philadelphia, Dec. 1861 and Jan. 1862.

BY ASA GRAY.

Having for many years past taken a prominent part in the study of Texan botany, as made known by the ample collections of Berlandier, Drummond, Wright, Lindheimer, Thurber, and others, and being under the necessity of keeping, as nearly as possible, *au courant* with all publications upon the subject, I was naturally much interested in the appearance of Mr. Buckley's two papers, and not a little surprised at the large number of new species which he had gleaned in such a well-harvested field. Accordingly I applied for specimens of the plants in question; and Mr. Buckley—an early correspondent of Dr. Torrey and myself—promptly and obligingly has placed in my hands, for examination, nearly the whole original materials upon which these new genera and species were characterized. These materials I have examined and compared with my own herbarium, calling in the assistance of Dr. Torrey in those orders in which I am not proficient; and I report the results herewith, with the request that, if favorably received by the Academy, they may be printed in its Proceedings.

I take the species in order, as they stand in Mr. Buckley's papers.

1. *Clematis Texensis*, Buckl., is *C. Viorna*, var. *coccinea*, Gray, Pl. Wr. 2, p. 7, *C. coccinea*, Engelm. The latter name would have preference; but I see no reason for changing my published opinion, that it is a mere variety of *C. Viorna*, although a striking one. Mr. Buckley's character would have been better had he described the cauline leaves from the specimen in Mr. Durand's herbarium, the "foliis pusillis, segmentis lanceolatis acutis" being from an imperfectly developed leaf. The leaflets are usually rounded.
2. *Clematis Coloradoensis* is founded on a very insufficient, thin-leaved, not fully developed specimen of a common Texan form of *C. Pitcheri*, Torr. and Gray. The leaves are plainly *pinnate*.
3. *Streptanthus glabrifolius* is a large *S. hyacinthoides*, Hook.
4. *Streptanthus Brazoensis* is *S. petiolaris*, Gray, Pl. Fendl. p. 7, Pl. Lindh. 2, p. 143, Pl. Wr. 2, p. 7, &c.
5. *Lepidium Texanum* is *L. intermedium*, Gray, Pl. Wr. 2, p. 15.
6. *Arenaria* (Alsine) *monticola* is *A. Benthamii*, Fendl., Torr. and Gray, Fl. 1, p. 675.
7. *Sida Sabeana* is *Melochia pyramidata*, L.!
8. *Callirrhoe palmata* is what we have always taken for a small form of *C. involucrata*, Gray, i. e. *Malva involucrata*, var. *linearibola*, Torr. and Gray, Fl. Some of the specimens with narrow lobes to the leaves are exactly this var. *lineariloba* (= Berlandier's No. 1815); the others are like Capt. Pope's specimens from the Upper Colorado. It appears to run into the ordinary *C. involucrata*. (I think I have elsewhere stated that *C. macrorhiza* is probably a form of the little-known *C. alceoides*.)
9. *Sidalcea Atacosa* is *Malvastrum pedatifidum*, Gray, Pl. Lindh. 2, p. 160, and in the later collections. How, if "the specimens are in fruit only," were the peculiar characters of the genus *Sidalcea* ascertained?
10. *Malvastrum linearifolium* is *Sida fasciculata*, Torr. and Gray, a most genuine *Sida*.  
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11. *Elidurandia Texana*, n. gen., is *Fugosia Drummondii*, Gray, Pl. Wr. 1, p. 23.

12. *Linum* (Linopsis) *San-Sabeianum* is *Lechea Drummondii*!

13. *Zanthoxylum hirsutum* is the *Z. Carolinianum* var. Pl. Wright, 1, p. 30, No. 81, there discussed by me, and mentioned as *Z. coriaceum*, Wright, *Z. diggnum*, Engelm., and *Z. alveolatum*, Shuttleworth; so that, if a distinct species, (as I suppose it is not), it has names enough already. As to the hairiness, upon which Mr. Buckley's name is founded, some flowering specimens of his in Mr. Durand's herbarium demonstrate the slight importance of this character.

14. *Ampelopsis heptaphylla* is the same as Fendler's No. 108, viz., a small-leaved state of *A. quinquefolia*, only with some of the leaves 6--7-foliolate. It is also in Wright's earlier, undistributed, Texan collection.

15. *Vitis monticola* is *V. rupestris*, Scheele, (see Pl. Lindh. 2, p. 165, and Pl. Wr. 2, p. 27).

16. *Vitis Linsecomii* is what I have always referred to *V. Labrusca*. The Louisiana specimen (of Dr. Hale) exactly agrees with specimens from the plant which we formerly cultivated in the Cambridge Botanic Garden as *Isabella* Grape.

17. *Vitis Mustangensis* (which is not the Mustang Grape of Florida, &c., vide Chapm. S. Flora, p. 71) is the well known *V. candicans*, Engelm., (Pl. Wright 2, p. 32, &c.); and *V. coriacea* of Shuttleworth is a thick-leaved form of it, the *V. Caribæa* of Chapman; whether of De Candolle I am still uncertain, but have seen no West Indian specimens which exactly match it. Surely there is some mistake in the statement that "its leaves are neither toothed nor mucronate." It would be more correct to say that they are never entire, and some Texan specimens of Lindheimer, &c., show the glandular mucronations of *C. Caribæa*. Perhaps the reader should be warned that *mustang* is not the name of a town or country, (as the termination *ensis* implies,) but of a wild horse.

18. *Psoralea palmata* is *P. cyphocalyx*, Gray, Pl. Lindh. 2, p. 450, coll. No. 593.

19. *Indigofera cinerea*, and 20, *L. Texana*, are both *I. leptosepala*, Nutt., common in all collections in that region. The specimens afford no evidence that the former has an annual root, and Mr. Buckley does not appear to know the plant except by these specimens.

21. *Amorpha Texana* is *A. levigata*, Nutt., var. *pubescens*, Gray, Pl. Wr. 1, p. 49, the same as Wright's and Lindheimer's specimens, the latter from the very same district; also apparently *A. Rameriana*, Scheele. The pubescent forms pass into *A. paniculata*, Torr. and Gray.

22. *Astragalus Brazøensis* is the rare or local *A. reflexus*, Torr. and Gray, Fl., from the district where Drummond discovered it; the legume better developed and more didymous than in Drummond's specimens. Its cells are not always "monospermous," some having ripened two seeds. The keel of the corolla is tipped with purple.

23. *Phaca* (*Astragalus*) *cretacea* is a form of *Astragalus Missouriensis*, Nutt., the flowers of which are "sometimes nearly white," but I suppose not ochroleucous. I have not felt at liberty to make a section of the single nearly full-grown legume which the specimens afford; but a closely similar specimen, in an undistributed collection of Mr. Wright from the same district, shows "the lower suture a little introflexed," just as *A. Missouriensis* is described in the Flora of North America.

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24. *Baptisia Texana*, the color of the corolla of which is not mentioned in the singular specific character, is founded on a branch of either *B. australis* or *leucantha*, the two commonest of species.

25. *Cassia Texana* is *C. chamæcristoides*, Collad. (*C. cinerea*, Cham. and Schlecht.) enumerated in the Botany of the Mex. Bound. Survey, p. 59. It is No. 2427 and 2429 of Berlandier's collection.

26. *Hoopesia arborea*, n. gen. and sp. is made up of a flowering specimen of *Cercidium Texanum*, Gray, a fruiting one of *Acacia flexicaulis*, Benth., and a sterile branchlet of *Acacia rigidula*, Benth. The character "semen reniformis" is, like the gender, an oversight. The above are the materials in herb. Durand. Those of the herbarium of the Academy lack the *Acacia rigidula*, and have only broken fragments of the *Cercidium*.

27. *Acacia Sabeana* is *Leucæna retusa*, Benth., in Pl. Wr. 1, p. 64; a species not easy to mistake.

28. *Acacia Durandiana* is *A. Greggii*, Gray, Pl. Wright, 1 and 2; Bot. Mex. Bound., &c.

29. *Acacia Nuéciana* is founded on a miserable fragment of *Pithecolobium brevifolium*, Benth., in Pl. Wr., 1, p. 67.

30. *Mimosa calcareæ* is *Strombocarpa* (*Prosopis*, Benth.) *cinerascens*, Gray, Pl. Wr., 1, p. 61; Torr. Bot. Mex. Bound. Surv., p. 60—where it should have mentioned that it is Berlandier's Nos. 2013 and 3143.

31. *Desmanthus pedunculatus* is *D. velutinus*, Scheele, abundant in all collections.

32. *Desmanthus rhombifolius* is *D. reticulatus*, Benth., the characters which distinguish the species quite omitted.

33. *Cratægus Texana* is *C. tomentosa* var. *mollis*, Gray, Man., and *C. subvillosa*, Schrader, not to mention other names.

34. *Gaura triangulata* is *G. tripetala*, Cav.; Gray, Pl. Wr., 1, p. 72, mixed with some *G. coccinea*.

35. *Oenothera Lampasana* is just intermediate between Wright's No. 199, *Æ. Greggii* var. *pubescens*, Gray, Pl. Wr., 1, p. 72, and his No. 1076, *Æ. Hartwegi* var. approaching *Fendleri*. So that, instead of a new species, a farther reduction than I had indicated in Pl. Wr., 2, p. 58, &c. is indicated.

36. *Oenothera Leona*, the glabrous calyx excepted, accords throughout with *Æ. rhombipetala* of the Flora of North America, and I presume with Nuttall's plant, which I have not access to at present. What Mr. Durand takes for *Æ. rhombipetala* (Texas, Dr. Linsecom), also Lindheimer's No. 56 and Berlandier's No. 1842, with the calyx hirsute with very long and spreading hairs, the petals rhombic-ovate, but obtuse and erect pods, I take to be *Æ. bifrons* of Don and Hooker, probably quite distinct, although some forms are questionable.

37. *Mentzelia petiolata* is a not uncommon form of *M. oligosperma*, Nutt.

38. *Saxifraga Texana*: no specimen extant.

39. *Cymopterus macrorhizus* is *C. montanus*, Nutt., and the Texan plant so named in Pl. Fendl., p. 56 and Pl. Wright, 1, p. 79, the latter from Austin, Mr. Buckley's own locality. I had recorded the fact that it agreed very well with Nuttall's original specimens in the Hookerian herbarium.

40. *Eurytænia macrophylla*, as it appears to me, is *E. Texana* with 1862.]

the radical leaves, which were before unknown. The flowers, upper leaves, &c. are the same, and the fruit of the proposed new species is unknown.

41. *Eupatorium Sabeanum* is *E. conyzoides*, Vahl., noticed in Bot. Mex. Bound.

42. *Bulbostylis* (*Brickellia*) *deltoides* is founded on a specimen (with the flowers too undeveloped for Mr. Buckley to make out the generic character) of *Eupatorium Berlandieri*, DC.; also *E. ageratifolium*, var. *Mexicanum*, DC., and var. *Texense*, Gray, Pl. Lindh., &c.—a familiar Texan plant.

43. *Kuhnia macrantha* is the common Western form of *K. eupatorioides* var. *corymbulosa*, Torr. & Gray; and, if to be distinguished, must take the old name of *K. Maximiliani*, Sinn.

44. *Erigeron Brazoense* is *E. tenue*, Torr. & Gray, a rather stout and leafy form.

45. *Erigeron nudiflorum* is *E. divergens*, Torr. & Gray, the form called *E. cinereum* in Pl. Fendl.

46. *Machæranthera* (*Dieteria*) *grandiflora* is *Xanthisma Texanum*, DC. (*Centauridium Drummondii*, Torr. & Gray), which Mr. Buckley had in his own collection. The rays have fallen, but were bright yellow.

47. *Aplopappus linearifolius* is *Baccharis Texana*, Gray, the female plant, showing plainly that it is a *Baccharis*.

48. *Parthenium lobatum* is the old and familiar *P. hysterophorus*, L.

49. *Aphanostephus pilosus* is one of the hispid forms of *A. rammosissimus*, DC.

50. *Sericocarpus* (*Galatella*) *Woodhousii* is *Linosyris Wrightii*, Gray, Pl. Wr., and has hardly any thing in common with *Sericocarpus*.

51. *Lepachys serratus* is *L. peduncularis* var. *picta*, Gray, Pl. Wr., 1, p. 107. The heads are undeveloped in the specimens.

52. *Margacola parvula* nov. gen. (which, from its position, Mr. Buckley may be thought to have mistaken the affinities of) is *Trichocoronis Wrightii*, Gray, Pl. Fendl., Pl. Wr., &c.

53. *Linsecomia glauca*, nov. gen.,—the whole published character of which perfectly accords with *Helianthus*,—is the well known *Helianthus ciliaris*, DC.

54. *Halea repanda*, so far as I can judge from the fragments, accords with *H. Ludoviciana* (of which it has just the pappus), with more of the leaves (and these sharply dentate instead of “repando-denticulatis”) petioled, and some of them lobed. The specimens do not show the plant to be an annual, but the contrary.

55. *Zexmenia* (*Lasianthea*) *hispidula* is *Oligogyne Tampicana*, DC.

56. *Verbesina Texana* is *V. microptera*, DC., a variety of *V. Virginica*.

57. *Actinella lanuginosa* is *A. scaposa*, Nutt.

58. *Heterotheca latifolia* is *H. Chrysopsidis*, DC.

59. *Gaillardia lobata* is *G. picta*, Don., a form with the leaves all sinuate-pinnatifid in one specimen; the upper ones entire in another, just as in Lindheimer's No. 103.

60. *Gaillardia scabrosa* is *G. amblyodon*, Gay, depauperate specimens, just like Drummond's original ones.

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61. *Phileozeroa* (*Philoxera* was intended) *multiflora*, nov. gen., is *Hymenoxys odorata*, DC., *Actinella odorata*, Gray, Pl. Fendl.

62. *Helenium Texanum* is just Berlandier's plant, *H. microcephalum*, DC., a species to include also *H. elegans* and *heterophyllum*, DC.

63. *Cirsium Texanum* is *C. filipendulum*, Engelm., in Torr. & Gray, Fl., there regarded, I think correctly, as a variety of *C. Virginianum*.

64. *Specularia* (*Campanula*) *Linsecomia* and *Campanula Coloradense* are *S. (Campanula) leptocarpa*, Engelm., *Campylocera leptocarpa*, Nutt.

65. *Arbutus Texana* is the *A. Menziesii* of the Bot. Mex. Bound., p. 108, and, so far as known, differs from the Western plant only in its smaller leaves.

66. *Comarostaphylis glauca* is the same plant as the foregoing.

67. *Bumelia arborea* is *B. oblongifolia*, Nutt., the common species of Lindheimer's and other Texan collections, and certainly a form of *B. lanuginosa*. The long hairs of the lower surface of the adult leaves are not scanty.

68. *Pentstemon pauciflorus* is *Phlox pilosa*, L. ! as to the solitary specimen in the Academy's herbarium, and nearly the whole description; while to Durand's herbarium was supplied a bit of the same *Phlox* and two small specimens of *Pentstemon gracilis*, Nutt. or (which is probably the same thing) a slender form of *P. pubescens*. The character "filamento sterili glabro apice dilatato" is factitious, since there is no sterile filament in the *Phlox*, and that of the real *Pentstemon* (which has been dissected out and displayed in the specimen) is heavily bearded !

69. *Pentstemon amplexicaule* is *P. Fendleri*, Gray, well figured in the second volume of Pacif. R. Road Reports; and it is also, with scarce a doubt, both *P. acuminatus* and *P. nitidus* of Douglas, &c.

70. *Drejera parviflora* is the first plant of the collection at all new to me. I believe it to be a congener of *Schaueria parviflora* and *linearifolia*, Torr. Bot. Mex. Bound.

71. *Lithospermum prostratum* is exactly Berlandier's No. 2311, *L. Matamorensis*, DC. The nutlets are rather tawny than white, and are better described by De Candolle than by Buckley.

72. *Echinospermum pilosum* is *E. Redowski*, Lehm., which has been confused with *E. patulum*,—the same as Fendler's No. 634, Wright's 1569, &c.

73. *Echinospermum scabrosum* is *E. strictum*, Nees, Torr., Bot. Mex. Bound.

73a. *Eritrichium hispidum* is *E. Texanum*, DC.

74. *Nemophila hirsuta* (founded on decumbent branches) and *N. pilosa* are both essentially alike, do not differ in the kind of pubescence, and are both the original *N. phacelioides*, Nutt.

75. *Phacelia* (*Cosmanthus*) *hispidula* is *Eutoca patuliflora*, Engelm. & Gray, Pl. Lindh., (in herb. Durand)—forms verging to *E. strictiflora*, Engelm. & Gray, l. c. They all run together, and into *Phacelia hirsuta*, Nutt., the proper name.

76. *Phlox macrantha*, the quite peculiar characters of which are totally overlooked, and the seeds of which are wrongly said to be alate, has long been known in Wright's and Lindheimer's collection (No. 467 of the latter), was named *P. Lindheimeri* by Engelmann, but published by Scheele under the name of *P. Roemeriana*.

77. *Convolvulus* (*Ipomea*) *caddoensis* is *Ipomea leptophylla*, Torr. long ago well figured in Emory's Gila Report.

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78. *Solanum* (Cryptocarpum) *Sabea* is *S. Balbisii*, Dun., now referred to *S. sisymbriifolium*, Lam., the var. *acutilobum albiflorum* of Dunal, probably also *S. tectum*, Pers., and an introduced plant.

79. *Solanum* (Lasiocarpa) *Linsecumii* is *Withania sordida*, Dunal, Torr., in Bot. Mex. Bound., p. 155.

80. *Physalis Sabeana* is *P. lobata*, Torr.

81. *Nicotiana glandulosa* is *N. ipomopsisiflora*, Dunal; also, *N. trigonophylla*, Dunal, and *N. multiflora*, Nutt.? Torr. For an elucidation of the species see Proceed. Amer. Acad., 5, p. 166.

82. *Erythraea calycosa* is *Gyrandra chironoides*, Griseb. and *Erythraea chironioides*, Torr., Bot. Mex. Bound., where the species is cleared up and well figured.

83. *Sabbatia formosa* is *S. campestris*, Nutt., a familiar species, beautifully figured in Bot. Mag. No. 5015.

84. *Forestiera autumnalis* differs from *F. ligustrina*, especially the var. *pubescens*, only in having flowered in summer while the leaves are on. Lindheimer collected a similar form at Houston, flowering in July, with full-grown leaves terminating the flowering branches. The specimens of Linsecum and Buckley in Durand's herbarium render it clear that all belong to the common Texan *F. ligustrina*.

84a. *Fraxinus Americana*, *pubescens* and *oblongocarpa* (a hybrid name) are all three absolutely the same species,—the differences in the specimens before me being only such as may be found in different trees from the same seed-bed, and are *F. pubescens*, Lam.

85. *Fraxinus albicans*—as to the tree intended from New England, Pennsylvania, &c.—is what all American botanists have taken for *F. Americana*. Whether it be the ash Linnaeus had in view (excluding the syn. of Catesby), viz., the species of Clayton, I am uncertain, although the remark about the fruit, in the second edition of the Species Plantarum, looks to the white ash rather than to *F. pubescens* or *viridis*. But, in adopting his view of the case, Mr. Buckley had no need to give a new specific name to the white ash. There is, first of all, Marshall's most appropriate name,—*F. alba*. The still older name,—*F. Novæ-Angliæ* of Wangenheim, probably belongs here, as also *F. juglandifolia*, Lam. and *F. discolor*, Muhl. But, above all, an undoubted name of the white ash, over half a century old, is *F. epiptera*, of the elder Michaux. Here, the phrase "*capsulis obverse lanceolatis, ima parte teretibus apteris*" is perfectly discriminative. To be sure Mr. Buckley describes his *F. albicans*, "*samaris basi subteretibus*," and his *Americana* and *pubescens* as "*basi teretibus*." Now, our white ash, the *F. epiptera* of Michaux, is well marked by the latter character, the wing not at all decurrent as a margin on the terete body of the fruit. Turning to Mr. Buckley's Texan specimens in the herbarium of the Academy, I find that there are two, both in fruit; one with the larger leaves and fruit is clearly *F. viridis*, var. *Berlandieriana*, Torr., Bot. Mex. Bound. (*F. Berlandieriana*, DC.); the other is, I think, a form of *F. Americana* (i. e. *albicans* of Buckley), of the small-fruited form we are familiar with, but with very small leaves as well as fruits, the latter terete and cylindrical in the manner of the species. Upon studying our ashes several years ago, I ventured the opinion that the fruits of *F. Americana* and *F. viridis* in the Sylva of the younger Michaux were mismatched. This, Mr. Buckley controverts by stating that the descriptions in the letter-press correspond with the figures on the plates. It would be surprising if they did not, both being drawn from the same materials! The case may easily be tested. The green ash is as well marked by its foliage as the common white ash is by its fruit. When any person shall exhibit upon

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a green ash such fruit as that represented on Michaux's plate of the species, with an oblong, turgid and terete body, and a wing which commences so abruptly, I shall retract my opinion.

It is a curious statement to be made in the Proceedings of the Philadelphia Academy of Natural Sciences, that Zaccheus Collins was a pupil and correspondent of Linnæus! Also, that Linnæus may have derived from him and Dr. Kuhn his specimens of *Fraxinus Americana*,—upon which Linnæus had published his last words a little before he ever saw, or probably had ever heard of, Dr. Kuhn, and somewhere about the time that Mr. Collins was born!

86. *Fraxinus nigrescens*. No specimen of this is communicated. A specimen from Louisiana, Hale, which generally accords with the description, is *F. platycarpa*.

87. *Fraxinus triolata* is a small-leaved and small-fruited form of *F. viridis*, var. *Berlandieriana*, with a triple wing, which is not uncommon in *F. platycarpa* and some other species.

88. *Abronia speciosa* is one of the forms or species which have been assembled under the name of *A. mellifera*, Dougl., and probably the same as Wright's No. 1710, which had "red-purple flowers," and has been indicated by Dr. Torrey under the still unpublished name of *A. turbinata*,—so that if the same, and really distinct, Mr. Buckley's name will take precedence.

89. *Oxybaphus pauciflorus* is a common Texan form of *O. nyctagineus*, vide Gray in Bot. Mex. Bound. p. 174.

90. *Phyllanthus* (*Lepidanthus*) *ellipticus* is founded, as appears, upon a specimen of one of Wright's collections, given to the Academy's herbarium by Mr. Durand. If I have myself specimens of it they are mislaid. The species is distinct from any of our recognized ones of the United States, and, so far as I know, a new one. But it is not at all a *Lepidanthus*, is not "dioecious," but monœcious, and its proper characters are not noticed in Mr. Buckley's description. Moreover, his specific name is anticipated.

91. *Morus microphylla*, a common Texan Mulberry, which certainly does appear distinct from *M. rubra*, and was so regarded by Dr. Engelmann, who distributed Lindheimer's specimens under the name of *M. parvifolia*; but I think it has not been published. Dr. Torrey refers it to *M. rubra*.

92. *Yucca longifolia*; no specimen supplied.

93. *Yucca constricta* is *Y. angustifolia*, Nutt. The constriction of the capsule is inconstant. It occurs also in *Y. rupicola*. This and all the following determinations are by Dr. Torrey.

94. *Juncus filipendulus* is *J. heteranthos*, Nutt., a variety of *J. marginatus*, Rostk.

95. *Juncus diffusissimus* is *J. debilis*, Gray, Man.

96. *Tradescantia speciosa* as appears from the character and an unnamed species in herb. Durand, is the well-marked *T. leiandra*, Torr., Bot. Mex. Bound. (misprinted "*T. biandra*"); but Mr. Buckley has omitted to notice its headless filaments.

97. *Cyperus retroflexus* is a fully developed state of *C. uniflorus*, Torr. Mon. Cyp., which was described from starved specimens.

98. *Cyperus ruficomus* is *C. lutescens*, Torr.

99. *Cyperus Heermannii* is not identified with any published North American species.

100. *Chaetocyperus membranaceus* is *Eleocharis pygmaea*, Torr., the variety with naked achenia noticed in Nicolle's report.

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101. *Eleocharis cylindrica* is *E. tenuis*, Schultes, a variety with smooth achenia.

102. *Eleocharis microformis* [a hybrid name] is near *E. intermedia*, Schultes.

103. *Eleocharis acutisquamata* is the *E. palustris* var. *anachata*, Torr.

It will be perceived that all the new genera of Mr. Buckley's two papers, and nearly all the new species, are either oversights or mistakes, which might have been avoided. The painful duty I have had to perform was all the more necessary, inasmuch as the true names of the plants could seldom have been ascertained from the published descriptions in those papers. However excellent the author's intentions, we can only regret a publication which entails upon our science a hundred worse than useless synonyms, (a regret which I have reason to believe Mr. Buckley now shares), and we should endeavor to prevent future calamities of the kind. In this regard, understanding that a third paper of the sort, upon a peculiarly difficult order of plants, has been printed in the Academy's Proceedings, but not yet issued, I am confident that my motives will not be misunderstood when I venture to suggest, that the credit both of the Academy and of the author of the paper, no less than the interests of science, would be most subserved by the cancelling of the sheets.

#### Descriptions of Ten new species of UNIONIDÆ of the United States.

BY ISAAC LEA.

UNIO GRANDIDENS.—Testâ valdè tuberculatâ, obliquâ, ad umbones inflatâ; valvulis crassissimis, anticè crassioribus; natibus valdè tumidis terminalibusque; epidermide fuscâ; dentibus cardinalibus pergrandibus, percrassis corrugatisque; lateralibus crassis, sublongis, obliquis et valdè corrugatis; margaritâ albâ et iridescente.

*Hab.*—Near Hot Springs, Arkansas, Byrd Powell, M. D.

UNIO SPECIOSUS.—Testâ omninò tuberculatâ, ferè granulatâ, quadrangulari, valdè compressâ, ad latere planulatâ, subæquilaterali, posticè subbiangulatâ et emarginatâ, anticè rotundatâ, valvulis subcrassis, anticè paulisper crassioribus; natibus subelevatis, ad apices acuminatis et elegantissimè perundulatis; epidermide viridi-luteâ, substriatâ, vel obsoletè radiatâ vel eradiatâ, submicante; dentibus cardinalibus subgrandibus, compressis, obliquis, erectis, striatis, in utroque valvulo duplicibus; lateralibus rectis, sublongis obliquisque; margaritâ argenteâ et iridescente.

*Hab.*—Colorado River, near Lagrange, Texas, Prof. Forshey; and Leon Co., Texas, Lieut. E. F. Beale.

UNIO LEIBII.—Testâ lævi, quadrâ, subcompressâ, valdè inæquilaterali, posticè emarginatâ, anticè rotundatâ, valvulis subcrassis, anticè crassioribus; natibus subprominentibus, ferè terminalibus; epidermide stramineâ, eradiatâ; dentibus cardinalibus subgrandibus, erectis striatisque; lateralibus curtis, rectis crassisque, in utroque valvulo duplicibus; margaritâ albâ et paulisper iridescente.

*Hab.*—Erie Co., Michigan, G. B. Leib, M. D.

UNIO GERHARDTII.—Testâ subsulcatâ, ellipticâ, subcompressâ, sublenticulari, inæquilaterali, posticè obtusè angulatâ, anticè retundâ; valvulis crassiusculis, anticè paulisper crassioribus; natibus subelevatis; epidermide stramineâ, radiis capillaribus; dentibus cardinalibus parviusculis, compressis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis subcurvisque; margaritâ albâ et valdè iridescente.

*Hab.*—Chattanooga, Geo., Alexander Gerhardt.

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**UNIO MERCERI.**—Testâ lævi, latè elliptica, compressâ, posticè compressâ et biangulatâ, anticè rotundatâ, valdè inæquilaterali; valvulis subtenuibus; natibus prominulis; epidermide tenebroso-fuscâ, subnitidâ, eradiatâ; dentibus cardinalibus parvis, tuberculatis striatisque; lateralibus prælongis subcurvisque; margaritâ purpureâ et valdè iridescente.

*Hab.*—Lee Co., Geo., Dr. Mercer.

**UNIO ARKANSASENSIS.**—Testâ lævi, ovato-obliquâ, inæquilaterali, posticè compressâ et obtusè biangulatâ, anticè rotundâ; valvulis crassiusculis, anticè paulisper crassioribus; natibus subelevatis; epidermide flavescente, obsoletè radiatâ; dentibus cardinalibus parvis, striatis crenulatisque; lateralibus sublongis, subrectis subcrassisque; margaritâ albâ et valdè iridescente.

*Hab.*—Near Hot Springs, Arkansas, Byrd Powell, M. D.

**UNIO BEALEI.**—Testâ lævi, ellipticâ, subcompressâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis crassiusculis, anticè crassioribus; natibus prominulis; epidermide vel tenebroso-fuscâ vel nigricante, obsoletè radiatâ; dentibus cardinalibus parvis, compressis, crenulatis, acuminatis, in utroque valvulo duplicibus; lateralibus prælongis, subcurvis, lamellatis; margaritâ vel albâ vel dilutè salmoniâ et valdè iridescente.

*Hab.*—Leon County, Texas, Lieut. E. F. Beale, U. S. Navy. Rutersville, Texas, Prof. Forshey.

**ANODONTA LEONENSIS.**—Testâ lævi, ellipticâ, inflatâ, inæquilaterali, posticè subbiangulatâ, anticè obliquè rotundatâ et paulisper sulcatâ; valvulis tenuibus, anticè paulisper crassioribus; natibus prominentibus, tumidis, ad apices nodosis; epidermide fulgidâ, luteo-virente vel fuscescente, vel obsoletè radiatâ vel eradiatâ; margaritâ cæruleo-albâ et valdè iridescente.

*Hab.*—Leon County, Texas, Lieut. E. F. Beale, U. S. Navy.

**ANODONTA WILLIAMSII.**—Testâ lævi, ovato-oblongâ, inflatâ, subæquilaterali, posticè subbiangulatâ, anticè rotundatâ et paulisper sulcatâ; valvulis subtenuibus, anticè ad marginem incrassatis; natibus prominulis, inflatis, ad apices undulatis; epidermide vel viridi vel luteo-olivâ, fulgidâ, obsoletè radiatâ vel eradiatâ; margaritâ cæruleo-albâ et valdè iridescente.

*Hab.*—Potomac River, at the White House below Mt. Vernon, H. C. Williams.

**ANODONTA TRYONI.**—Testâ lævi, obliquo-ellipticâ, subcompressâ, sublenticulari, valdè inæquilaterali, posticè subbiangulari, anticè rotundatâ; valvulis tenuibus; natibus prominulis, subcompressis, ad apices undulatis, epidermide fulgidâ, vel virente vel fuscescente, obsoletè radiatâ; margaritâ cæruleo-albâ et valdè iridescente.

*Hab.*—Schuylkill River, above Philadelphia, Delaware River, at League Island, G. W. Tryon, jr. Flemington, Con., Prof. Shepard. Westfield, Mass., Dr. Shurtleff; and Potomac near Chain Bridge, above Washington, Prof. Henry.

### Description of a New Genus, (TRYPANOSTOMA) of the Family MELANIDÆ, and of forty-five New Species.

BY ISAAC LEA.

#### Family MELANIDÆ.

Genus TRYPANOSTOMA.\*—Testa conica, apertura rhomboidea, infernè subcanaliculata. Labro expanso. Columella lævis, infernè contorta. Operculum corneum, ad spirans pertinens.

The enormous number of species in the genus *Melania*, has made it very desirable to eliminate as many as possible, by founding new genera, when well-characterised groups can be established. With this view, I proposed, in the

\* Τρυπανον, an auger, and στόμα, a mouth.

Proceedings of the Academy in April last, the genus *Strephobasis*. The genus now proposed, under the name of *Trypanostoma*, will include all the well-known *Melania* with an *auger-shaped* aperture, the type of which may be considered Mr. Say's *Melania canaliculata*, a common and well-known species from the basin of the Ohio River. It will include a number of large species, indeed, nearly all of the large and ponderous species of the United States. Many new ones will be found in this paper. Objections may be raised against increasing the number of genera without the aid of the examination of the soft parts. But there is no validity in this objection, from the fact, that in the present condition of the Science of Malacology, we are becoming acquainted with a vast number of new and interesting forms, without the hope, at present, of seeing the soft portion of the animals. These may, at some future time, and, no doubt, will be examined and carefully described by Zoologists, who may dwell near the waters where these numerous and highly developed species reside. Until this takes place, we can only group them upon the characters which are presented by their outward hard portions, which are accessible to us now.

In proposing this new genus, I am aware that European Zoologists have made many genera and subgenera in this Family, but none have made groups of our numerous species by which they can be properly divided. They have mixed them up, notwithstanding all the time and care they have bestowed upon them, in a manner so as to make great confusion. Mr. Swainson, in his "Treatise on Malacology," proposed a subgenus of *Melania* under the name of *Ceriphasia*, and gives a figure, page 204, (*C. sulcata*), stating it came from Ohio. It is evident, on looking on this figure, that it does not represent any Ohio species, neither in the aperture nor in the revolving ribs. Dr. Gray and the Messrs. Adams\* adopt the genus, and the latter give a figure (pl. 31, fig. 6) of *canaliculata*, Say, as the type, which I do not think answers to the description or figure of Mr. Swainson. Dr. Gray, in his excellent "List of the genera of Recent Mollusca," in the Proceedings of the Zoological Society, expresses a doubt whether his *Telescopella* may not be the same with *Ceriphasia*. Mr. Reeve, in his beautiful work, "Conchologia Iconica," mixes many of our species in a manner that does not admit of their being separated into groups; and Dr. Chenu ("Manuel de Conchyliologie") groups together some very incongruously. Many of our groups are emphatically American, and the divisions made by our zoologists have not had the attention they deserve from European writers. Thus, neither Dr. Gray, Mr. Reeve, nor the Messrs. Adams adopt Prof. Haldeman's genus *Lithasia*, established so long since, and which is an easily recognized group. Mr. Reeve puts the various species of that group into my genus *Io* to which they certainly do not belong, and Dr. Chenu puts part of them there. The genus *Ammicola*, long since proposed by Gould and Haldeman, for a very natural group of small shells, divided from *Paludina*, is not recognized by Chenu or Reeve.

In a future paper I propose to define the group into which our *Melanidae* seem naturally to divide themselves, adopting the well recognized genera which have been established.

TRYPANOSTOMA DUX.—Testâ carinatâ, pyramidatâ, crassâ, rufo-fuscescente; spirâ valdè elevatâ; suturis paulisper impressis; anfractibus instar novenis, planulatis; aperturâ subgrandi, rhombicâ, intus pallido salmoniâ; labro acuto, sinuoso; columellâ incrassatâ et valdè contortâ.

Hab.—Tennessee River, W. Spillman, M. D. Fox River, Illinois, J. Sampson. Oostena, Rev. G. White. Tuscumbia, B. Pybas.

TRYPANOSTOMA THORTONII.—Testâ carinatâ, pyramidatâ, subcrassâ, corneâ

\* Messrs. Adams for the type of subgenus *Juga* give *Buddii*, Say. I am not aware that Mr. Say described any Melanian under that name; and in *Megara* they give *alveare*, Con. and *basalis*, Lea, as types, while they certainly belong to very different groups, having very differently formed apertures.

vel vittatâ vel evittatâ; spirâ regulariter elevatâ; suturis parum impressis; anfractibus instar denis, planulatis; aperturâ parviusculâ, rhomboideâ, intus albidâ; labro acuto, valdè sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tuscumbia, Ala., L. B. Thorton, Esq. and Rev. G. White. Chattanooga, Tenn., J. Clark.

**TRYPANOSTOMA TROOSTII.**—Testâ carinatâ, conoideâ, valdè inflatâ, vel luteo-corneâ vel viridescente, vel vittatâ vel evittatâ; spirâ elevatâ; suturis valdè et irregulariter impressis; anfractibus instar novenis, subimpressis, interdum canaliculatis; aperturâ grandi, rhomboideâ, intus albidâ, interdum vittatâ; labro acuto, sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tennessee, Prof. G. Troost. Florence, Ala., Rev. G. White. Oostenaula River, Ga., Bishop Elliott; and Fox River, near New Harmony, Indiana, J. Sampson.

**TRYPANOSTOMA INCURVUM.**—Testâ carinatâ, conoideâ, subtenui, corneâ; spirâ subelevatâ; suturis regulariter impressis; anfractibus octonis, planulatis, infernè obsoletè striatis; aperturâ parviusculâ, rhomboideâ, intus albidâ; labro acuto, sigmoideâ; columellâ valdè contortâ.

*Hab.*—Florence, Ala., Rev. G. White.

**TRYPANOSTOMA POSTELLII.**—Testâ carinatâ, pyramidatâ, subcrassâ, corneâ; spirâ regulariter conicâ; suturis valdè impressis; anfractibus octonis, vel planulatis vel impressis, ultimo parviusculo; aperturâ parvissimâ, rhomboideâ, intus albidâ; labro acuto, valdè sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tennessee River, J. Postell. North Alabama, Prof. Tuomey.

**TRYPANOSTOMA TUOMEYI.**—Testâ carinatâ, crassiusculâ, elevato-conicâ, tenebroso-fuscâ; spirâ elevato-conicâ; suturis vix impressis; anfractibus instar denis, planulatis, infernè obsoletè striatis; aperturâ parvâ, rhomboideâ, intus tenebrosâ; labro acuto, sinuoso; columellâ paulisper incrassatâ, et valdè contortâ.

*Hab.*—North Ala., Prof. Tuomey. Florence, Ala., Rev. G. White.

**TRYPANOSTOMA FLORENCENSE.**—Testâ subcarinatâ, turritâ, subcrassâ, tenebroso-fuscâ vel luteo-corneâ, obsoletè vittatâ vel evittatâ; spirâ valdè elevatâ; suturis leviter impressis; anfractibus instar undenis, paulisper convexis; aperturâ parviusculâ, rhomboideâ, intus cæruleo-albâ; labro acuto, sinuoso; columellâ albidâ et valdè contortâ.

*Hab.*—Florence, Ala., Dr. Spillman. Tuscumbia, L. B. Thornton, Esq.

**TRYPANOSTOMA CLARKII.**—Testâ obtusè carinatâ, conicâ, subcrassâ, tenebroso-olivâ; spirâ elevatâ; suturis valdè impressis; anfractibus instar octonis, planulatis; aperturâ parviusculâ, rhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ albâ et contortâ.

*Hab.*—French, Broad and Tellico Creeks, Tenn., J. Clark and Prof. Christy. Florence, Ala., G. White. Noxubee River, Miss., Dr. Spillman; and Clinch River, Tenn., Dr. Warder. Coosa, Cahawba and Alabama Rivers, Ala., Dr. Showalter.

**TRYPANOSTOMA ALABAMENSE.**—Testâ carinatâ, crassiusculâ, subfusiformi, tenebroso-corneâ; spirâ subattenuatâ; suturis regulariter impressis; anfractibus instar octonis, planulatis, infernè striatis; aperturâ parviusculâ; rhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—North Alabama, Prof. Tuomey. Florence, Ala., Rev. G. White.

**TRYPANOSTOMA LIGATUM.**—Testâ carinatâ, fusiformi, subcrassâ, inflatâ, nitidâ, vittatâ vel evittatâ, luteo-olivâ; spirâ obtusè conicâ; suturis impressis; an-

fractibus septenis, convexiusculis, ultimo pergrandi, ligatâ apud peripheriam; aperturâ grandi, rhomboideâ, intus obsoletè vittatâ; labro acuto, sinuoso; columellâ infernè incrassatâ, ad basim rufo-maculatâ, valdè contortâ.

*Hab.*—Tennessee, Prof. Troost. Cumberland, River, C. T. Downie. North Ala., Prof. Tuomey. Ohio River at Cincinnati, U. P. James.

**TRYPANOSTOMA PYBASII.**—Testâ obtusè carinatâ, obtusè conicâ, solidâ, bivittâ, viridi-fuscâ; spirâ obtusâ; suturis valdè impressis; anfractibus instar octonis, convexiusculis; aperturâ parvâ, rhombicâ, intus albâ et vittatâ; labro acuto, valdè sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tuscumbia, Ala., B. Pybas.

**TRYPANOSTOMA OLIVACEUM.**—Testâ carinatâ, subfusiformi, subcrassâ, olivaceâ; spirâ subobtusâ; suturis impressis; anfractibus instar octonis, planulatis; aperturâ subgrandi, rhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tombigbee River, Mississippi, W. Spillman, M. D.

**TRYPANOSTOMA MONILIFERUM.**—Testâ tuberculatâ, crassâ, pyramidatâ, vel luteolâ vel virentè, vittatâ vel evittatâ; spirâ elevato-pyramidatâ; suturis irregulariter impressis; anfractibus instar denis, planulatis, infernè striatis, interdum obsoletè sulcatis, ad peripheriam tuberculatis; aperturâ subgrandi, rhomboideâ, intus vel albidâ vel salmoniâ, plerumquè bivittatâ; labro acuto, valdè sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tennessee, Prof. Troost and Mr. Anthony. Florence, Ala., Rev. G. White, Mr. Pybas and Mr. Thornton. Cumberland River, Dr. Powell. Ohio River, near the mouth, in Illinois, J. Donaldson. New Harmony, Indiana, Mr. Carley and Mr. Sampson. Warrior River, Ala., Prof. Brumby.

**TRYPANOSTOMA LEWISII.**—Testâ sulcatâ, subtenui, elevato-conicâ, tenebroso-fuscâ vel corneâ, vittatâ; spirâ attenuatâ; suturis paulisper impressis; anfractibus instar undenis, planulatis; aperturâ parvâ, subrhomboideâ, intus vittatâ; labro acuto, paulisper sinuoso; columellâ infernè paulisper incrassatâ et valdè contortâ.

*Hab.*—Peoria, Illinois, J. Lewis, M. D.

**TRYPANOSTOMA MORIFORMI.**—Testâ sulcatâ, subcylindraceâ, solidâ, uno-vittatâ, corneâ, spirâ obtusè conicâ; suturis impressis; anfractibus instar novenis, impressis, canaliculatis; aperturâ parviusculâ, rhombicâ, intus albâ et uno-vittatâ; labro acuto, valdè sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Oostenaule River, near Rome, Ga., Rev. G. White. Tenn. River, Dr. Spillman. Tuscumbia, Ala. B. Pybas.

**TRYPANOSTOMA VIRIDE.**—Testâ subsulcatâ, subcrassâ, subfusiformi, olivaceâ; spirâ obtusè conicâ; suturis valdè impressis; anfractibus septenis, convexis, ultimo subcanaliculato; aperturâ subgrandi, rhomboideâ, intus vel purpureâ vel albidâ; labro acuto, sinuoso; columellâ infernè incrassatâ et paulisper contortâ.

*Hab.*—Tennessee, Prof. Troost.

**TRYPANOSTOMA SHOWALTERII.**—Testâ striatâ, interdum lævi, valdè exertâ, crassâ subcylindraceâ, vel corneâ vel fuscâ, interdum infernè vittatâ; spirâ valdè elevatâ; suturis valdè impressis; anfractibus novenis, subplanulatis; aperturâ parvâ, rhomboideâ, intus vel albidâ vel salmoniâ; labro acuto, parum sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Cahawba River, Ala., E. R. Showalter, M. D. Tuscaloosa, Ala., Dr. Budd. Oostenaule River, Ga., Rev. G. White and Bishop Elliott.

**TRYPANOSTOMA ANTHONYI.**—Testâ rugoso striatâ, pyramidatâ, crassâ, luteo-olivaceâ; spirâ elevatâ; suturis rugoso-impressis; anfractibus instar novenis,

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planulatis; aperturâ subgrandi, rhomboideâ, intus albâ; labro acuto, sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tennessee, J. G. Anthony. Warrior River and Yellowleaf Creek, Ala., Dr. Showalter. Fox River, Indiana; J. Sampson.

**TRYPANOSTOMA STRIATUM.**—Testâ striatâ, subulari, subtenui, corneâ; spirâ elevatâ; suturis impressis; anfractibus instar octonis, convexiusculis, ultimo parviusculo; aperturâ parvâ, subrhomboideâ, intus albidâ; labro acuto, valdè sinuoso, expanso; columellâ paulisper incrassatâ et valdè sinuosâ.

*Hab.*—Florence, Ala., B. Pybas.

**TRYPANOSTOMA HARTMANII.**—Testâ lævi, interdum obsoletè canaliculatâ, solidâ, virente vel rufo-fuscescente, regulariter conicâ, vittatâ vel evittatâ; spirâ pyramidatâ; suturis regulariter impressis; anfractibus instar novenis, convexiusculis; aperturâ parvâ, rhomboideâ, intus vel albâ vel salmoniâ; labro acuto, sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Cahawba and Coosa Rivers; Dr. Showalter. Warrior River, Alabama. Knoxville, Dr. Budd and J. Clark. Tenn. River, Ala., Dr. Spillman.

**TRYPANOSTOMA JAYI.**—Testâ lævi, subpupoideâ, crassâ, nitidâ, rufo-fuscâ; spirâ obtuso-conicâ; suturis valdè impressis, anfractibus octonis, subtumidis, ultimo subgrandi; aperturâ parvâ, rhomboideâ, subangustâ, intus pallido-fuscâ; labro acuto, sinuoso; columellâ infernè incrassatâ et contortâ.

*Hab.*—, Alabama? J. C. Jay, M. D.

**TRYPANOSTOMA SPILLMANII.**—Testâ lævi, regulariter conicâ, tenebroso-olivâ; spirâ elevatâ; suturis regulariter impressis; anfractibus instar novenis, planulatis; aperturâ parviusculâ, rhomboideâ, intus albidâ, interdum vittatâ; labro acuto, sinuoso; columellâ albâ et valdè contortâ.

*Hab.*—Noxubee River, Miss., W. Spillman, M. D.; and Tenn., J. Clark.

**TRYPANOSTOMA CHRISTYI.**—Testâ lævi, elevato-conicâ, crassiusculâ, corneâ, rarò vittatâ; spirâ valdè elevatâ; suturis regulariter impressis; anfractibus instar denis, parum convexis; aperturâ parvâ, subrhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ albâ et contortâ.

*Hab.*—Cane Creek, Tenn., Prof. D. Christy.

**TRYPANOSTOMA LABIATUM.**—Testâ lævi, acuto-conicâ, subcrassâ, nitidâ, virido-corneâ; spirâ attenuatâ, mucronatâ; suturis regulariter impressis; anfractibus instar denis, convexiusculis, ad apicem carinatis, ultimo subgrandi; aperturâ parviusculâ, rhomboideâ, intus albidâ; labro acuto, juxtâ marginem incrassato, valdè dilatato, valdè sinuoso; columellâ albidâ, infernè incrassatâ et valdè contortâ.

*Hab.*—Big Miami River, Ohio, J. Clark.

**TRYPANOSTOMA WHITEI.**—Testâ lævi, attenuato-conicâ, crassiusculâ, tenebroso-corneâ; spirâ valdè elevatâ; suturis regulariter impressis; anfractibus instar novenis, convexiusculis; aperturâ parvâ, subrhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ infernè incrassatâ et contortâ.

*Hab.*—Lafayette co. and Marietta, Ga.; Rev. G. White. Farland's Creek, Mississippi, Dr. Spillman; and Tenn., J. G. Anthony.

**TRYPANOSTOMA ESTABROOKII.**—Testâ lævi, attenuato-conicâ, subtenui, corneâ; spirâ valdè elevatâ, supernè carinatâ; suturis regulariter impressis; anfractibus instar denis, convexis; aperturâ parvâ, subrhomboideâ, intus albidâ; labro acuto, subsinuoso; columellâ albâ et contortâ.

*Hab.*—East Tennessee, President Estabrook and Bishop Elliott. Near Cleveland, Tenn., Prof. Christy; and Monroe co., Tenn., J. Clark.

**TRYPANOSTOMA KNOXVILLENSE.**—Testâ lævi, subulari, subtenui, pallido-corneâ; spirâ attenuato-conicâ, mucronatâ; suturis regulariter impressis; anfractibus denis, convexiusculis, ad apicem carinatis, ultimo subconstricto; aperturâ

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parvâ, subrhomboideâ, intus albâ; labro acuto, sinuoso; columellâ infernè incrassatâ et paulisper contortâ.

*Hab.*—Knoxville, Tenn., Pres. Estabrook.

*TRYPANOSTOMA ATTENUATUM.*—Testâ lævi, subulari, subtenui, corneâ; spirâ attenuatâ; suturis impressis; anfractibus novenis, vix convexis, ultimo parvo; aperturâ parvâ, rhomboideâ, intus albidâ; labro acuto, valdè sinuoso; columellâ vix incrassatâ et contortâ.

*Hab.*—Lafayette, Ga., Rev. G. White; and Tenn., Dr. Hartman.

*TRYPANOSTOMA SUBULÆFORME.*—Testâ carinatâ, subulari, subtenui, corneâ; spirâ attenuato conicâ; suturis valdè impressis; anfractibus denis, infernè planulatis, supernè carinatis; aperturâ parvâ, subrhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ paulisper incrassatâ et contortâ.

*Hab.*—Knoxville, Tenn., Prof. Troost and W. Spillman, M. D.

*TRYPANOSTOMA TORTUM.*—Testâ substriatâ, conicâ, corneâ, subcrassâ; spirâ subobtusio-conicâ; suturis valdè impressis; anfractibus septenis, planulatis; aperturâ subgrandi, subrhomboideâ, intus albidâ; labro acuto, vix sinuoso; columellâ valdè incurvatâ, supernè paulisper incrassatâ, infernè incrassatâ et valdè contortâ.

*Hab.*—Uchee Bar, below Columbus, Ga., J. Lewis, M. D.

*TRYPANOSTOMA PALLIDUM.*—Testâ lævi, attenuato-conicâ, subcrassâ, pallido-corneâ; spirâ valdè elevatâ; suturis valdè impressis; anfractibus undenis, convexiusculis, supernè subgeniculatis; aperturâ parviusculâ, subrhomboideâ, intus albâ; labro acuto, sinuoso; columellâ albâ et valdè contortâ.

*Hab.*—Niagara Falls, New York.

*TRYPANOSTOMA PARVUM.*—Testâ lævi, crassiusculâ, conoideâ, corneâ, vittatâ vel evittatâ; spirâ conoideâ; suturis regulariter impressis; anfractibus octonis, planulatis; aperturâ parvâ, rhomboideâ, intus albidâ; labro acuto, paulisper sinuoso; columellâ infernè paulisper incrassatâ et contortâ.

*Hab.*—Knoxville, Pres. Estabrook; and French Broad River, East Tenn., J. Clark.

*TRYPANOSTOMA MODESTUM.*—Testâ lævi, conicâ, subtenui, virido-corneâ; spirâ subelevatâ; suturis linearibus; anfractibus instar septenis, convexiusculis, ultimo subcompresso; aperturâ parviusculâ, subrhomboideâ, intus cæruleo-albâ; labro acuto, sinuoso, expanso; columellâ infernè paulisper incrassatâ et contortâ.

*Hab.*—Chilogita Creek, Blount co., Tenn., J. Clark.

*TRYPANOSTOMA SIMPLEX.*—Testâ lævi, conicâ, subcrassâ, luteo-olivaceâ, spirâ subelevatâ; suturis paulisper impressis; anfractibus octonis, subconvexis, ultimo subconstricto; aperturâ parvâ, constrictâ, rhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ infernè incrassatâ et contortâ.

*Hab.*—Cincinnati, Ohio, T. G. Lea.

*TRYPANOSTOMA MINOR.*—Testâ lævi, obtusè conoideâ, subcrassâ, luteolâ, vittatâ; spirâ obtuso-conoideâ; suturis valdè impressis; anfractibus septenis, convexiusculis, ultimo grandi; aperturâ grandi, subrhomboideâ, intus albâ, interdum vittatâ; labro acuto, sinuoso; columellâ incurvâ, infernè incrassatâ et paulisper contortâ.

*Hab.*—Tennessee, Prof. Troost.

*TRYPANOSTOMA PUMILUM.*—Testâ lævi, nitidâ, conoideâ, subsolidâ, luteo-virescente, bivittatâ; spirâ obtuso-conoideâ; suturis valdè impressis; anfractibus septenis, subconvexis, ultimo pergrandi; aperturâ subgrandi, rhomboideâ, intus albidâ et trivittatâ; labro acuto, sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tennessee, Prof. Troost.

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**TRYPANOSTOMA BIVITTATUM.**—Testâ lævi, conoideâ, subcrassâ, luteâ, bivittatâ; spirâ obtuso-conoideâ; suturis valdè impressis; anfractibus septenis, subconvexis, ultimo grandi; aperturâ subgrandi, subrhomboideâ, intus albâ, bivittatâ; labro acuto, paulisper sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Tennessee, Prof. Troost.

**TRYPANOSTOMA VANUXEMII.**—Testâ lævi, conoideâ, flavidâ, vel bivittatâ vel evittatâ; spirâ obtuso-conicâ; suturis impressis; anfractibus senis, convexiusculis; aperturâ parviusculâ, subrhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—South Carolina, Prof. L. Vanuxem.

**TRYPANOSTOMA TRIVITTATUM.**—Testâ lævi, subfusiformi, subtenui, nitidâ, olivaceâ, trivittatâ; spirâ conicâ, mucronatâ, ad apicem carinatâ; suturis linearibus; anfractibus octonis, planulatis, ultimo subgrandi; aperturâ subgrandi, rhomboideâ, intus vittatâ; labro acuto, sinuoso; columellâ paulisper incrassatâ et incurvâ.

*Hab.*—Tombigbee River, Mississippi, W. Spillman, M. D.

**TRYPANOSTOMA TROCHULUS.**—Testâ lævi, trochiformi, valdè tumidâ, luteâ, infrâ unifasciatâ; spirâ valdè obtusâ; suturis impressis; anfractibus senis, supernè planulatis, infernè inflatis; aperturâ grandi, rhomboideâ, albidâ et unifasciatâ; labro acuto, sinuoso; columellâ infernè incrassatâ et valdè contortâ.

*Hab.*—Holston River, Tenn., Prof. G. Troost.

**TRYPANOSTOMA SYCAMORËNSE.**—Testâ plicatâ, conicâ, luteo-corneâ, subcrassâ; spirâ attenuatâ, mucronatâ; suturis impressis; anfractibus undenis, convexiusculis, supernè carinatis, in medio plicatis; aperturâ parviusculâ, rhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ incurvâ, infernè incrassatâ et contortâ.

*Hab.*—Sycamore, Claiborne co., E. Tenn., J. Lewis, M. D.

**TRYPANOSTOMA CHAKASAHÆNSE.**—Testâ lævi, conicâ, fusco-virente, subtenui, bivittatâ; spirâ subattenuatâ; suturis valdè impressis; anfractibus instar octonis, convexis, supernè carinatis; aperturâ parvâ, rhombicâ, intus albâ et vittatâ; labro acuto, sinuoso; columellâ incurvâ, infernè incrassatâ et valdè contortâ.

*Hab.*—Chakasaha River, Ala., Wm. Spillman, M. D.

**TRYPANOSTOMA TENNESSEËNSE.**—Testâ lævi, obtusè conicâ, valdè inflatâ, subcrassâ, tenebroso-fuscâ; spirâ brevi, valdè obtusâ; suturis impressis; anfractibus instar denis, convexis; aperturâ magnâ, rhomboideâ, intus tenebrosâ; labro acuto, expanso, inflecto et valdè sinuoso; columellâ internè valdè incrassatâ et contortâ.

*Hab.*—Tenn., Prof. Troost. Lebanon co., Tenn., J. M. Safford.

**TRYPANOSTOMA KNOXENSE.**—Testâ lævi, conicâ, vel ferrugineâ vel vittatâ, subcrassâ; spirâ subelevatâ, mucronatâ; suturis impressis; anfractibus octonis, convexiusculis, supernè carinatis; aperturâ parvâ, intus vel albidâ vel fuscâ; labro acuto, sinuoso, expanso; columellâ paulisper incrassatâ et contortâ.

*Hab.*—Flat Creek, Knox co., Tenn., Prof. D. Christy.

**TRYPANOSTOMA CANALITUM.**—Testâ canaliculatâ, conicâ, crassiusculâ, corneâ, obsoletè vittatâ; spirâ regulariter conicâ, subelevatâ, ad apicem bivittatâ; suturis impressis; anfractibus planulatis; instar septenis, ultimo canaliculato; aperturâ parvâ, rhomboideâ, intus vel albâ vel salmoniâ et vittatâ; labro acuto et sigmoideo; columellâ contortâ, ad basim recurvâ.

*Hab.*—Yellowleaf Cr., Ala., E. R. Showalter, M. D.

Descriptions of two new species of **EXOTIC UNIONES** and one  
**MONOCONDYLAEA**.

BY ISAAC LEA.

**UNIO PARAMATTENSIS.**—Testâ crebrè et leviter sulcatâ, ellipticâ, subinflâtâ; valdè inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis crassiusculis, anticè paulisper crassioribus; natibus prominulis, ad apices radiis undulatis; epidermidè tenebroso-fuscâ, nigricante, eradiatâ; dentibus cardinalibus parvis, valdè compressis, obliquis, valvulæ dextræ duplicibus; lateralibus prælongis, lamellatis subrectisque; margaritâ albâ et valdè iridescente.

*Hab.*—Paramatta River, New South Wales, Smithsonian Institution.

**UNIO PAZII.**—Testâ lævi, obliquâ, anticè inflatâ, valdè inæquilaterali, posticè acuto-angulatâ et attenuatâ, anticè rotundatâ; valvulis crassiusculis, posticè paulisper crassioribus; natibus tumidis, subterminalibus; epidermidè olivaceâ, obsoletè radiatâ et transversè latè vittatâ; dentibus cardinalibus longis, lamellatis, valdè obliquis corrugatisque; lateralibus prælongis, obliquis, lamellatis corrugatisque; margaritâ vel albâ vel cæreulâ et valdè iridescente.

*Hab.*—China. Sig. Patricio Maria Paz.

**MONOCONDLEA WHEATLEYI.**—Testâ lævi, oblongâ, subcompressâ, valdè inæquilaterali, anticè obliquè rotundatâ, posticè truncatâ; valvulis subcrassis, anticè paulisper crassioribus; natibus parvis, acuminatis, ad apices minutissimè undulatis; epidermidè luteâ, nitidâ, eradiatâ; dentibus cardinalibus parvis, erectis, in utroque valvulo uno-tuberculatis; margaritâ albâ et valdè iridescente.

*Hab.*—River Tigris, Assyria, Rev. Mr. Beadle, by C. M. Wheatley.

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Contributions to **NEOTROPICAL SAUROLOGY**.

BY E. D. COPE.

**Phyllodactylus spatulatus.**

Muzzle elongate, rounded, depressed, extending anterior to the orbit once and one-third times the diameter of the latter. Frontal and nasal regions closely squamulose tuberculous, each tubercle as large as those that are scattered upon the occiput. Superior labials six, the last minute; inferior labials five. Symphyseal elongate campanuliform in outline, succeeded by three or four transverse series of mental plates. The anterior is composed of three (median smallest), which are much longer than broad; the posterior are hexagonal. About twenty-five rows of abdominal plates, and twenty rows of elongate trihedral dorsal tubercles. Extremities coarsely tuberculous. Length of head to angle of mandible 8 lin.; from this point to vent, 1 in. 9 lin.; of hinder extremity, 1 in.; tail? Above pale yellowish; a dark brown line from orbit to shoulder; dark brown longitudinal lines, which inosculate on the nape and anterior dorsal region; on the posterior dorsal and sacral they form cross-bands. Extremities banded. Beneath immaculate.

*Habitat.*—Barbadoes. Prof. Theodore Gill coll.

**Anolis (Acantholis) argillaceus.**

Size small, form stout. Head large, the muzzle short. Canthus rostralis straight, sharp; facial rugæ very obtuse, uniting a little anterior to the middle of the muzzle, and forming a slightly pronounced median keel. Tail one and one-half times the length of the body, slightly compressed and trenchant, though not serrate above; its scales keeled. No dorsal dermal fold. A slight prebrachial fold. Nares vertical. Orbit large; tympanic orifice moderate; dorsal and lateral scales minute, equal, except an occasional one a little

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larger. Abdominal scales rounded, smooth; those of the extremities smooth. Occipital plate not in contact with superciliaries; the latter are in contact medially, and number six or seven on each side; the anterior pair is much the longest, and enclose a subtriangular plate. The second plate on the facial ruga is large, transverse; the third is large and in contact with that of the other side and with the third plate of the canthus rostralis. Anterior to them is a median plate. The rest of the head plates are small, all are perfectly smooth. Two or three loreal rows. Superior labials six. Palpebrals three or four, transverse, forming an isolated disc. First infralabial large. Goitre well developed.

In alcohol, above brownish white, with two rows of brown spots on each side; occasionally a median series of dots. A short, median; nuchal band; two convergent lateral cervical bands; a dark band between the eyes. Extremities brown banded.

*Habitat*.—Eastern Cuba, (estate of Monte Verde.) From a valuable collection made there by Mr. Chas. Wright. Mus. Academy Phila. and Smithsonian, (No. 5098.)

This species has an occasional large granular scale in place of the dermal appendages of the *loysianus*. In that species the muzzle is more elongate; the third plate of the facial ruga is not in contact with that opposite, or with that of the canthus rostralis; the scales of the canthus are narrower. There are four or five palpebral plates, never three. The coloration is also different.

#### *Anolis (Ctenocercus) coelestinus*.

Size medium, form slender. Tail more than twice as long as head and body, cylindrical, the vertebral series of scales largest. Abdominal scales subquadrate, smooth, those of the back and sides subequal, coarsely granular, smooth. No dorsal or nuchal dermal folds. The hinder extremity directed forward reaches the ear; the anterior, four-fifths the distance to the groin. Digital expansions well developed. Goitre large; a prebrachial fold. Head elongate, front very little concave, nostrils latero-vertical close, to the extremity of the muzzle. Canthus rostralis acute, straight, covered with small scales; facial rugæ none. Head plates all small, keelless. Seven in the superciliary series, the posterior minute; two rows of scales separate those of one side from those of the other; they are also well separated from the occipital, which is small oval. Five loreal series. Eight superior labials; anterior infralabials small, keelless. Palpebrals small, scarcely keeled, separated from the superciliaries by granules. Length of head and body 2 in. 6 lin.; of posterior extremity 1 in. 4 lin.

Color above bright bluish green (in alcohol), the extremities bluer. A white or reddish band extends beneath the orbit, through the ear to a short distance beyond the axilla. Above and behind the latter a large black spot extends more or less posteriorly. A reddish tint sometimes pervades parts of the inferior surfaces; otherwise they are greenish white. Tibia and femur indistinctly dark cross-banded. Postorbital and sometimes the loreal and frontal regions blackish.

*Habitat*.—Western Hayti. Specimens obtained by Dr. Weinland near Jeremie (No. 1500 Mus., Compar. Zool.) have been kindly lent me by Prof. Agassiz.

This species takes the place of *A. principalis* in Hayti. It is the nearest ally of that species, but differs in important particulars, as the smoothness of the abdominal and frontal plates, the smallness of the latter, and the absence of facial rugæ; the digital expansions are less developed and the nostrils are more anterior.

#### *Anolis (Anolis) cybotes*.

Size above medium; form stout, head massive. Tail much compressed, ser-  
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ulate above. Digital expansions rather narrow. Abdominal scales smooth rounded; scales of the lateral thoracic region keeled. A strong nuchal dermal fold and a slight dorsal one. Lateral and dorsal scales minutely granular, except two to four median series, which are larger and keeled. Anterior brachial, antebrachial and tibial, and inferior tibial scales keeled. Angular process of mandibulum prominent. Temporo-occipital region swollen; occiput with a median, gemmiform, sharply-defined depression, which is continuous with the gutter-like frontal concavity. The facial rugæ are well defined, little divergent, including rather a deep longitudinal depression. Nostrils large, lateral; canthus rostralis sharp, a little curved, depressed anteriorly. Superciliary plates large, five on each side, in contact or barely separated medially. Frontal scales rather large, longitudinal, smooth. Occipital plate elongate, small, separated from superciliaries. Seven or eight loreal rows; seven superior labials; symphyseals large, first infralabial not large. Tympanic orifice large. Anterior extremity extended, reaches beyond the groin; the posterior anterior to the orbit. Length of head to angle of jaw 9 lines; from angle of mandible to vent 1 in. 8 lin.; hind extremity 2 in. 2 lin.

General color green, with blackish tints. Posterior extremities sometimes cross-banded. Female with a pale vertebral streak.

*Habitat*.—Western Hayti; from near Jeremie, Dr. Weinland. Mus. Compar. Zoology, Cambridge, No. 1501.

#### *Anolis* (*Coccoëssus*) *pentaprión*.

Size medium; form stout. Tail one and a quarter times the length of the head and body, much compressed, subtriangular in section, the vertebral angle trenchant, serrate; four basal angles formed by the continued keels of as many series of large scales. Goitre large. Scales of the back and sides equal, minute, the abdominal larger, though small, subgraniform, smooth. Orbits large, auricular orifice small. Head stout, muzzle thick, rounded. Canthus rostralis obtuse anteriorly, facial rugæ just traceable posteriorly. Nares near the end of the muzzle, lateral. Occiput covered with numerous irregular smooth plates, which extend between the superciliary series. Plates of the front and muzzle rather small, polygonal, rough, not keeled; palpebrals numerous, smooth, three loreal rows; nine superior labials, nine inferior, the second small. Infralabials small. Extremities stout, their scales small, not keeled; digital expansions well developed. The anterior extremity does not reach the groin, the posterior scarcely the auricular orifice. Length of head and body 2 in. 6 l.; of tail 3 in. 4 l.; head to ear 8 l.; hinder extremity 1 in. 2 l.

Above whitish, tinted with reddish brown, and marbled with brown. Extremities and tail pale reddish brown with brown cross-bars. Frontal and occipital regions dark, muzzle pale; some brown shades beneath the eye on both jaws. Beneath yellowish; goitre cherry red.

*Habitat*.—New Granada, near the river Truando. Discovered by Arthur Schott, Esq., who accompanied the U. S. Expedition under Lieut. Michler.

The shape of the tail and the subgranular ventral scales place this species in a section of the genus which I call *Coccoëssus*. It is most nearly allied to sect. *Gastrotropis*, Fitz., in which *A. schiedii* Wieg. resembles it in many respects; the form of the muzzle is much as in this species and in *A. nebulosus*.\*

#### *Anolis* (*Dracontura*) *limifrons*.

Tail cylindrical, without a larger median series of scales. Ventral scales smooth. Dorsal and lateral scales granular, rugulose, all equal. Scales of arm, inferior tibia and anterior femur keeled. Neck rather elongate; eyes large, head broad, very concave in profile, muzzle prominent, truncate, nearly

\* Dr. Gray, Catal. Liz. Brit. Mus., refers *A. sagræ* to this species. They are different, and typical of different sections of the genus.

plane above. Nares large, lateral. Frontal concavity elongate deep, its scales numerous, granular. Facial rugæ moderately developed, divergent, soon obsolete, covered by three scales anterior to the seven superciliary, and separated from the canthus rostralis by larger keeled scales. The canthus is weak, concave. Occipital plate small, oval, surrounded by granular scales, which also separate the superciliaries. Palpebrals keeled; muzzle plates polygonal, tricarinate. Loreal rows about seven; upper labials eight, inferior seven, infralabials small. Anterior extremity slender, not reaching the groin, the external digit shorter than the second; posterior extremity reaches the anterior margin of the orbit. Auricular orifice large, vertical. Length from muzzle to axilla 9 l.; from auricle to vent 1 in. 3 l.; of hinder extremity 1 in. 4 l.

Above bronze brown, beneath rusty white, separation between the two abrupt anteriorly; lips and femora beneath varied with brown. Another specimen is brownish golden above, light yellow beneath.

This species differs from *fuscoauratus* in the uniform size of the dorsal and lateral scales, and the absence of a larger median caudal row. In *radulinus*, *poecilopus* and *fraseri* the ventral scales are keeled. In the last there is no occipital plate, and the second has the scales of the muzzle no larger than those of the front. *A. radulinus* exhibits a few larger dorsal rows. In general appearance it is quite similar to *A. lionotus*. It inhabits the same country, viz.: Veragua. Mus. Academy Nat. Sciences, from Mr. R. W. Mitchell.

*Anolis (Dracontura) poecilopus.*

Size medium; neck and hinder extremities elongate; head broad, muzzle full, rather prominent. Tail compressed cylindrical, its scales keeled, the median row largest. Abdominal scales small, ovate, keeled; lateral minute, gradually merging into the dorsal, which are larger, flat, keeled and in numerous rows. All the scales of the extremities are keeled, those of the internal surfaces minute, the others flat, not large. The scales of the upper surface of the head are minute, subgranular, rugulose; those between the canthus rostralis and facial ruga larger. The canthus weakly pronounced, soon obsolete; rugæ slightly developed, bounding a rather deep frontal concavity, which extends between the orbits. Nostrils near the end of the muzzle, lateral. Seven or nine superciliaries bounded internally by granules; occipital minute or wanting. Superior labials nine; infralabials small. Palpebrals small, keeled. Loreal series nine or ten. Auricular orifice small, vertical. No dorsal or nuchal fold; goitre large. Anterior extremity reaching groin; second finger longer than fifth; posterior extremity reaching end of muzzle; digital expansions narrow. From muzzle to tympanum 8 lin.; tympanum to vent 2 in.; tail 4 in. 8 lin.; posterior extremity 2 in. 1 lin.

General color above, brown; the extremities and digits with numerous light cross-bands; sides darker, with numerous longitudinal light lines, one commencing above the axilla most distinct; light vertical bands ascend from this to a superior obsolete longitudinal band. In female specimens dark chevron-shaped spots cross the back. Beneath pale yellowish.

*Habitat.*—Near Carthagena, and on the Truando, New Grenada. From Lieut. Micheler's collection, made by Arthur Schott. (Sm. No. 4320, 4331.)

This animal probably most nearly resembles the *A. fraseri*, Gthr., but that species is said to have but five rows of loreal scales, the fifth finger longer than the second, and different coloration. In general appearance it approaches near to *A. limifrons*, *fuscoauratus* and *lionotus*. In the last the dorsal scales are much larger and smooth; the scales of the front and muzzle are also larger.

*Anolis (Dracontura) vittigerus.*

Head rather broad, muzzle short. Tail cylindrical, four times the length of the head and body. Anterior extremity just reaching the groin, posterior ex-

tending to the middle or in front of the orbit; second finger longer than fifth. The latter is large; tympanic orifice moderate. Nineteen teeth in the superior maxillary bone. Goitre very small. Abdominal scales imbricate subacute, keeled; lateral scales minute; dorsal scales larger, less than the ventral, flat, keeled, in about twenty rows. Anterior brachial, antebrachial and femoral, superior brachial and tibial, and inferior femoral and tibial scales keeled. Occipital plate not in contact with the superciliaries. The latter are rather large, five or six in number, in contact medially. Facial rugæ low, divergent. Frontal depression obpyriform, containing rather large, flat, smooth scales; scales of the muzzle smaller, carinate. Palpebrals numerous, keeled. Canthus rostralis short, acute. Five rows loreal scales; superior labials eight, inferior seven; infralabials small. Length of head and body 1 in. 4 lin.; of tail 5 in. 6 lin.

Light yellowish brown, median dorsal region and tail reddish brown, crossed by some irregular blackish markings. A longitudinal light lateral band, bounded above and below by a brown one. A brown band from eye to axilla, one above it rising to the nape, one from superciliary region nearly joining one from the opposite side behind the occiput. A band between the eyes and one on the muzzle; lips varied. A crossed-band on the tibia and femur formed of two united triangles. Beneath golden with a coppery tint.

*Habitat*.—Truando region, New Granada. Mr. Schott coll., Lt. Michler's Exped. Mus. Academy; Smithsonian (No. 4332.)

This species is much like *A. lemurinus* in form, but has the larger dorsal rows more numerous, and a different coloration. From *A. chrysolepis* it differs in the more numerous series of larger dorsal scales.

*Anolis (Gastrotropis) radulinus*.

Size small, head not short. Tail cylindrical or slightly compressed, median row of scales a little larger. Ventral scales ovate, keeled; lateral scales minute; the dorsal scales larger, flat, keeled, becoming larger medially, where two series are abruptly larger. Occipital distinct, isolated; superciliaries five, separated by three or four rows of minute scales. Facial rugæ weak, enclosing a shallow concavity, which is covered with minute, keeled scales. Those outside the rugæ and on the muzzle are larger, keeled. Canthus rostralis acute, nearly straight, soon obliterated. Nostrils terminal, lateral. Six or seven rows of loreal scales; labials nine—nine; infralabials small. Auricular orifice rather large, vertical. Goitre large. Digital dilations very narrow. Anterior extremity reaching groin; the posterior to beyond the orbit. Length of head to tympanum 6 lin.; from tympanum to vent 1 in. 3 lin.; of tail 3 in. 6 lin.

Above golden brown, with eight or ten narrow, chevron-shaped cross-lines, the angles directed posteriorly. A lateral series of small white spots, most distinct anteriorly, beneath which is a light longitudinal band, obsolete posteriorly. A narrow brown band between the eyes; extremities banded. Beneath brownish white. The ♀ is bronze brown, the dorsal line sometimes darker.

*Habitat*.—Truando region, New Grenada. Lt. Michler Exped. coll. Mus. Academy and Smithsonian (Nos. 4327, 4328.)

In the minuteness of the interrugal scales this species resembles *limifrons*, *poecilopus* and *fraseri*. From the first the keeled ventral plates and other peculiarities separate it; in the second, the frontal and loreal scales are smaller and the large dorsal scales more numerous. The large occipital and coloration will separate it from *fraseri*. *Sallaei*, *cooperi* and *cupreus* resemble it in form, but all have larger frontal and muzzle plates; in *sallaei* the large dorsal rows of scales are more numerous.

*Anolis (Gastrotropis) concolor*.

*Anolis refulgens* "Schl.," Hallow., Proc. Acad. Nat. Sci., 1860, p. 480.

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General form that of *A. maculatus*. A strong nuchal fold in larger specimens. Tail cylindrical or slightly compressed. Head elongate, muzzle rather narrow, nostrils lateral. Canthus rostralis straight, loreal region long, perpendicular. Occipital plate large, not in contact with superciliaries, in a depression which is not defined in the young. Facial rugæ not acute, convergent anteriorly; the enclosed depression elongate diamond-shaped, with rather small, more or less keeled scales. Superciliary plates seven, in contact or separated by one series of granules medially. Palpebrals numerous, keeled. Loreal rows five or six. Upper and lower labials eight. Infralabials small. Scales of the extremities small, keeled; abdominal scales keeled; lateral scales minute, dorsal larger, keeled; two median rows abruptly largest. Auricular opening moderate, vertical. Digital expansions moderate; second and fifth fingers nearly equal; anterior extremity reaches groin; posterior, middle or anterior part of orbit.

General color darker or lighter brownish green, the extremities faintly banded. A few dorsal dots in the young.

*Habitat*.—Nicaragua. Mr. C. Wright, of Capt. Rodger's Exped., collection Mus. Smithsonian (No. 6055); Phila. Academy.

The young of this species may be distinguished from *A. cupreus* Hallow. by the longer muzzle, more prominent facial rugæ and nearer approach of the superciliary plates; from *radulinus* by the same characters, and by the greater size of the interrugal scales and the coloration. *A. cupreus* Hallow. is nearly related to *A. cooperi* Baird, both differing from *A. sallaei* in the less number and uniformity of the rows of keeled dorsal scales. In *cooperi* the first infralabial is large as in *sagrae*, and there is a strong prebrachial fold. The palpebrals are three or four-rowed. In *cupreus* these are only two rowed, and the infralabials are small. The colors are lighter.

*A. longicaudus* Hallowell, described in the memoir referred to at the head of the description of this species, is allied to *A. tropidogaster* Hallow. Like it, it is a slender animal, the length from the muzzle to the tympanum entering two and a half times into the distance from the latter point to the groin. The tympanum is, however, very much smaller, the dorsal scales are larger and the facial rugæ more strongly pronounced. The head is narrower. *Dracontura bivittata*, described in the same memoir, belongs to the sub-family of Basiliscinæ, where it should be placed next to *Thysanodactylus* Gray. In proof of this, it may be stated that the external nares are lateral, and the toes broadly margined. From all the genera it differs in its plain occiput, without enlargement or compression, and the total absence of nuchal, dorsal or caudal crest. Tail compressed. A transverse gular fold. The species may be called *Paraloma bivittata*.

#### *Basiliscus (Cristasaura) nuchalis*.

Tail compressed, its superior margin undulate serrate. Dorsal crest low, extending between interscapular and crural regions; its rays eleven. Helmet highly developed, produced posteriorly, where its outline is sigmoid; from its posterior extremity to its anterior, which is between the hinder borders of orbits, its margin is more than twice as long as from the last-mentioned position to the end of the muzzle. It is thin and covered with smooth scales, which are much larger than any on the cranium. Occiput much swollen, its scales smooth; supraorbital scales keeled. Superciliaries ten on each side, separated by three rows of scales. Facial rugæ well developed, enclosing a concavity covered with rough scales. Muzzle scales scarcely keeled. Canthus rostralis acute. Rostral bordered by three plates posteriorly. Labials seven or eight above, nine below. Tympanum half as large as bony orbit. Two gular folds. Abdominal scales keeled. Dorsal flat, subquadrangular, slightly keeled, larger than lateral. Hinder extremity extends beyond the muzzle.

1862.]

From muzzle to second gular fold 2 in.; from fold to vent 3 in. 8 lin.; from vent to end of tail 16 in.; length of hinder extremity 5 in. 6 lin.

General color olivaceous, paler below. A white (or ?yellow) band from the superior posterior angle of orbit, which extends half way to the helmet. A rusty-brown band extends from above the tympanum to the posterior part of the back. Three transverse black spots on the nape.

*Habitat*.—Near Greytown, Nicaragua. Discovered by Dr. Caldwell, who sent specimen 5845 to the Smithsonian Institution.

Dr. Gray says of his *Cristasaura mitrella*, that the scales of the crest are smaller than those of the front, and slightly keeled, also that the dorsal crest is high—which is, however, only important specifically when compared with the development of the helmet. The coloration of that species is also different. It is an inhabitant of Honduras.

#### *Scartiscus caducus*.

*Char. gen.*—Body depressed. A median dorsal keel, which forms a low crest on the nape. Tail slender, compressed, covered with appressed equal verticils of weakly-keeled scales. Digits 5—5, without lateral expansions, strongly pectinate inferiorly. Tympanum distinct. Nostrils in a single plate, which is lateral and below the canthus rostralis. Head plates numerous, small, keeled; interparietal, parietals (in contact) and postparietal only distinguishable. Pterygoid teeth none; maxillaries triscuspid. No antepectoral fold. Scales of the body large, flat, caducous, keeled everywhere; the dorsal in posteriorly convergent series. No femoral or anal pores.

In this genus of *Iguanidæ*, there are two pairs of abdominal ribs,\* connected by a slight linea alba. In *Brachysaurus*, which resembles *Scartiscus* in general appearance, these are more numerous; the external nares also are superior to the canthus rostralis. In *Polychrus*, the representative of the *Gastropleur* type with lateral nostrils, the general form and squamation are totally different. The position of the nostril will distinguish *Scartiscus* from many *Humivagæ* (e. g. *Liocephalus*), and the compressed spineless tail will separate it from others.

*Char. specif.*—Labials very narrow; inferior, to proc. coron. mand. six, superior four, bounded above by a similar series of seven; symphyseal single. Scales of head everywhere keeled; two larger superciliary series distinguishable, which are in contact medially. No earlobes. A slight preaxillary fold. A lateral crural keel on each side. Posterior extremities elongate, extending forward to anterior border of orbit. Tibia longer than femur; foot much longer than tibia or than hand and antebrachium. External toe reaching beyond internal. Brachium shorter than antebrachium; order of digits, first, fifth, second; third and fourth nearly equal. Whole anterior extremity reaching nearly to groin. Head to posterior border of tympanum equals longest measurement of tibia.

Color above brown, with numerous dark brown chevrons, the angles directed posteriorly; a narrow, vertical, yellow line from the axilla. Extremities and tail cross-banded. Beneath yellowish brown, the throat darker, light varied.

Length of head and body to vent 3 in. 3 lin.; of tail 6 in. 3 lin.; of anterior extremity 1 in. 6 lin.; of posterior do. 2 in. 7 lin.

*Habitat*.—Paraguay. Mus. Smithsonian (No. 5852). Capt. Page's Exped. coll.

#### *Liocephalus personatus*.

Head shields keeled, not lanceolate. First internasal not in contact with

\* Dr. Fitzinger places *Laemantus* among the *Gastropleuræ*, but it seems incorrectly. *Laemantus longipes* is destitute of abdominal ribs. *Chamaeleopsis hernandezii* there is one pair which do not meet on the median line.



rostral. Six or seven in the supraocular series. Interparietal lanceolate. Across the middle of the nape, between lines continuous with the temporal ridge, eleven rows of scales may be counted. Cheek with rather large keeled scales; four thick marginal auricular scales. Labials five—five. Prebrachial folds conspicuous. Dorsal crest high, higher upon the origin of the tail. The tail is very much compressed. Posterior extremity reaching tympanum. Length from muzzle to vent 2 in. 11 lin.; vent to end of tail 5 in. 4 lin.; greatest depth of tail 4 lin.

Above light brown, many of the scales with greenish shades; a few median black spots on the nape. Side of the head, and posteriorly nearly to axilla, also chin and jaw, black. Beneath bluish green, the sides of the abdomen, the hinder extremities and tail, varied with greenish white scales.

*Habitat*.—Hayti (near Jeremie). Sent in a valuable collection made by Dr. D. F. Weinland to Prof. Agassiz. Mus. Comparative Zoology, Cambridge, Mass.

The West Indian *Liocephali*, with smooth ventral scales, possess either three pairs of fronto-nasal plates in addition to the supranasals, or only two. Of the former description are *L. carinatus* Gray (*microlophus* Coct. Bibr.) *L. vittatus* Hallow. (*schreibersii* Gray), *L. macropus* n. sp., *L. schreibersii* and *L. melanochlorus* n. sp. Those of the latter kind are *L. raviceps* n. sp., *L. trigeminatus* n. sp. and the subject of the preceding description.

#### *Liocephalus trigeminatus*.

Head shields slightly keeled, not lanceolate; first internasal not in contact with rostral; six or seven supraoculars; interparietal lanceolate. Ten nuchal rows. Nuchal and dorsal crest low, caudal elevated. Labials six—five; temporal scales large; two principal marginal auricular. Lateral neck folds very strong. Post auricular scales not granular. Posterior extremity not quite reaching orbit. Tail much compressed. Length from muzzle to vent 2 in. 1 lin.; vent to end (?) of tail 2 in. 10 lin.; of hinder extremity 1 in. 6 lines.

Above olivaceous brown, with four narrow, transverse, blackish brown bars, bordered behind with lighter; the posterior between the groins. Tail spotted above, a light lateral band from the orbit to the base of the tail, and another from the ear to the groin; between these brown with a few vertical blackish brown bars. Beneath dirty greenish white, chin spotted with brownish.

*Hab*.—Hayti, near Jeremie. Dr. Weinland's Coll. in Mus. Compar. Zool.

#### *Liocephalus raviceps*.

First internasal often in contact with rostral. Head scales generally strongly keeled. Posterior fronto-nasals remarkably large. Six or seven supraoculars. Interparietal elongate triangular, short. Fifteen nuchal rows, (counted as in *personatus*). Nuchal dorsal and caudal crest equal, little developed. Tail nearly cylindrical. Labials five—six; cheek scales rather small; five large marginal auriculars; post auriculars not granular. All the scales of the body small. Posterior extremity reaching ear or angle of mouth. Length from muzzle to vent 3 in. 1 lin.; from vent to end of tail 4 in. 4 lin.; of posterior extremity 2 in.

Above yellowish brown, with many short, narrow, black longitudinal lines, which are sometimes arranged as a double series of dorsal spots. A dark band from the eye to the groin, which becomes obsolete in age, and is bounded beneath by a rather broad yellowish vitta which is permanent. Beneath yellowish, under surfaces of limbs and abdomen and sides as far as the jaws varied with ? yellow (white in spirits) scales. Tail with brown chevron-shaped crossbands. Top of head light yellowish brown.

*Hab*.—Eastern Cuba. Mr. C. Wright discoverer. Mus. Smithsonian (No. 4162) and Academy Phila.

1862.]

*Liocephalus macropus*.

Head plates broad, smooth or keeled; first internasal not touching rostral. Six or seven supraoculars. Labials six—six; cheek plates rather small; four marginal auriculars; postauriculars granular. Nuchal rows nineteen. Crest low, equal. Tail nearly cylindrical. Posterior extremity quite or nearly reaching end of muzzle. Dimensions of largest specimen: from muzzle to vent 2 in. 9 l.; from vent to end of tail 4 in. 3 l.

Above olive, often with a metallic lustre; sometimes brownish. A transverse interscapular and crural pale-bordered spot, which is often indistinct. A blackish band extends from the orbit to the groin, mostly varied with white near the axilla—obsolete posteriorly. Beneath yellowish or greenish, the gular region sometimes streaked with black.

*Hab.*—Eastern Cuba. Mr. Chas. Wright has sent specimens to the Smithsonian Institution, which has presented some to the author.

This species is much like the *L. vittatus*, but differs in the greater breadth and smoothness of the head-plates, especially of the supranasals and frontonasals, and in the granular nature of the scales for some distance posterior to the auricular opening; its size is less, more resembling the *raviceps* in this respect.

The species first named by Dr. Edw. Hallowell, as *Holotropis vittatus*\* has been apparently mistaken by Dr. J. E. Gray for the *L. schreibersii* (*Pristinotus schreibersii* Gravenhorst). The head plates are very lanceolate, and strongly keeled, the crest low and equal. It is perhaps the most abundant species of the genus in Cuba, though the *carinatus* only is represented in de la Sagra's work, where it is called *Holotropis microlophus*. The latter species resembles yet exceeds the *macropus* in the breadth of its head-plates; they further differ in being perfectly smooth.

*Liocephalus melanochlorus*.

Head scales more or less keeled, numerous; anterior extremities of supranasals cut off, sometimes three anterior internasals; always four prefrontals. Six supraorbitals; interparietal lanceolate. Labials six—six. Two prominent marginal auriculars; postauriculars squamous. Scales of the back large, the keels unusually strong; nuchal rows eleven. Crest well developed, highest on the tail. Tail compressed, the scales of the lower surface keeled. Posterior extremity reaching the orbit. Length from muzzle to vent 3 in. 7 lin.; from vent to end of tail 7 in.

General color light green, principally appearing above in two dorsal bands and in the interspaces of a series of about ten transverse black bands extending between them. These become more or less confluent in old males, as do also sometimes the vertical bars on the sides, which are often present. Top of head brownish. Posteriorly beneath spotted with greenish white scales; gular region coarsely reticulated with black. Extremities dusky green above.

*Hab.*—Hayti, near Jeremie. Mus. Compar. Zoology, Cambridge, Mass. Dr. D. F. Weinland.

*Tretioscincus castaniaterus*.

*Char. gen.*—Scales large, those of the tail and median dorsal rows keeled. Supranasals none. Internasal broad; but two supraoculars; interparietal large. Gular region covered by the large infralabials. Inferior eyelid with a transparent disc. Extremities moderately developed, digits unequal, four—five. A series of femoral pores medially separated. Tail cylindrical.

*Char. specif.*—Sixteen rows of scales on the body, of which the median dorsal pair are weakly keeled posteriorly; on the crural region the included rows are all keeled; the carinae are stronger on the tail. Two large marginal

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\* Proc. Acad. Nat. Sci. Phila.

and two median triangular preanal plates. Five pectoral plates in an arched transverse series. Three pairs of infralabials, one transverse mental, one symphyseal. Labials 8—6; eye over the fifth upper. One loreal, two nasals, nostril between; the anterior slightly bent upon the surface of the muzzle. Fronto-nasals transverse, in contact; frontal nearly parallel-sided, obtuse-angled before and behind. Fronto-parietals longer than broad, in contact; interparietal shield-shaped, its point projecting behind the borders of the parietals; all the head plates impressed-punctate. Posterior extremity scarcely reaching the elbow of the appressed anterior limb; extent of digits in the order, first, second, fifth, third, fourth. Femoral pores six on each side. Tail plates smooth beneath. Length from muzzle to vent 1 in. 9 l., (tail mutilated); of fore limb 6 lines; of hinder, 9 lines.

Color above and on the sides dark chestnut; a bright yellow band, which commences on each side of the base of the tail, extends anteriorly round the outer border of the supraocular plates, and meets its fellow on the rostral; internally it is dark bordered on the head. Beneath yellowish, the scales bordered with chestnut; chin immaculate; under surface of tail yellow spotted.

The discovery of this little lizard is particularly interesting, as exhibiting femoral pores for the first time among the Scincidae. In other points it nearly resembles the genus *Heteropus* of Fitzinger. One specimen in the Museum of the Philadelphia Academy is labelled as having come from New Grenada.

#### *Mabuia fulgida*.

Dr. Girard has regarded the genus *Mabuia* as peculiarly American, the species from the Pacific Islands formerly placed in it belonging more properly to the genus which he first defined under the name *Emoa*, (but which Dr. Gray had previously called *Emœa*), and the East Indian type probably remaining under Dr. Gray's *Riopa* (except the *M. elegans* Gray). This view cannot be considered as fully established, at least, as regards the latter group, for Prof. Gill has discovered in the island of Barbadoes a species (*Mabuia lanceolata*) which, in weakness of extremities and cylindrical form, nearly approaches the *M. (Riopa) punctata*. The genus *Emœa* is no longer Polynesian, for a species of it has been discovered in Paraguay by the naturalists connected with the government expedition sent thither.

The history of the American *Mabuia* is in a state of some confusion, probably on account of the want of close observation in the discrimination of the species. The following table exhibits the relations of those which appear to be truly distinct.

I. Species in which there are twenty-six or fewer rows of scales on the body: *M. brevis* Günther, from Mexico; *M. punctata*, India, and perhaps the other species placed by Gray in *Riopa*, viz., *M. hardwickii* and *ruppellii*; *R. sundevallii* Smith, from South Africa, is not stated to possess a transparent eyelid, and hence may not belong to this genus. Possibly *M. elegans* Gray should be placed here.

II. Species in which there are thirty or more rows of scales on the body:

- A. Eye over the seventh superior labial..... *agilis*.\*  
 B. Eye over sixth superior labial.  
   *a. Internasal semidisoid, its posterior outline straight, sloanei*.  
   *a. Internasal rhombic;*

*b. As long as broad, in contact with rostral.*  
 Muzzle narrow; the yellow marginal band bordered with  
   brown above, on head..... *fulgida*.

*b. Broader than long, rarely or not touching rostral.*

*c. Frontal acute anteriorly.*

Four brown bands on the neck; thirty-four rows of scales, *cuprescens*.

\* Vid. Girard Herpetol. U. S. Expl. Exped. p. 261, for synonymy and observations.  
 1862.]

Two brown bands on neck, thirty-two rows of scales..... *unimarginata*.  
c c. Frontal truncate anteriorly.

Scales large..... *surinamensis*.\*

C. Eye over fifth superior labial.

Thirty-four rows of scales, head acute..... *aenea*.†

Thirty rows of scales.

Elongate; head acute; appressed extremities not touching.....

..... *lanceolata*.

Stout; head short; appressed extremities meeting..... *cepedii*.‡

*Mabuia fulgida* is perhaps the most abundant species in Jamaica, where it has been seen and described by Mr. Gosse under the name of *M. agilis*. That the *agilis* of Dr. Gray is this species is not improbable, though that author has alluded to South American specimens, and quoted synonymy pertaining to the South American species, the original *agilis*, which Girard's description shows to be distinct.

The scales of the median nuchal rows are of unusual breadth. The head is narrow, continuous with the neck, and the muzzle is depressed and acute. The scales have a metallic refulgence, in fresh specimens strongly golden cupreous. There are many small black spots on the dorsal region. The lateral stripe extends from the end of the muzzle, and is black; its yellow superior and inferior borders are brightest anteriorly, the former extending round the muzzle, and having a brown inner border. The tail is speckled with blackish brown, and the extremities are barred with the same; lips and beneath yellowish. Specimens probably exist in most of the larger museums.

*Mabuia cuprescens*.

Body short, gradually tapering into the narrow acute head. Length of muzzle from canthus of eye a little greater than width between anterior margins of orbits. Supranasals in contact over rostral. Frontonasal rhombic, broader than long. Frontal not truncate, its greatest width three quarters its length. Four supraoculars. Anterior border of interparietals angular; parietals in contact posteriorly; postparietals well developed. Superior labials eight, six beneath eye; with the seventh the largest. Scales smallest on sides, in thirty-four rows. Seven marginal prenasals. Extremities touching when extended. Length from muzzle to vent 3 in.; from vent to end of tail 5 in.; hinder limb 1 in.; fore limb 9 in.; muzzle to ear 7 in. General color above iridescent brown or coppery, darkest on the median six rows of scales. A brown band extends from the muzzle to the groin, covering three and a half scales on the neck, one and two halves on the side. It is bounded above and beneath by broad gray bands, of which the superior shades into the dorsal color, except where bounded above by a narrow brown band which is most distinct on the nape, though it extends on the head-plates and is traceable on the back. The lower light band is margined inferiorly by a darker shade, which becomes a band between the rictus and axilla. Tail pale gray; beneath whitish.

*Hab.*—St. Thomas. From Mr. A. H. Rüse, a gentleman whose valuable collections have been for some time adding much to our knowledge of the zoology of the West Indies.

A very pretty species resembling the *aenea* in form, and the number of rows of its scales. It has four supraoculars instead of three, the frontal is not truncate anteriorly, the eye rests upon the sixth not fifth superior labial. The coloration is different.

\* Hallowell, Trans. Amer. Phil. Soc.

† "Scinque (appelé Anolis de terre et Mabouia dans les Antilles) Cuvier."

‡ *Eumeces mabuia* Dum., Bibr., as Dr. Gray has pointed out.

§ I have supposed a specimen from the Paris Museum labelled as *Eumeces mabuia* from Marie Galante, to belong to the *M. aenea*, while new Grenadian and Trinidad specimens have been referred to the *cepedii*.

*Mabuia unimarginata*.

Form slender, head as wide as the neck to the orbits, the muzzle not elongate; scales (in the specimen described) in thirty-two rows. Supranasals in contact; frontal elongate, not truncate anteriorly; a postnasal. Supraoculars four; superior labials eight, eye over sixth. Appressed limbs overlapping. Seven marginal anal plates. From muzzle to tympanum 6 lines; from muzzle to vent 2 in. 7 lin.; from vent to end of tail 3 in. 10 lin., anterior extremities 9 lin.

Above rather dark brown; a narrow black band extends from the end of the muzzle to the groin, which has a bright yellow inferior border. Beneath this the sides are brown. Abdomen yellowish.

*Hab.*—Panama.

This species resembles strongly the *cepedii* and *aenea*.

*Mabuia lanceolata*.

Body narrow, head lanceolate, narrow, the distance from the muzzle to the brachium nearly two-thirds that from the latter point to the groin. Frontal breadth less than length of muzzle anterior to orbit. Internasal nearly as long as broad, in contact with rostral, and frontal. Four supraorbital; frontoparietals divaricate on account of the intervention of the angle of the interparietal. Seven upper labials, eye over fifth. Lateral head plates narrow. Extremities weak, not touching when extended upon the sides. Tail cylindrical at base, compressed at its middle with a large median series of scales above as is frequently seen in this member when reproduced. From muzzle to tympanic meatus 5 lin., meatus to vent 2 in. 2 l. Tail mutilated; anterior extremity 7 l., posterior 11 l.

General color iridescent olivaceous; no lateral band; sides of body, neck and jugulum with numerous narrow black streaks. Labial and infralabials yellowish margined with black; head shields sometimes with darker variations.

This very distinct species was discovered by my friend Prof. Theodore Gill, in the Island of Barbadoes. This gentleman has made a valuable collection of Trinidad reptiles, through which the knowledge of the fauna of that Island will soon be increased.

*Emœa frenata*.

Head distinct; muzzle from anterior canthus to eye longer than breadth of frontal region. Appressed extremities overlapping. Auricular meatus without lobes. Eight or nine upper labials, eye over sixth or seventh. Four supraorbitals. Interparietal nearly trigonal. Frontoparietal broadly triangular, nearly as long as frontal; the latter narrowly truncate posteriorly, in contact with internasal anteriorly. This plate is rhombic, broader than long. Supranasals in contact behind rostral. Nostril near the middle of nasal plate. Scales in thirty or thirty-two rows. Length from muzzle to ear 4 lin.; muzzle to vent 2 in. 6 l.; posterior extremities 11 lin.

Above bright olive, with golden reflections on the head. Brownish spots produce a darker shade on the posterior part of the back. An irregularly margined brownish black band extends from the end of the muzzle to the groin; it is margined above and below by lighter. Superior labials yellow. Beneath yellowish.

*Hab.*—Paraguay. Mus. Smithsonian (5855) and Acad. Nat. Sci. Discovered by Mr. Wood of the U. S. Expedition up the River Paraguay.

This is the only species of the genus which does not inhabit some part of the Polynesian or Malaysian Archipelagos. It constitutes the nearest approach to the genus *Mabuia*. Seven species of *Emœa* have been enumerated by Dr. Chas. Girard, in the Herpetology of the U. S. Exploring Expedition under Commodore Wilkes.\*

\* Page 263.

*Diploglossus stenurus*.

Sides vertical: outline of body contracted at axillae; head distinct, muzzle obtuse: tail depressed at base, much compressed throughout the remainder of its length, twice as long as from vent to opposite auricle. Extremities pressed to the sides not meeting; toes compressed, very unequal. Scales in forty-two longitudinal series, each with 26 lines and a strong median keel. From orbit to end of muzzle equal to width between orbits. Postoccipital smaller than interoccipital. Five supraorbitals. Internasal longer than in *D. occidentus*, nine-sided, the anterior angle right, the latero-posterior produced. Lateral borders of frontal curved. A rhombic postnasal; two frenals longer than high; nine supralabials, suborbital over 6th and 7th; four pairs of large infralabials. Maxillary and mandibular teeth subbicuspoid, with an antero-lateral groove. Length from muzzle to vent 5 in. 10 l.; tail 9 in. 1 lin.; posterior extremity 2 in.

Color above brown, with occasional spots formed by a deeper brown scale. Sides with vertical undulate light bars, darker bordered, which are subdivided superiorly so as to form longitudinal series of light spots. Top of head uniform. Tail with light vertical bars. Beneath yellowish.

*Hab.*—Hayti. Found near Jeremie, by Dr. A. F. Weinland, whose collection is in Prof. Agassiz splendid Museum at Cambridge. Beside species described in this memoir, Dr. Weinland obtained the types of the previously unknown genera *Panolopus* and *Ialtris*.

In this species and the *D. occidentus* (*Celestus* Gr.), in the *Oneyda sagrae* (*Diploglossus* part. Gray,) and *Panolopus costatus*, I have observed that the slender quasi-squamous terminal third of the tongue, is retractile within the other portion, which covers it as a sheath. This is not mentioned by the French herpetologists; Wiegmann does not mention it in *Herpetologia Mexicana*, but says in *Archiv f. Naturgesch.* 1837, p. 129, “\*lingua\* subparte basali, aquamarum linguam forma referenti, quasi emergente.” It is a structure probably characteristic of the *Diploglossinae*. It does not occur in *Siderolamprus*, which is allied to *Plestiodon*, though resembling *Diploglossus* in the plating of the head.

On *Neosorex albibarbīs*.

BY E. D. COPE.

Of the twenty well distinguished species of shrews which Prof. Baird,\* enumerates as inhabiting the United States, one only exhibits that peculiar modification of structure which is indicative of his genus *Neosorex*. This animal, the *N. navigator*, Cooper, has been found in Washington Territory. It is, therefore, a matter of some interest that the present article introduces to notice a second species which the author discovered at the Profile Lake, in the Franconia Mountains, New Hampshire. In September, 1859, two specimens were seen swimming in the Lake about forty feet from the bank: their motion was undulatory, their backs alternately appearing above, and disappearing beneath the surface of the water. They were caught under stones upon the shore, where they had taken refuge. This aquatic habit, so little known among American *Soricine*, would be inferred from comparison with the water-loving *Crossopodes* of Europe, where we find the feet similarly fringed with a border of stiff hairs.

*N. albibarbīs* as compared with the *navigator* has a shorter tail, and a shorter hind foot. The color of the thorax and abdomen is also much darker.

2 5—5 4—4

Dental formula — — — — —. The internal process of the superior incisor

2 2—2 3—3

\* In vol. viii. of the *Pacif. R. R. Rept.*

is one-third of its length distant from the tip: the basal is well developed, and nearly equal to the first premolar. Second and first premolars nearly equal; fourth larger than third; fifth very small, wedged between the molar and premolar, its crown oval, with a faint transverse line of coloration. All the other teeth are tipped with bright chestnut, those of the mandible most extensively, especially the incisors, in which the whole superior border is colored. First superior molar scarcely larger than second and third. Inferior incisors with indistinct lobes. First premolar small, very oblique; second larger, little oblique, bicuspid. First molar largest. Muzzle slender, depressed, probably less elongate than in *N. navigator*. Distance between the ocular fissures contained once and a half times in the distance between the same and end of the muzzle. A styloid angular process of the mandibulum. The whiskers are long—the anterior directed downward and forward, the posterior extending as far as the margin of the helix of the ear. The auricle is directed backwards and closely appressed to the head: the length from antitragus to border of helix is equal to the width between the centres of the orbits. The superior and inferior portions of the helix are closely folded longitudinally upon it, the inferior fold most extensive. The antitragus is large, its anterior border folded backward, the whole closely covering the meatus. Antihelix vertical, short, folded backwards. The posterior, and external anterior faces of the helix are covered with long dark hairs like those of the body; the other portions of the auricle are heavily fringed with the same. Fur, upon the middle of the side about three lines long. Tail obtusely tetragonal, as long as the head and body. The hairs are stiff, flattened, equal; they form a pencil at the tip. A close fringe extends along the inner and outer borders of the palms and soles and exterior digits; a slighter fringe occurs on the border of the median digits. The claws are acute, short. The anterior foot is contained one and two-thirds times in the length of the posterior. In the latter there is a depressed tubercle at the base of the internal digit, one at the base of the second, and one at the base of the fissure between the fourth and last. There is a compressed tubercle at the base of the third digit, and two on the metatarsus. The arrangement of tubercles on the palm is similar, except that they are more depressed, and close together. Length of head 1 in.  $2\frac{1}{2}$  lin., of body 1 in. 6 l., of tail 1 in. 9 l., of fore foot  $4\frac{1}{2}$  l., of hind foot  $8\frac{3}{4}$  l.

The general color is black, with a tinge of brown; this tinge is more apparent on the abdomen, and most upon the posterior gular region; anterior gular region and chin nearly white, lightest anteriorly. Tail unicolor.

#### On *Lacerta echinata* and *Tiliqua dura*.

BY E. D. COPE.

##### *Lacerta* (*Zootoca*) *echinata*.

Scales nearly granular on the sides and nape of the neck. They increase in size posteriorly, becoming rhombic, and having strong keels parallel with the median line. Abdominal plates in six series, transverse, except the posterior portion of the median two series, which are longitudinal. Gular scales in cross series, coarsely granular, the posterior largely. Eight plates on the antepectoral fold, preceded by six or seven smaller. Four series of brachial plates, two anterior; the superior of these is the largest of all. One antero-internal antebrachial series: the external and posterior scales of the antebrachium are keeled, as are also those of the tibia and femur. Anterior femoral series five, the second (from above) largest. Femoral pores fourteen, large, in the posterior parts of the plates. Two tibial rows, external larger, composed of six plates, of which the median three are nearly equal. Marginal preanals, one very large, transverse, two small on each side. The former is 1862.]

bordered anteriorly by a curved series of six small plates. Plates of the tail strongly keeled above and below: the margins and keels of those of the superior halves of the whorls from the tenth (counting from vent) to the twenty-sixth greatly produced, forming flattened trihedral spines. Temple with flattened, slightly keeled scales. Superior labials eight, last minute, eye separated from the large sixth by a chain of small suborbitals. Frenal and pre-frenal well developed; prenasals larger than postnasals, in contact medially. Internal longer than broad; frontonasals large, in contact; frontal more than half as broad as long; frontoparietals longer than broad, in contact with a truncate cuneiform interparietal. Parietals large, as long as the anterior four upper labials. An elongate semicircular inter-post parietal. Inferior eyelid scaled. Tympanic meatus, large, vertical. Inferior labials four, narrow; infralabials four, large, two anterior in contact with those of the other ramus. Teeth as in other species tricuspid. Length from symphysis to antepectoral fold 1 in. 6 l., from fold to vent, 2 in. 7 lin., from vent to end of tail 10 in. 6 l. Anterior extremity 1 in. 6 l.; posterior, 1 in. 11 lin. Above bluish-green with about fifteen blackish cross bands; those upon the nape and rump are narrow, the others broad, dark bordered. Beneath yellowish. Head shaded with yellowish.

*Hab.*—West Africa, Museum Smithsonian, (No. 5995.)

The spinous swelling upon the tail of this species is its most characteristic peculiarity.

*Tiliqua dura.*

Body stout, tetragonal; sides vertical. Tail tetragonal at base. Head distinct, muzzle narrow, with vertical sides. Rostral plate covering the tip of the muzzle like a cup, its posterior border straight. Nostril in the middle of a subquadrangular nasal. A pair of large supranasals, longer than broad, extensively in contact medially: an elongate frontonasal connects the supranasal with the supraocular on each side; it is separated from its fellow by a shorter pentagonal internasal. One or two minute freno-nasals; an elongate freno-ocular bounding the second and third superior labial. Vertical (or frontal) elongate cuneiform, truncate anteriorly, extensively in contact with fronto-nasals. Fronto-parietals and parietals moderate; interparietal cuneiform acute, angled anteriorly. Two crescentic postparietals on each side. Four supraoculars. All superior head plates longitudinally rugose. Six superior labials, four under middle of orbit. Temporal region covered with large keeled scales, the tympanic meatus appearing as a small slit behind the free border of one of the posterior. Thirty rows of scales round the body, the dorsal and ventral in longitudinal rows, the lateral in oblique series which are directed upward and backward; they are uncarinate, the dorsal tricarinate, the keels very strong. Four large marginal preanals. Three large infralabials on each side, beside mental and symphyseal, all in contact with inferior labials; of the latter there are six, the anterior small. Digits unequal. Hinder extremity reaching the elbow; the scales of its external surfaces strongly keeled, as are those of the fore limb; tail (reproduced) covered with strongly keeled scales which form on the upper surface four strong continuous ridges. Length from muzzle to axilla, 9.5 lin.; from axilla to vent 1 in. 2 l.

Above dark rusty, the head and a broad interscapular cross-band, also a median dorsal series of spots, and five or six rather large dorso-lateral spots, chestnut. Beneath and upper lip, rusty yellow.

*Hab.*—Western Africa, Museum Smithsonian, (No. 5996.)

This species is not to be considered a *Euprepis*, on account of the squamous inferior eyelid: it is quite different from the *Tiliqua rufescens* in the much stronger carination, the more compressed head, minute auricular opening, and different arrangement of head-plates.

This species and the preceding, as well as several others previously described in these Proceedings, must be added to the catalogues of West African rep-

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tiles, recently published by Drs. Gray and Duméril. Of these may be mentioned the crocodile *Osteolaemus tetraspis*, the turtle *Aspidonectes aspilus*, the tree-frog *Hyperolius fulvivittatus* and the serpent *Dasypeltis carinata* (*Dipsas carinata* Hallow). M. Duméril has united many of the supposed species which have been described as distinct; he has, however, not noticed Dr. Günther's identification of Hallowell's *Heteronotus triangularis* with his *Graya silurophaga*. As both the names for this genus have been previously employed, I have called it *Glaniolestes* in the "Hand-book to the Museum, Philadelphia Academy."

## On the Classification and Synonymy of the recent species of PHOLADIDÆ.

BY GEORGE W. TRYON, JR.

In the year 1851, Dr. John Edward Gray proposed a very excellent arrangement of the genera of shells included by earlier conchologists in PHOLAS and TEREDO.\* This arrangement has received the approval of most of the subsequent authors, who have treated on the subject, including Fischer, (Journ. Conchyl., 2d ser., iii. iv.), H. and A. Adams, (Genera of Recent Mollusca,) and Chenu, (Manuel, tome 2.)

S. P. Woodward, however, in his admirable Treatise on Conchology, part second, makes the following disposition of the Pholades:

Genus PHOLAS (including DACTYLINA, BARNEA, TALONA, etc.

"The differences in the dorsal shields are only of specific value."

Genus PHOLADIDEA, subgenera MARTESIA, JOUANNETIA, PARAPHOLAS.

Genus XYLOPHAGA.

Mr. P. P. Carpenter, in his various works on the West Coast Mollusca, follows Woodward's arrangement.

The only other modern classification of the family with which I am acquainted, is that contained in Swainson's Malacology, which is as follows:

### Order DITHYRA.

#### Tribe MACROTRACHIÆ.

##### Family PHOLIDÆ.

Genera ASPERGILLUM, CLAVAGELLA, FISTULANA, GASTROCHENA, PHOLADOMYA, PHOLAS, PHOLIDÆA, MARTESIA, XYLOPHAGA, TEREDO, TEREDINA.

I am much inclined to think that more than merely specific value should be attached to the number, form and position of the accessory valves, and I have therefore adhered in the main to Dr. Gray's arrangement.

The Pholades are monographed by Sowerby, Thes. Conch., ii. 1849. Chenu, Ill. Conchyl.; and Hanley, Desc. Cat., besides which, scattered descriptions are contained in the works of numerous ancient and modern authors.

For very full and satisfactory anatomical descriptions of the animals of PHOLADIDÆ, see

Poli. Testacea utriusque Siciliæ.

Deshayes. Exploration Scientifique de l'Algérie. Mollusques.

Fischer. Journal de Conch. 2d ser., vols. iii. and iv.

The Pholades inhabit all parts of the world, and many of the species have a geographical range much surpassing that of the generality of bivalve mollusca; and the supporters of the theory of the specific distinctness of all

\* An Attempt to Arrange the Species of PHOLADIDÆ into Natural Groups, by J. E. Gray, Ann. and Mag. Nat. Hist., 2d ser., viii. p. 380, 1851.

the Mollusca of the Pacific coast of America from that of the Atlantic, must admit that in this family, at least, no such barrier exists. This wide distribution has doubtless been caused, in a great degree, by the circumstances of habitation of several of the species, which seem to select floating timber for their abode. In these habitations they appear to sustain those vicissitudes of temperature which so generally circumscribe the Marine Testacea, except deep-sea species, to restricted zones of latitude; but it is exceedingly surprising that the larger species, which naturally make their abode in stone or mud, do not appear to be any more restricted in habitat than the others. In illustration of this subject, the following species and their range are cited:

*Pholas costata*, L. New Bedford, Mass. Mexico. Mediterranean.

*Pholas truncata*, Say. Atlantic coast from Nova Scotia to Florida. Peru. Chili.

*Zirphæa crispata*, L. Europe. United States. West coast (teste Carpenter.)

*Martesia striata*, L. Europe. West Indies. Philippine Islands.

The manner in which the animals of *Pholas* excavate the holes in rocks, wood and hard clay, in which they reside, has long proved a puzzling question to naturalists, and various theories have been started in explanation. The hypothesis of the evolution of an acid or solvent to eat away the surface of limestone rocks, was met with the powerful objection that the delicate valves of the animal itself would be equally liable to attack, and when it was found that the *Pholas*, not restricting its operations to carbonate of lime, excavated with equal facility surfaces on which acid has no effect,—gneiss, for instance,—the “solvent theory” received its death-blow. The use of the valves with their sharp imbrications in effecting the work of excavation is forbidden by their frequently perfect state, even when contained in the hardest substances;—(exemplified by a piece of extremely hard gneissic rock from the coast of France, containing a magnificent specimen of *Dactylina dactylus*, with its imbricated ribs sharp and perfect. Coll. Acad. Nat. Sci.)

The anterior part of the animal of *Pholas* has a granulated surface, caused by the presence of numerous siliceous particles; and this is probably the instrument which the animal employs in its work. Recent investigations have shown that these granules are renewed as fast as they are worn off by attrition with the surrounding surface, thus forming an analogy with the tongue of the Gasteropoda. The young shells of *Pholadidæ* frequently differ much from the adult, and this difference has caused the description of many of these as distinct species; the synonymy of the family is further confused by the redescription of species procured from stations far distant from the original localities.

Dr. Gray includes in the family *Pholadidæ*, three subfamilies, which are thus characterized:—

1. *PHOLADINÆ*. Dorsal muscle attached by one or two dorsal shelly valves. Cavity in which the animal lives not lined with a regular shelly tube enclosing the valves.

2. *ZIRPHÆINÆ*. Dorsal muscles only covered with a horny or coriaceous epidermis. The cavity in which they live not lined with a regular shelly tube enclosing the valves.

3. *TEREDININÆ*. Dorsal muscles covered with a coriaceous epidermis. Cavity in which they live lined with a regular shelly tube surrounding the valves.

The great differences between *Pholas* and *Teredo* (strengthened by Dr. Gray's recent discoveries respecting *T. giganteus*) have induced me to separate them into distinct families, one containing two, the other three subfamilies, as follows.

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Order *PHOLADACEA*.Family *PHOLADIDÆ*.

Animal clavate, with a large truncated foot protruded through the otherwise closed mantle; siphons elongated, connected nearly to their ends, and not provided with shelly styles. Gills narrow, attached, closing the branchial chamber; palpi elongate.

Shell always present, its valves generally protected by one or more accessory dorsal plates.

Inhabiting excavations in wood or stone, the walls of which are sometimes, but not frequently, lined with a testaceous deposit.

Subfamily 1. *PHOLADINÆ*. The valves with a gap anteriorly, which is never closed in the adult shell.

Subfamily 2. *JOUANNETINÆ*. Anterior ventral hiatus open in the young shell, but invariably closed in the adult by a callous plate.

Family *TEREDIDÆ*.

Animal elongate, subcylindrical, siphons united nearly to the end, their extremities armed with two shelly styles; foot long and narrow, protruded through the united mantle lobes, which are thickened in front. Gills long; mouth with palpi. Shell, when present, globular, tripartite, included with the animal in a more or less cylindrical testaceous tube, the siphonal end of which is divided into two by a longitudinal partition.

Subfamily 1. *TEREDINÆ*. Valves present, free, contained in the tube, which is irregularly cylindrical, sometimes much contorted. Perforating timber.

Subfamily 2. *TEREDININÆ*. Valves with an accessory anterior dorsal plate; their margins prolonged into a shelly tube when adult. Tube frequently concamerated; siphonal extremity often truncate, and the opening contracted by a six-lobed internal margin, (*fossil*.)

Subfamily 3. *KUPHINÆ*. Without valves. Tube clavately cylindrical, sunk horizontally in sand. Never penetrating timber.

The present paper will comprise the family *Pholadidæ* as here limited, while *Teredidæ* will form the subject of a future article.

*Synopsis of Genera.*Subfamily *PHOLADINÆ*.

Anterior hiatus always open.

\* *With two dorsal accessory valves.*

Dorsal valves placed anterior and posterior to the beaks, the anterior lanceolate, the posterior small, transverse. Umbonal processes reflected over the beaks, closely applied.

Shell elongate ..... Genus *PHOLAS*, Linn.

Dorsal valves lanceolate, placed side by side. Umbonal processes reflexed over the beaks, cellular beneath. Shell oblong, ovate.....

..... Genus *DACTYLINA*, Gray.

Dorsal valves half ovate, diverging, small. Umbonal processes none, but the anterior margins of the valves reflexed. Shell globose.....

..... Genus *XYLOPHAGA*, Turton.

Dorsal valves moderate, diverging; anterior hiatus small. Shell oblong-ovate, with a pair of siphonal valves at their posterior end.....

..... Genus *TALONA*, Gray.

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\*\* *With a single accessory valve.*

Dorsal valve lanceolate; umbonal processes reflexed, closely applied. Shell oblong-ovate.....Genus *BARNEA*, Leach.

Dorsal valve ovate-cuneiform; umbonal processes reflexed, cellular beneath. Shell oblong-ovate.....Genus *MONOTHYRA*, Tryon.

Dorsal valve small, transverse, posterior, under a coriaceous epidermis. Hinge plates produced and reflexed. Shell ovate.....Genus *NAVEA*, Gray.

\*\*\* *Destitute of accessory valves.*

Beaks protected by a membrane. Valves ovate...Genus *ZIRPHEA*, Leach.

Subfamily *JOUANNETINÆ*.

Anterior ventral gap closed in the adult by a callous plate.

\* *With three dorsal accessory valves.*

Anterior dorsal plates two, placed side by side, posterior to which is a central plate, directly over the umbones. Base of the siphons protected by reflected appendages.....Genus *PENITELLA*, Valenciennes.

\*\* *With two dorsal accessory valves.*

Dorsal valves small. The base of the siphons protected in the adult by a subtestaceous cup-shaped appendage, which is absent in young individuals. Valves ovate.....Genus *PHOLADIDEA*, Turton.

Surface impressed by two oblique sulci, extending from the beaks to the margins. Shell ovate-oblong. Valves equal.....Genus *PARAPHOLAS*, Conrad.

\*\*\* *With a single accessory valve.*

Shell globose, hinge plates not reflexed; inequivalve, the left valve overlapping the right.....Genus *JOUANNETIA*, Desmoulins.

Shell ovate-oblong, accessory valve lanceolate or peltate. Equivalve; the surface impressed by one or more furrows.....Genus *MARTESIA*, Leach.

*Index to the species of PHOLADIDÆ.*

<i>Anchomasa Pennantiana</i> , Leach = <i>Bar-</i>	<i>Dactylina candeana</i> , D'Orb. = <i>D. Cam-</i>
<i>nea parva</i> , Penn.	<i>pechensis</i> .
<i>Barnea Australasica</i> , Gray.	" <i>Chiloensis</i> , King.
" <i>Bakeri</i> , Desh. = <i>B. Burmanica</i> ?	" <i>dactylus</i> , Linn.
" <i>Burmanica</i> , Philippi.	" <i>orientalis</i> , Gmel. = <i>Monothyra</i>
" <i>candida</i> , Linn.	<i>orientalis</i> , Gm.
" <i>Erythraea</i> , Gray.	<i>Jouannetia Cumingii</i> , Sowb.
" <i>fragilis</i> , Sowb. = <i>Manillensis</i> ,	" <i>Darwini</i> , Sowb. = <i>Peaitella</i>
<i>Philippi</i> .	<i>penita</i> .
" <i>lanceolata</i> , D'Orb.	" <i>globosa</i> , Quoy.
" <i>Manillensis</i> , Philippi.	" <i>globulosa</i> , Quoy = <i>J. globosa</i> .
" <i>parva</i> , Pennant.	" <i>pectinata</i> , Conrad.
" <i>similis</i> , Gray.	" <i>pulcherrima</i> , Sowb. = <i>J. pec-</i>
" <i>subtruncata</i> , Sowb.	<i>tinata</i> .
<i>Cadmusia Solanderiana</i> , Leach = <i>Phola-</i>	<i>Martesia acuminata</i> , Sowb. = <i>M. calva</i> .
<i>idea papyracea</i> , Soland.	" <i>aperta</i> , Sowb.
<i>Dactylina Campechensis</i> , Gmel.	" <i>Australis</i> , Gray.
" " Gray = <i>D. Chi-</i>	" <i>branchiata</i> , Gould.
<i>loensis</i> (part.)	" <i>Californica</i> , Conr. = <i>Parapho-</i>
	<i>las Californica</i> .

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- Martesia calva*, Sowb.  
 " *clavata*, Lam. = *M. striata*.  
 " *corticaria*, Adams.  
 " *cuneiformis*, Say.  
 " *curta*, Sowb.  
 " *intercalata*, Carpenter.  
 " *multistriata*, Sowb.  
 " *obtecta*, Sowb.  
 " *ovum*, Gray.  
 " *rivicola*, Sowb.  
 " *striata*, Linn.  
*Monotkya orientalis*, Gmelin.  
*Mya crispata*, Linn. = *Zirphæa crispata*.  
*Navea nucifera*, Fabr.  
 " *subglobosa*, Gray.  
 " *tenuis*, Gray.  
*Parapholas acuminata*, Sowb. = *Martesia calva*.  
 " *bisulcata*, Conr. = *Martesia calva*.  
 " *Californica*, Conrad.  
 " *calva*, Sow. = *Martesia calva*.  
 " *concamerata*, Desh. = *Penitella penita*.  
 " *Janelli*, Desh. = *P. Californica*.  
 " *ovoidea*, Gld. = *Pholadidea ovoidea*.  
 " *penita*, Conr. = *Penitella penita*.  
 " *quadrizonalis*, Spengl.  
*Penitella* *Conradi*, Val. = *P. penita*.  
 " *penita*, Conrad.  
 " *Wilsonii*, Conr. = *Pholadidea melanura*.  
*Pholadidea cuneiformis*, Say = *Martesia cuneiformis*.  
 " *curta*, Sow. = *Martesia curta*.  
 " *Goodallii*, Blain. = *P. papyracea*.  
 " *loscombia*, Turt. = *P. papyracea*.  
 " *melanura*, Sowb.  
 " *ovoidea*, Gould.  
 " *papyracea*, Solander.  
 " *penita*, Conr. = *Penitella penita*.  
 " *quadra*, Sowb.  
 " *spathulata*, Sowb.  
 " *sulcata*, Brown.  
 " *tridens*, Gray.  
 " *tubifera*, Sowb.  
*Pholadopsis pectinata*, Conr. = *Jouanneitia pectinata*.  
*Pholas acuminata*, Sowerb. = *Martesia calva*.  
 " *angustus*, Petiver. = *Dactylina dactylus*.  
*Pholas antipodum*, Phil. = *Barnea similis*.  
 " *aperta*, Sowb. = *Martesia aperta Australasiæ*, Gray, = *Barnea Australasiæ*.  
 " *Bakeri*, Desh. = *Barnea Burmanica*?  
 " *Beauiana*, Recluz. = *Mart. corticaria*, Ad.  
 " *bifrons*, Da Costa, = *Zirphæa crispata*.  
 " *Birmanica*, Phil. = *Barnea Burmanica*.  
 " *branchiata*, Gould. = *Martesia branchiata*.  
 " *Californica*, Conr. = *Parapholas Californica*.  
 " *callosa*, Lam. = *Dactylina dactylus*.  
 " *calva*, Sowb. = *Martesia calva*.  
 " *Campechensis*, Gmel. = *Dactylina Campechensis*.  
 " *Candeana*, D'Orb. = *Dactylina Campechensis*.  
 " *candida*, Chemn. = *Talona explanata*.  
 " *candida*, Linn. = *Barnea candida*.  
 " *Caribæa*, D'Orb. = *Martesia corticaria*.  
 " *Chiloensis*, King, = *Dactylina Chiloensis*.  
 " *clausus*, Gray, = *Talona explanata*.  
 " *clavata*, Lam. = *Martesia striata*.  
 " *concamerata*, Desh. = *Penitella penita*.  
 " *conoides*, Flem. = *Mart. striata*.  
 " *constricta*, Sowb. = *Zirphæa constricta*.  
 " *cordata*, Schröter, = *Schröteria cordata*.  
 " *cornea*, Sowb. = *Penitella penita*.  
 " *corticaria*, Ad. = *Martesia corticaria*.  
 " *costata*, Linn.  
 " *crenulatus*, Spengler, = *Barnea parva*.  
 " *crispa*, Blainv. = *Zirphæa crispata*.  
 " *crispata*, Linn. = *Zirphæa crispata*.  
 " *crucifera*, Sowb.  
 " *cruciger*, Sowb. = *P. crucifera*.  
 " *cucullata*, Gray, = *Penitella penita*.  
 " *cuneiformis*, Say, = *Martesia cuneiformis*.  
 " *curta*, Sowb. = *Martesia curta*.

- Pholas dactyloides*, Della Chiaje, = *Barnea candida*.  
 " *dactyloides*, Lamarck, = *Barnea parva*.  
 " *dactylus*, Linn. = *Dactylina dactylus*.  
 " *dactylus*, Spengl. = *Monothyra orientalis*.  
 " *dactylus*, var. Deshayes, = *Barnea parva*.  
 " *Darwini*, Sowb. = *Penitella penita*.  
 " *Edwardsii*, Gray, = *Martesia cuneiformis*.  
 " *explanata*, Spengl. = *Talona explanata*.  
 " *falcata*, Wood, = *Martesia striata*.  
 " *fragilis*, Sowb. = *Barnea Manillensis*.  
 " *gibbosa*, D'Orb. = *Xylophaga globosa*.  
 " *globulosa*, Quoy, = *Jouannetia globosa*.  
 " *hians*, Pultney, = *Dactylina dactylus*.  
 " *Hornbeckii*, D'Orb. = *Martesia corticaria*.  
 " *Inci*, Sowb. = *Parapholas quadrizonalis*.  
 " *Janelli*, Desh. = *Parapholas Californica*.  
 " *Julan*, Adans. = *Zirphæa Julan*.  
 " *lamellata*, Turt. = *Pholadidea papyracea*.  
 " *lamellosa*, D'Orb. = *Barnea subtruncata*.  
 " *lanceolata*, D'Orb. = *Barnea lanceolata*.  
 " *laqueata*, Sowerby, = *Dactylina Chiloensis*.  
 " *latissima*, Sowb.  
 " *ligamentina*, Deshayes, = *Barnea parva*.  
 " *lignorum*, Spengler, = *Martesia striata*.  
 " *Manillæ*, Sowb. = *Barnea Manillensis*.  
 " *Manillensis*, Phil. = *Barnea Manillensis*.  
 " *melanura*, Sowb. = *Pholadidea melanura*.  
 " *multistriata*, Sowb. = *Martesia multistriata*.  
 " *muricata*, Da Costa, = *Dactylina dactylus*.  
 " *nana*, Pult. = *Martesia striata*.  
 " *nucifera*, Fab. = *Navea nucifera*.
- Pholas oblongata*, Say, = *Dactylina Campechensis*.  
 " *oblecta*, Sowb. = *Martesia oblecta*.  
 " *orientalis*, Gmel. = *Monothyra orientalis*.  
 " *ovata*, Gray, = *Martesia ovum*.  
 " *ovoidea*, Gould, = *Pholadidea ovoidea*.  
 " *ovum*, Gray, = *Martesia ovum*.  
 " *papyracea*, Spengler. = *Barnea candida*.  
 " *papyracea*, Soland. = *Pholadidea papyracea*.  
 " *parva*, Pennant, = *Barnea parva*.  
 " *parva*, Da Costa, = *Zirphæa crispata*.  
 " *patula*, Gould, = *P. latissima*.  
 " *penita*, Conr. = *Penitella penita*.  
 " *pusilla*, Linn. = *Martesia striata*.  
 " *quadra*, Sowb. = *Pholadidea quadra*.  
 " *quadrizonalis*, Spengl. = *Parapholas quadrizonalis*.  
 " *rivicola*, Sowb. = *Martesia rivicola*.  
 " *rudis*, Gray, = *Martesia cuneiformis*.  
 " *semicostata*, H. C. Lea, = *Martesia striata*.  
 " *Siamensis*, Spengl. = *Monothyra orientalis*.  
 " *silicula*, Desh. = *Barnea candida*.  
 " *similis*, Gray, = *Barnea similis*.  
 " *spathulata*, Sowb. = *Pholadidea spathulata*.  
 " *striata*, Linn. = *Martesia striata*.  
 " *striata*, Blainv. = *Pholadidea papyracea*.  
 " *subtruncata*, Sowerby = *Barnea subtruncata*.  
 " *sulcata*, Brown, = *Pholadidea sulcata*.  
 " *Terediniformis*, Sowb. = *Martesia striata*.  
 " *tridens*, Gray, = *Pholadidea tridens*.  
 " *truncata*, Say.  
 " *tuberculatus*, Turton, = *Barnea parva*.  
 " *tubifera*, Sowb. = *Pholadidea tubifera*.  
 " *Vibonensis*, Phil. = *Pholadidea papyracea*.  
 " *Xylophaga*, Desh. = *Xylophaga dorsalis*.
- Schröteria cordata*, Schröter.  
*Solen crispus*, Gmel. = *Zirphæa crispata*.

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<i>Talona clausa</i> , Gray, = <i>T. explanata</i> .	<i>Xylophaga cardissa</i> , Gould.
" <i>explanata</i> , Spengler.	" <i>dorsalis</i> , Turton.
<i>Teredo dorsalis</i> , Turton. = <i>Xylophaga dorsalis</i> .	" <i>globosa</i> , Sowb.
<i>Thurlosia crispata</i> , Leach. = <i>Zirphæa crispata</i> .	<i>Zirphæa Beauviana</i> , Recluz. = <i>Martesia corticaria</i> .
<i>Triumphalia Cumingii</i> , Sowb. = <i>Jouan- netia Cumingii</i> .	" <i>constricta</i> , Sowb.
" <i>globosa</i> , Quoy, = <i>Jouanne- tia globosa</i> .	" <i>crispata</i> , Linn.
" <i>pulcherrima</i> , Sowb. = <i>Jou- annetia pectinata</i> .	" <i>Darwini</i> , Sowb. = <i>Penitella penita</i> .
	" <i>Julan</i> , Adanson.
	" <i>Vibonensis</i> , Philippi, = <i>Phola- didea papyracea</i> .

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\* The title-page of this volume bears date 1835—'43, yet reference is made in the text to descriptions published by other authors in 1846.



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There are but four known recent species of *Pholas* as now restricted, and they are very easily distinguishable from each other.

\*Margins of the valves regularly rounded anteriorly.....*P. costata*.

\*\*Anterior ventral margins emarginate.....Subgenus *CYRTOPLEURA*.

a. Posterior extremity of the shell not truncate.....*P. crucifera*.

b. Posterior extremity truncate.

Truncated end but very slightly convex in outline.....*P. truncata*.

Truncated end rounded, shell short and broad.....*P. latissima*.

*P. costata*, Linn., Linnæus, Syst. Nat. 1111. Adams, Genera iii. t. 89, f. 1, 1, a. Anton. Verzeich der Conch. p. 1. Blainville, Man. de Malacol. t. 79, f. 6. Born., Testacea, p. 15. Bosc. Hist. Nat. des Coq. ii. p. 195. Brug. Encyc. Meth. t. 169, f. 1, 2. Catlow., Conch. Nomenc. p. 3. Chemnitz, Conchyl. Cab. viii. t. 101, f. 863. Chenu, Man. de Conch. ii. f. 1, 2, 3. Deshayes, Encyc. vers. iii. p. 754. Deshayes, Traite Elem. i. pt. ii. t. 3, f. 10. Dekay, Mollusca New York, p. 248. Dillwyn, Desc. Cat. p. 36. D'Orbigny, Voy. Amer. Merid. Mollusques, p. 496. D'Orbigny, Mollusques, Sagra's Cuba, ii. p. 213. Favanne, Conchyl. t. 60, f. 1. Fischer, Journ. Conchyl. 2d ser. iii. p. 48. Gibbes, in Tuomey's Geol. S. Carolina. Gmelin, Syst. Nat. p. 3215. Gould, Invert. Mass. p. 27. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 381. Gualtieri, Index Test. t. 105, fig. g. Hanley, Desc. Cat. p. 6. Jay, Cat. 4th edit. p. 10. Knorr, Vergnüg. ii. t. 25, f. 4. Kurtz, Cat. Shells, N. and S. Carolina, p. 3. Lamarck, Anim. sans Vert. (Desh. Edit.) vi. p. 45. Lister, Conch. t. 434, f. 277. Mawe., Conch. t. 1, f. 4. Menke, Syn. p. 73. Mörch. Cat. p. 3. Potiez and Mich., Galerie des Moll. ii. p. 269. Reeve, Conch. Syst. t. 23. Schröter, Einleit. Conch. iii. p. 537. Sowerby, Genera No. 23. Sowerby, Monog. *Pholas*. Thes. Conch. ii. p. 487, t. 102, f. 8, 9. Spengler, Skrivt. Nat. ii. p. 86. Stimpson, Shells New England, p. 25. Stimpson, Check List E, Coast Shells, No. 243. Wheatley, Cat. Shells. U. S. p. 2. Wood, Gen. Conch. t. 15, f. 1, 2. Wood, Index Test. t. 2, f. 4. Wyatt, Conch. p. 28, t. 3, f. 4.

Coll. Acad. Nat. Sci., from Georgia, Cuba, Vera Cruz. Coll. Dr. J. C. Jay. Coll. G. W. Tryon, Jr., (from Atlantic City, N. J.) Coll. Isaac Lea, LL.D.

Dr. Gould included this species in his "Invertebrata," on account of the discovery by Prof. C. B. Adams of an extensive bed of dead shells in New Bedford harbor. He subsequently announced it as living at this locality, remarking that he was not aware of its existence at any other place north of the Mexican Gulf. (Bost. Proc. ii. p. 81, 1845.)

Dr. De Kay described *P. costata* as a Southern shell, and no account of its occurrence north of North Carolina has been noticed, except "New York," in Jay's Catalogue. Dr. Stimpson writes to me that he has never met with this shell at any intermediate locality; therefore I am glad to announce its occurrence at Atlantic City, New Jersey, where I obtained several perfect valves on the beach, and at Cape May, New Jersey, where Dr. Leidy has procured a few specimens.

Subgenus *CYRTOPLEURA*, Tryon.

Margins of the valves emarginate anteriorly, making a short wide hiatus.

*P. crucifera*, Sowerby.

1862.]

*Pholas cruciger*, Sowerby, Zool. Proc. p. 69, 1834. Catlow, Conch. Nomenc. p. 3. D'Orbigny, Voy. Amer. Merid. Moll. p. 499. Müller, Syn. Test. Viv. p. 236.

" *crucigera*, Philippi, Neüer Mollusken, iii. Pholas. t. 2, f. 4.

" *crucifera*, Adams, Panama Shells, p. 301. Adams, Genera, ii. p. 335. Chenu, Man. Conch. ii. f. 5. Fischer, Journ. Conch. 2d ser. iii. p. 48. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 381. Hanley, Desc. Cat. p. 6. Jay, Cat. 4th ed. p. 10. Sowerby, Monog. Pholas. Thes. Conch. ii. p. 489, t. 104, f. 24—26.

Coll. Acad. Nat. Sci.; St. Croix, West Indies? Panama. Coll. Dr. J. C. Jay. Coll. G. W. Tryon, Jr.

This is a very distinct species, differing from all others in the genus by the cruciform expansion of the dorsal margin.

*P. truncata*, Say, Journ. Acad. Nat. Sci. 1st ser. ii. p. 321. Adams, Genera, ii. p. 325. Catlow, Conch. Nomenc. p. 4. De Kay, Moll. New York, n. 248, t. 34, f. 223 *a b*. Fischer, Journ. Conch. 2d ser. iii. p. 48. Gibbes, Tuomey's Geol. S. Carolina. Gould, Proc. Bost. ii. p. 81. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 381. Hanley, Desc. Cat. p. 6, t. 9, f. 56. Jay, Cat. 4th ed. p. 10. Kurtz, Cat. Shells N. and S. Carolina, p. 3. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 488, t. 104, f. 29, 30. Stimpson, Shells New England, p. 25. Stimpson, Check List E. Coast Shells. Wheatley, Cat. Shells U. S. p. 2.

Coll. Acad. Nat. Sci.; New Bedford, Mass., Long Island Sound, S. Carolina, Payta, Peru, Chili. Coll. Dr. J. C. Jay. Coll. Isaac Lea. Coll. G. W. Tryon, Jr.

Mr. Sowerby wrongly refers for Say's description to "American Journal of Science, ii. p. 321."

So late as 1845, Dr. Gould, in announcing to the Boston Society of Natural History the occurrence of this species at New Bedford, Mass., remarked that it was the only locality north of South Carolina; it is now known to inhabit almost the entire coast.

*P. truncata* grows quite large on the northern coast, reaching three and a half inches, as Dr. Gould informs me, in the vicinity of Sable Island. I had some doubt respecting the locality "Chili" attached to a specimen in Coll. A. N. S. until the recent discovery, amongst a mass of rubbish, of a large bottle of shells, collected by Dr. W. S. W. Ruschenberger at Payta, Peru, which contained a number of specimens of this shell and of *Dactylina Chilensis*. The west coast individuals are about the same size as our Southern specimens, which they also resemble in form, being rather longer and narrower than those from the New England States.

*P. latissima*, Sowerby.

*P. latissima*, Sowerby, Proc. Zool. Soc. 1849, p. 162. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 489, t. 103, f. 15, 16. Adams, Genera, ii. p. 325. Chenu, Man. Conchyl. ii. f. 4, 6. Fischer, Journ. Conchyl. 2d ser. iii. p. 48. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 381. Philippi, Neüer Conch. iii. Pholas, t. 2, f. 1.

*P. patula*, Gould, Bost. Proc. ii. p. 214, May, 1850. Gould, Moll. U. S. Expl. Exped. p. 384. Adams, Genera, ii. p. 325. Fischer, Journ. Conchyl. 2d ser. iii. p. 48. Jay, Cat. 4th ed. p. 10.

*Hab.*—Manilla. Philippines.

Coll. Dr. J. C. Jay.

Dr. Gould remarks, in the "Mollusca," that *P. patula* approaches, and may be identical with, Sowerby's species. The descriptions correspond, with the exception of a vertical constriction which divides the valve of *P. patula* in the middle, but which is not mentioned by Mr. Sowerby; nevertheless there is a slight constriction of the valve represented in Mr. Sowerby's figure. There can be no doubt of the identity of these shells.

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Dr. Gould, in his text, refers to fig. 497 *a b*, which was not published, in consequence, as he informs me, of the only valve being broken while in the artist's hands.

*P. latissima* is readily distinguishable from *truncata* by its posterior side being much shorter, with the edge more rounded, and by the greater thickness of the shell in proportion to its length.

#### Genus DACTYLINA, Gray.

DACTYLINA, Gray, Proc. Zool. Soc. p. 187, 1847. Gray, Ann. and Mag. Nat. Hist. 2 ser. viii. H. and A. Adams, Genera, ii. p. 325. Chenu, Man. Conch. ii.

*Dactylus*, Pliny, Hist. Nat. ix. cap. 87.

*Pholas*, (partim,) of authors.

There are two distinct forms of *Dactylina*; in the first, which I propose to consider the typical form, the nuclei of the dorsal valves are situated at their outer margins, posterior to the centre; several impressed lines radiate from the nuclei to the inner margin, dividing each valve into several subtriangular spaces. The valves are much emarginate anteriorly, forming a short, wide hiatus.

The other form may be thus characterized,—

#### Subgenus GITOCENTRUM.

Nuclei of the dorsal valves anterior, situated nearer the inner margin. Dorsal plates marked by radiating lines. Valves not emarginate anteriorly, but regularly rounded; hiatus long and narrow.

#### Typical Species.

*D. dactylus*, Linn. (species.)

*Pholas dactylus*, Linn. Syst. Nat. p. 1110. Linnæus, Faun. Suec. 2124. Anton, Verzeich der Conch. p. 1. Argenville, Conchyl. t. 3, f. k. m. Barbut, Gen. Verm. t. 1, f. 11. Bonanni, pt. 2, f. 25, 26. Born, Test. p. 14, t. 1, f. 7. Bosc, Hist. Nat. des Coq. ii. p. 194, t. 5, f. 1, 2, 3. Brooke, Conch. t. 1, f. 7, 8. Brown, Illust. Conch. Great Britain, p. 115, t. 49, f. 1, 2, 3. Bruguière, Encyc. Meth. t. 168, f. 2—4. Catlow, Conch. Nomencl. p. 3. Chemnitz, Conch. Cat. viii. t. 101, f. 857. Chenu, Encyc. Hist. Nat. Moll. t. 33, f. 4, 5. DaCosta, Brit. Conch. p. 144, t. 16, f. 2. Deshayes, Encyc. Vers. iii. p. 753. Deshayes, Expl. Sci. de l'Algerie Moll. p. 107, t. 9, C. E. & G. f. 1—3. (Animal.) Dillwyn, Desc. Cat. i. p. 35. Donovan, Brit. Shells, iv. t. 118. Favanne, Conchyl. t. 60, f. al. Fleming, Edinburgh Encyc. vii. p. 100. Fleming, Brit. Anim. p. 457. Forbes and Hanley, Brit. Moll. i. p. 108, t. 3. Giannini, Op. post. t. 31, f. 184, 185. Gmelin, Syst. Nat. p. 3214. Gualtieri, Test. t. 105, f. D. Hanley, Desc. Cat. p. 5. Herbst, Einl. i. p. 115, t. 26, f. 1. Jay, Cat. 4th ed. p. 10. Jonston, De exang. t. 11, f. 8, and t. 13. Karsten, Mus. Lesk. i. p. 150. Lamarck, Anim. sans Vert. v. p. 444. Lamarck, (Desh. edit.) Anim. sans Vert. vi. p. 43. Leach, Moll. Great Britain, p. 251. Lister, Conch. t. 433, f. 276. Marvy, Meth. necess. aux Marins, t. 1, f. 10. Mawe, Conch. t. 3, f. 3. Menke, Syn. Meth. p. 73. Montagu, Test. Brit. p. 20 and 528. Müller, Faun. Dann. p. 251. Murray, Fund. Testac. p. 40, t. 2, f. 3. Olivi, Zool. Adriat. p. 93. Pennant, Brit. Zool. iv. p. 76, t. 39, f. 10. Petiver, Gazoph. t. 79, f. 10. Philippi, Enum. Moll. Sicil. i. p. 3 and ii. p. 4. Plancus, de Conch. p. 33. Poli, Test. utr. Sicil. i. t. 7, f. 1—11. Poirer, Voy. en Barbarie, pt. 2, p. 11. Potiez et Michaud, Galerie des Moll. ii. p. 268. Reaumur, Mem. de l'Acad. 1712, p. 125, t. 7, f. 1, 2. Reeve, Conch. Syst. t. 24. Reichenbach, Conchyl. p. 117, t. 725, 726. Roissy, Moll. vi. p. 438. Seba, Mus. iii. t. 16, f. 6 *a b*. Sowerby,

Genera Pholas, f. 1. Sowerby, Conch. Man. t. 2, f. 55, 55 a. Sowerby, Illust. Brit. Shells, t. 1, f. 8. Sowerby, Monog. Pholas. Thes. Conch. ii. p. 485, t. 102, f. 10, 11 and t. 105, f. 47. Spengler, Skrivt. Nat. ii. pt. 1, p. 85. Thompson, Rep. Irish Fauna, p. 263. Thorpe, Brit. Mar. Conch. p. 31. Wood, Gen. Conch. t. 13, f. 1—3. Wood, Index Test, t. 2, f. 1. Woodward, Manual, p. 328, f. 22. Wyatt, Conch. p. 27, t. 3, f. 3.

*Dactylina dactylus*, Gray, Figs. Moll. Anim. t. 237, f. 4 and t. 238, f. 7. Gray, Ann. and Mag. Nat. Hist. 2 ser. viii. p. 382. H. and A. Adams, Genera, iii. t. 89, f. 2, 2 a b. Chenu, Man. Conch. ii. f. 10, 11, 13. Fischer, Journ. Conchyl. 2 ser. iii. p. 49. Mörch, Cat. p. 3.

*Pholas callosa*, Lamarck, Anim. sans Vert. v. p. 445. Lamarck, (Desh. edit.) Anim. sans Vert. vi. p. 46. Cuvier, Reg. Anim. (edit. Croch.) t. 113, f. 1. Hanley, Desc. Cat. p. 5.

" *hians*, Pultney, Dorset. Cat. p. 26.

" *angustius*, Petiver, Gazophyl. t. 79, f. 10.

" *muricata*, DaCosta, Brit. Conch. p. 244, t. 16, f. 2.

*Donax sive Dactylus*, Belon, de Aquat. p. 414.

*Coquille longue*, Rondelet, Hist. des Poissons, p. 16.

*Concha longa Rondeleti*, Gesner, de Crust. p. 201.

*Concha vera Plinii*, Aldrovandi, de Test. p. 454.

*Concha longa*, Aldrovandi, de Test. p. 455, f. 1, 2, 3.

*Hab.*—Europe.

Coll. Acad. Nat. Sci. Coll. Isaac Lea, LL.D. Coll. Dr. J. C. Jay. Coll. Geo. W. Tryon, Jr.

Hanley (Desc. Cat. p. 5) says, "*P. oblongata*, Say, is probably this shell, although its beak and the number of accessory valves is not mentioned." Say's shell does not at all resemble *D. dactylus*.

*P. callosa*, Lam., was described from some distorted specimens of *D. dactylus*. I have seen several specimens in Mr. Lea's cabinet which are greatly distorted in shape, the beaks being almost central, the shell much wider than usual in proportion to its length, the posterior surface worn entirely smooth, and anteriorly deeply pitted, instead of the usual radiating ribs.

Subgenus GITOCENTRUM, Tryon. 1862.

*D. Campechensis*, Gmel. (Species.)

*Pholas Campechensis*, Gmelin, Syst. Nat. 3216. Catlow, Conch. Nomenc. p. 3. Hanley, Desc. Cat. p. 6, t. 9, f. 44. Jay, Cat. 4th ed. p. 10. Lister, Hist. Conch. t. 432.

*Dactylina Campechensis*, (part.) Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. H. and A. Adams, Genera, ii. p. 326.

" *Campechiensis*, (part.) Fischer, Journ. Conch. 2d ser. iii. p. 49.

*Pholas oblongata*, Say, Journ. Acad. Nat. Sci. 1st ser. ii. p. 320. De Kay, Moll. New York, p. 248. Gibbs, in Tuomey's Geology of South Carolina. Kurtz, Cat. Shells N. and S. Carolina, p. 3. Stimpson, Check List E. Coast Shells.

" *Candeana*, D'Orbigny, Moll. Sagra's Cuba, p. 215, t. 25, f. 18, 19.

*Dactylina Candeana* Chenu, Manuel, ii. f. 12.

*Hab.*—Southern United States. West Indies.

Coll. Acad. Nat. Sci. Coll. A. A. Gould, M. D. Coll. Wm. Stimpson, M. D. Coll. Isaac Lea, LL.D.

Lister's figure of *D. Campechensis* represents very accurately a large individual of this species, although it is doubtfully referred by some European authors to the next species. The resemblance between this and the next shell, from Western South America, is so great that it would not be surprising if their identity should be established hereafter. The only difference is that our shell

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is narrower in proportion to its length than the South American species, which has about one-third of its posterior surface free from striæ, while the striæ in the *Campechensis* are continued faintly over the entire posterior surface.

*Pholas oblongata*, Say, has been entirely overlooked by European authors, with the exception of Mr. Hanley, who has referred it doubtfully to *D. dactylus*. It is figured in Tuomey and Holmes' Pleiocene Fossils of S. Carolina, t. 24, f. 5.

D'Orbigny's *Pholas Candiana* is a half-grown shell of this species.

The only specimens that I have seen having the dorsal valves belongs to Mr. Isaac Lea. They are identical in form with those of *D. Chilensis*.

*D. CHILOENSIS*, King. (sp.)

*Pholas Chilensis*, King, Zool. Journ. v. p. 334, 1832. Gay, Hist. Nat. Chili, viii. p. 381. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 486, t. 102, f. 1, 2. Philippi, Neuer Conch. iii. t. 1, f. 4, 5. D'Orbigny, Voy. p. 498.

*Dactylina Chilensis*, Chenu, Manuel, ii. f. 14, 15.

" *Campechensis*, (part.) Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. H. and A. Adams, Genera, ii. p. 326.

" *Campechiensis*, (part.) Fischer, Journ. Conch. 2d ser. iii. p. 49.

*Pholas laqueata*, Sowerby, Proc. Zool. Soc. 1849. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 486, t. 103, f. 19, 20.

*Hab.*—Peru. Chili.

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*Pholas laqueata* of Sowerby is a mere variety of *Chilensis*, differing in the greater prominence of the ribs and their arched scales.

King, in his description, refers to Molina, Hist. Nat. Chili, p. 179, as authority for the name; but as it would be preposterous to allow such an obscure and scant description as that of Molina's to remain as authority, I have thought it best to use King's name in that connection. Gmelin (Syst. Nat. p. 3217) merely copies Molina's description.

#### Genus MONOTHYRA, Tryon. 1862.

*Gen. Char.*—Equivale; anterior hiatus long and narrow. Accessory plate single, ovately triangular, with the base anterior and the nucleus subcentral. Hinge processes cellular beneath.

*M. orientalis*, Gmelin. (Species.)

*Pholas orientalis*, Gmelin, Syst. Nat. 3216. Bosc, Hist. Nat. ii. p. 196. Bruguiere, Encyc. Meth. t. 168, f. 10. Catlow, Conch. Nomenc. p. 4. Chemnitz, Conch. Cab. viii. t. 101, f. 860. Dillwyn, Desc. Cat. p. 36. Hanley, Desc. Cat. p. 5, t. 2, f. 2. Jay, Cat. 4th ed. p. 10. Lamarck, Anim. sans Vert. v. p. 444. Lamarck, Anim. sans Vert. (Desh. edit.) vi. p. 44. Lister, Hist. Conch. t. 431, f. 247. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 486, t. 102, f. 3, 4. Wood, Gen. Conch. t. 14, f. 1, 2. Wood, Index Test. Pholas, t. 2, f. 1.

*Dactylina orientalis*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. H. and A. Adams, Genera, ii. p. 326. Chenu, Man. Conch. ii. f. 16. Fischer, Journ. Conch. 2d ser. iii. p. 49.

*Pholas Siamensis*, Spengler.

" *dactylus*, Solander MSS. teste Gray.

*Hab.*—India.

Coll. Acad. Nat. Sci. Coll. Isaac Lea, LL.D. Coll. J. C. Jay, M.D. Coll. G. W. Tryon, Jr.

This species is placed by Sowerby, Gray and Chenu in the genus *Dactylina*, although it is so very different in its single accessory valve. Sowerby's figure 1862.]

of the back of the shell, including the dorsal accessory plate, is very good, and it is strange that the subsequent systematists, H. and A. Adams and Chenu, who must have been acquainted with the character of this plate, still leave the species in *Dactylina*.

Genus *XYLOPHAGA* Turton.

*XYLOPHAGA*, Turton, Conch. dith. Brit. p. 253, 1822. Gray, Zool. Proc. p. 188, 1847. Gray, Ann. and Mag. Nat. Hist. 2d ser. p. 380, 1851. H. and A. Adams, Genera, ii. p. 326.

*Teredo*, Turton, Conch. Dict. 1819.

*Pholas*, Deshayes, in Lamarek, An. sans Vert. vi. 1835.

*Xylotrya*, Leach, teste Menke, Syn. ed. 2, p. 121, 1830. Gray, Syn. Brit. Mus. p. 76, 1842.

*X. dorsalis*, Turton.

*Xylophaga dorsalis*, Turton, Conch. dith. Brit. p. 253, t. 2, f. 4, 5. H. and A. Adams, Genera, iii. t. 89, f. 4, 4 *abc*. Alder, Cat. Northumb. Moll. p. 101. Brown, Ill. Brit. Conch. p. 117, t. 50, f. 8—13. Catlow, Conch. Nomenc. p. 3. Chenu, Man. ii. f. 20, 21. Chenu, Encyc. Hist. Nat. Moll. t. 241—244. Fischer, Journ. Conch. 2d ser. iii. p. 49. Fleming, Brit. Anim. p. 455. Forbes and Hanley, Brit. Moll. i. p. 90. t. 2, f. 3, 4. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. Hanley, Desc. Cat. p. 10. Jay, Cat. 4th ed. p. 9. Reeve, Conch. Syst. t. 22. Sowerby, Genera of Shells. Sowerby, Conch. Manual. Sowerby, Illust. Brit. Shells, t. 1, f. 7. Sowerby, Monog. *Xylophaga*, Thes. Conch. ii. p. 503, t. 108, f. 103, 104. Thorpe, Brit. Mar. Conch. p. 32.

*Teredo dorsalis*, Turton, Conch. Dict. p. 185, 1819.

*Pholas xylophaga*, Deshayes, in Lam. Anim. sans Vert. vi. p. 47, 1835.

*Hab.*—England.

Coll. Acad. Nat. Sci. Coll. J. C. Jay, M. D. Coll. G. W. Tryon, Jr.

*X. globosa*, Sowerby.

*Xylophaga globosa*, Sowerby, Zool. Proc. p. 110, 1835. Sowerby, Monog. *Xylophaga*, Thes. Conch. ii. p. 503, t. 108, f. 101, 102. H. and A. Adams, Genera, ii. p. 327. Catlow, Conch. Nomenc. p. 3. Chenu, Man. Conch. ii. f. 22, 23. Fischer, Journ. Conch. 2d ser. iii. p. 49. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. Hanley, Desc. Cat. p. 10. Jay, Cat. 4th ed. p. 9.

*Pholas gibbosa*, D'Orbigny, Voy. Amer. Merid. Moll. p. 501. Gay, Hist. Nat. Chili, viii. p. 381.

*Hab.*—Valparaiso; inhabiting wood at sixty fathoms.

Coll. J. C. Jay, M. D.

This shell very closely resembles the English species, but may be distinguished by its more depressed dorsal margin, by its greater posterior length, and by the longitudinal portion of the ventral margin being slightly convex in outline, whilst in *X. dorsalis* this margin is concave.

*Xylophaga cardissa*, Gould, Otia Conchologica, p. 241, Feb., 1862.

*Hab.*—Mergive Archipelago.

Coll. Dr. A. A. Gould.

I owe to Dr. Gould the pleasure of examining specimens of this new form of *Xylophaga*, which is very distinct from the other species of the genus.

Genus *TALONA*, Gray.

*TALONA*, Gray, Syn. Brit. Mus. 1840. Gray, Proc. Zool. Soc. p. 188, 1847. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 381. H. and A. Adams, Genera, ii. p. 329.

*Pholas*, (part.) Spengler, Sowerby, Hanley, etc.

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**T. explanata**, Spengler. (Sp.)

*Pholas explanata*, Spengler, Skrivt. Nat. ii. pt. 1, 1791.

*Talona explanata*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii., 1851.  
H. and A. Adams, Genera, iii. t. 90, f. 2, 2a. Fischer, Journ. Conch.  
2d ser. iii. p. 51. Mörch, Cat. p. 3.

*Pholas clausus*, Gray, in Bowdich, Elem. 1822. Catlow, Conch. Nomenc. p. 3.  
Hanley, Desc. Cat. p. 6, t. 11, f. 8. Jay, Cat. 4th ed. p. 10. Sowerby,  
Monog. Pholas. Thes. Conch. ii. p. 498, t. 107, f. 74, 75.

*Talona clausa* Chenu, Man. Conch. ii. f. 34, 35, 1862.

*Pholas candidus*, Chemn, Conch. Cab. viii. f. 862, 1785.

*Hab.*—Western Africa.

Coll. Acad. Nat. Sci. Coll. J. C. Jay, M. D. Coll. Isaac Lea, LL. D. Coll.  
G. W. Tryon, Jr.

Genus *BARNEA*, Leach.

*BARNEA*, Leach, teste Risso, Hist. Nat. iv. p. 376, 1826.

" Risso, H. and A. Adams, Genera, ii. p. 326, 1853.

*Barnia*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. 1851. Leach, Moll. Great  
Britain, p. 254, 1852.

*Typical Species.*

*Margins of the valves regularly rounded, hiatus long and narrow.*

**B. Australasiæ**, Gray.

*Barnia Australasiæ*, Gray, Brit. Mus. Gray, Ann. and Mag. Nat. Hist. 2d  
ser. viii. p. 381.

*Barnea Australasiæ*, Fischer, Journ. Conch. 2d ser. iii. p. 49. H. and A.  
Adams, Genera, ii.

*Pholas Australasiæ* Sowerby, Mon. Pholas, Thes. Conch. ii. p. 488, t. 106,  
f. 73.

*Hab.*—Australia.

This shell closely resembles *B. candida* of England, but may be at once  
distinguished by its much larger size and more anterior position of the umbones.

**B. Burmanica**, Philippi. (Sp.)

*Pholas Birmanica*, Philippi, Neuer Conchyl. iii. Pholas. t. 1, f. 1.

*Barnia Burmanica*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382.

*Barnea Burmanica*, H. and A. Adams, Genera, ii. p. 326.

*Pholas Bakeri?* Deshayes, Woodward's Manual, t. 23, f. 19.

*Barnea Bakeri?* H. and A. Adams, Genera, ii. p. 326.

*Hab.*—Burmah.

The shape and sculpture of this shell, as figured by Philippi, remind one  
strongly of our *P. costata*; it is much broader than either of the other species  
of this section of *Barnea*.

*B. Bakeri* I have not seen, nor could I find the original description; but the  
figure in Woodward appears to be the same as *Burmanica*.

**B. candida**, Linn. (Sp.)

*Pholas candida*, Linnæus, Syst. Nat. 1111. Linnæus, Mus. Ulric, p. 469.  
Alder, Cat. Northumb. Moll. p. 100. Bosc, Hist. Nat. des Coq. ii. p.  
195. Bouchard-Chantereau, Moll. Boulon, p. 7. Brown, Ill. Conch.  
Great Britain, p. 115, t. 48, f. 6—10. Bruguière, Encyc. Meth. t. 168,  
f. 11. Burrow, Elem. t. 3, f. 4. Catlow, Conch. Nomenc. p. 3. Chem-  
nitz, Conch. Cab. viii. p. 358, t. 101, f. 861. Collard des Chèrres, Cat.  
Moll. Finisterre, p. 9. Crouch, Introd. Lam. t. 2, f. 11. DaCosta,  
Brit. Conch. p. 246. Deshayes, Moll. Expl. Sci. de l'Algerie, p. 109,  
t. 9, D. I. f. 4, 5, (Animal.) Deshayes, Traite Elem. i. pt. 2, p. 79, t.

3, f. 13, 14. Deshayes, Encyc. Meth. iii. p. 753. Dillwyn, Desc. Cat. i. p. 36. Donovan, Brit. Shells, iv. t. 132. Fleming, Brit. Anim. p. 457. Forbes and Hanley, Brit. Moll. i. p. 117, t. 4, f. 1, 2. Gerville, Coq. de la Manche, p. 10. Gmelin, Syst. Nat. p. 3215. Gualtieri, Test. t. 105, f. 8. Hanley, Desc. Cat. p. 5, t. 2, f. 3. Jay, Cat. 4th ed. p. 9. Karsten, Mus. Lesk. p. 151. Lamarck, Anim. sans Vert. v. p. 444. Lamarck, (Desh. edit.) vi. p. 44. Lister, Anim. Angl. p. 193, t. 5, f. 39. Macgillivray, Moll. Aberd. p. 306. Mawe, Introd. Conch. t. 3, f. 2. Menke, Syn. p. 73. Middendorff, Mal. Rossica, iii. p. 79. Montagu, Test. Brit. p. 24. Müller, Zool. Dan. prodr. p. 251. Pennant, Brit. Zool. iv. p. 76. Philippi, Enum. Moll. Sicil. i. p. 3 and ii. p. 4. Poli, Test. utr. Sicil. t. 7, f. 12, 13. Potiez et Michaud, Gal. Moll. ii. p. 269. Pultney, Dorset. Cat. p. 26. Schröter, Einleit. Conch. iii. p. 539. Sowerby, Illust. Brit. Conch. t. 1, f. 9. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 488, t. 103, f. 21—23. Thompson, Rep. Fauna Ireland, p. 263. Thorpe, Brit. Mar. Conch. p. 31. Turton, Conch. Dict. p. 144, f. 79. Turton, Conch. dith. Brit. p. 10. Wood, Gen. Conch. p. 79, t. 14, f. 3, 4. Wood, Index Test. Pholas, t. 2, f. 3. Wyatt, Conch. p. 27, t. 3, f. 2.

*Barnia candida*, Leach, Moll. Great Britain, p. 255. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. Gray, Figs. Moll. Anim. t. 338, f. 6.

*Barnea candida*, H. and A. Adams, Genera, ii. p. 326. Chenu, Man. Conch. ii. f. 17, 18. Fischer, Journ. Conch. 2d ser. iii. p. 49.

*Pholas dactyloides*, Della Chiajè, Mem. iv. t. 65, f. 4.

“*papyracea*, Spengler, Skrivt. Nat. ii. pt. 1, t. 1, f. 4, 1791. (Not of his diagnosis.) Lister, Hist. Conch. t. 435, f. 278.

“*silicula*, Deshayes, in Lam. Anim. sans Vert. vi. p. 45, 1835. Anton, Verzeich. der Conch. p. 1. Catlow, Conch. Nomenc. p. 4. Delessert, Rec. t. 1, f. 19. Hanley, Desc. Cat. p. 6.

*Hab.*—England. Ireland.

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*B. lanceolata*, D'Orbigny. (Sp.)

*Pholas lanceolata*, D'Orb. Moll. Voy. Amer. Merid. p. 497, t. 77, f. 18, 19.

*Hab.*—Patagonia. South of the Rio Negro.

This shell appears to be distinct from *B. candida*, although very nearly allied to it. It is not so much inflated across the umbones as that species; it is more narrowly elongate and acuminate at the buccal region, more rounded posteriorly, and the hinge tooth is larger. D'Orbigny's figures also show a vast difference in the great prominence of the concentric raised striae.

The figures of D'Orbigny represent probably a young shell.

Subgenus ANCHOMASA, Leach.

ANCHOMASA, (genus,) Leach, Moll. Great Britain, p. 253.

*Ventral anterior margin of the valves emarginate; hiatus short and wide.*

*B. Manillensis*, Philippi. (Sp.)

*Pholas Manillensis*, Philippi, Zeitschr. für Malak. p. 72, 1847. Philippi, Neuer Conch. iii. Pholas. t. 1, f. 2.

*Barnea Manillensis*, H. and A. Adams, Genera, ii. p. 326. Fischer, Journ. Conch. 2d ser. iii. p. 49.

*Barnia Manillensis*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382, 1851.

*Pholas Manillæ*, Sowerby, Proc. Zool. Soc. p. 161, 1849. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 487, t. 103, f. 17, 18. Jay, Cat. 4th. edit. p. 10.

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*Pholas fragilis*, Sowerby, Proc. Zool. Soc. p. 161, 1849. Sowerby, Monog. Thes. Conch. ii. p. 488, t. 108, f. 92, 93, 1849.

*Barnea fragilis*, Fischer, Journ. Conch. 2d ser. iii. p. 49.

*Barnia fragilis*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382.

*Hab.*—Manilla. Philippines.

Coll. Acad. Nat. Sci. Coll. J. C. Jay, M. D. Coll. G. W. Tryon, Jr.

The *Pholas fragilis* of Sowerby is undoubtedly identical with *Manillensis*. This species differs from *B. similis* in having a different shaped dorsal plate, which is also much smaller in proportion to the valves, which are narrower, with the umbones placed nearer the anterior end; and by the extension of the ribs over the whole posterior surface, which is quite plain in *B. similis*. *Barnea parva* is a wider shell, with the umbones nearer the centre.

*B. Parva*, Pennant. (Sp.)

*Pholas parva*, Pennant, Brit. Zool. iv. p. 77, t. 40, f. 13, 1777. Brown, Ill. Brit. Conch. t. 9, f. 11, 12. Catlow, Conch. Nomenc. p. 4. Dillwyn, Desc. Cat. i. p. 38. Fleming, Edin. Encyc. vii. p. 100. Fleming, Brit. Anim. p. 457. Forbes and Hanley, Brit. Moll. i. p. 111, t. 2, f. 2; t. 4, f. 1, 2. (Animal t. F. f. 3, 3a.) Hanley, Desc. Cat. p. 5, t. 2, f. 6. Jay, Cat. 4th edit. p. 10. Montagu, Test. Brit. p. 22, t. 1, f. 7, 8. Philippi, Neüer Conch. iii. *Pholas*, t. 2, f. 2. Sowerby, Illust. Brit. Conch. t. 1, f. 10. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 487, f. 31, 32. Thorpe, Brit. Mar. Conch. p. 32, f. 71. Turton, Conch. Dict. p. 143. Turton, Conch. dith. Brit. p. 9. Wood, Gen. Conch. p. 82. Wood, Index Test. t. 2, f. 6.

*Barnia parva*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. Gray, Figs. Moll. Anim. t. 338, f. 10.

*Barnea parva*, H. and A. Adams, Genera, iii. t. 89, f. 3, 3a, b. Chenu, Man. ii. f. 19. Fischer, Journ. Conch. 2 ser. iii. p. 49.

*Anchomasa Pennantiana*, Leach, Moll. Gt. Britain, p. 253.

*Pholas crenulatus*, Solander. Spengler, Skrivt. Nat. ii. pt. 1, p. 92.

" *dactylus*, var. Deshayes. In Lamarck Anim. sans Vert. vi. p. 45, note.

" *dactylodes*, Lamarck, Anim. sans Vert. v. p. 445. Menke, Syn. p. 73.

" *ligamentina*, Deshayes, Traite Elem. p. 80, t. f. 11, 12. Catlow, Conch. Nomenc. p. 4.

" *tuberculatus*, Turton, Conch. dith. Brit. p. 5, t. 1, f. 7, 8. Brown, Illust. Brit. Conch. p. 115, t. 49, f. 12, 13. Chenu, Ill. Conchyl. t. 3, f. 3. Fleming, Brit. Anim. p. 547. Hanley, Desc. Cat. p. 9. Thorpe, Brit. Mar. Conch. p. 30. Wood, Index Test. Supp. t. 1, f. 3.

*Hab.*—England.

Coll. Acad. Nat. Sciences. Coll. J. C. Jay, M. D. Coll. Isaac Lea, LL. D. Coll. G. W. Tryon, Jr.

Forbes and Hanley (Brit. Moll.), after an examination of the original specimen of Dr. Turton's *Pholas tuberculatus*, pronounced it to be a monstrosity of *B. parva*, and not a synonym of *D. dactylus*, as Gray and others supposed.

*B. subtruncata*, Sowerby. (Sp.)

*Pholas subtruncata*, Sowerby, Zool. Proc. p. 69, 1834. Catlow, Conch. Nomenc. p. 4. D'Orbigny, Moll. Voy. Amer. Merid. p. 499. Hanley, Desc. Cat. p. 6. Jay, Cat. 4th edit. p. 10. Müller, Syn. Test. p. 236.

*Pholas lamellosa*, D'Orb. Voy. Am. Merid. p. 498, t. 77, f. 20, 21.

*Hab.*—Payta, Peru, Isle Plata (subtruncata); Patagonia, south of Rio Negro (*lamellosa*.)

Judging from the descriptions, D'Orbigny's species is founded on a variety of *subtruncata* in which the anterior ribs are much more prominent. The obtusely rounded form of the posterior end and the nearly parallel dorsal and ventral margins distinguish this from *B. parva*, to which, however, it is very  
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closely allied. It may eventually prove to be a mere variety of that shell. The absence of a posterior accessory plate prevents this species from being placed in the genus *Pholas*, where it is nearly allied to *P. truncata*.

*B. Erythræa*, Gray.

*Barnia erythræa*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382, 1851.

*Barnea erythræa*, H. and A. Adams, Genera, ii. p. 326.

*Hab.*—Red Sea.

This shell, which has not yet been figured, seems to be allied to *B. similis*, but is probably distinct.

*B. similis*, Gray. (Sp.)

*Pholas similis*, Gray, in Yates' New Zealand. Catlow, Conch. Nomenc. p. 4.

Jay, Cat. 4th edit. p. 10. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 487, t. 103, f. 12—14.

*Barnia similis*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382.

*Barnea similis*, H. and A. Adams, Genera, ii. p. 326. Fischer, Journ. Conch. 2d ser. iii. p. 49.

*Pholas antipodum*, Philippi, Zeitschr. für Malak. p. 71, 1847.

"*antipodarum*, Philippi. Gray, Ann. and Mag. N. Hist. 2d ser. viii. p. 382. 1851.

*Hab.*—New Zealand.

Coll. Acad. Nat. Sciences. Coll. J. C. Jay, M. D. Coll. G. W. Tryon, Jr.

#### Genus *NAVEA*, Gray.

*NAVEA*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385.

*N. nucifera*, Fabricius (sp.)

*Pholas nucifera*, Fabricius. Spengler, Skrivt. Nat. iv. p. 40, t. 10, f. 4, 9.

Fischer, Journ. Conch. 2d ser. iii. p. 50.

*Navea nucifera*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385. H. and

A. Adams, Genera, ii. p. 328. Mörch, Cat. p. 2.

According to Dr. Gray, resembling *tenuis*, but appears to be shorter in front and longer and more rounded behind.

*N. subglobosa*, Gray.

*Navea subglobosa*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385,

1851. Chenu, Man. Conchyl. ii. f. 28, 29. H. and A. Adams, Genera, iii. t. 89, f. 6, 6, a, 6, b. Fischer, Journ. Conchyl. 2d ser. iii. p. 50.

*Hab.*—California.

*N. tenuis*, Gray.

*Navea tenuis*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385, 1851. H.

and A. Adams, Genera, ii. p. 328. Fischer, Journ. Conchyl. 2d ser. iii. p. 50.

*Hab.*— ?

#### Genus *ZIRPHÆA*, Leach.

*ZIRPHÆA*, Leach. H. and A. Adams, Genera, ii.

*Zirfæa*, Leach. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385, 1851.

*Z. constricta*, Sowerby (sp.)

*Pholas constricta*, Sowerby, Proc. Zool. Soc. p. 161, 1849. Sowerby, Monog.

*Pholas*, Thes. Conch. ii. p. 489, t. 104, f. 27, 28.

*Zirphæa constricta*, H. and A. Adams, Genera, ii. p. 327. Fischer, Journ. Conch. 2d ser. iii. p. 50.

*Zirphæa constricta*, Gray, Ann. and Mag. N. H. 2d ser. viii. p. 385, 1851.

*Hab.*—Straits of Sunda.

[April.

Fischer (Journ. Conch.) believes this to be an immature shell; however this may be, there can be no doubt that it is a good species.

*Z. crispata*, Linnæus. (Sp.)

*Pholas crispata*, Linn. Syst. Nat. 1111. Linn. Mus. Ulric, ii. p. 469. Alder, Cat. Northumb. Moll. p. 100. Anton, Verzeich. der Conchyl. p. 1. Bosc. Hist. Nat. des Coq. ii. p. 195. Bouchard-Chantreaux, Moll. Boulon. p. 7. Brown, Ill. Conch. Gt. Brit. p. 114, t. 48, f. 1—5. Bruguière, Encyc. Meth. t. 169, f. 5—7. Catlow, Conch. Nomenc. p. 3. Chemnitz, Conch. Cab. viii. t. 102, f. 872—874. Collard des Cherres, Cat. Moll. Finisterre, p. 9. Dekay, Moll. N. York, p. 247, t. 32, f. 306, a, b. Deshayes, Traité Elem. i. pt. 2, p. 77. Dillwyn, Desc. Cat. i. p. 40. Donovan, Brit. Shells, ii. p. 3, t. 62. Fleming, Edinb. Encyc. vii. p. 100. Fleming, Brit. Anim. p. 456. Forbes and Hanley, Brit. Moll. i. t. 4, f. 3, 4, 5. Gerville, Cat. Coq. Manche, p. 10. Gmelin, Syst. Nat. p. 3216. Gould, Invert. Mass. p. 27. Hanley, Desc. Cat. p. 7. Jay, Cat. 4th edit. p. 10. Lamarck, Anim. sans Vert. v. p. 445. Lamarck, (edit. Brux.) ii. p. 518. Lamarck, (edit. Desh.) vi. p. 46. Lister, Anim. Angl. p. 192, t. 5, f. 38. Macgillivray, Moll. Aberd. p. 306. Montagu, Test. Brit. p. 23. Olafsen, Isl. f. 4, 6. Penant, Brit. Zool. iv. p. 77, t. 40, f. 12. Petiver, Gazoph. t. 79, f. 13. Potiez et Mich. Gal. ii. p. 268. Pultney, Dorset Cat. p. 27. Russell, Essex (Mass.) Journ. Nat. Hist. i. p. 50. Schröeter, Einleit. iii. p. 541. Schumacher, Essai d'un Nov. Syst. p. 96. Sowerby, Illust. Brit. Shells, t. 1, f. 11. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 489, t. 104, f. 37. Spengler, Skrivt. Nat. ii. pt. 1, p. 96. Stimpson, Shells N. England, p. 25. Stimpson, Check-List, E. Coast Shells. Thorpe, Brit. Mar. Conch. p. 29. Turton, Conch. Dict. p. 146. Turton, Conch. dith. Brit. p. 6. Wheatley, Cat. Shells U. S. p. 2. Wood, Gen. Conch. t. 15, f. 4, 5. Wood, Index Test. t. 2, f. 5. Wyatt, Conch. p. 28.

*Zirphæa crispata*, H. and A. Adams, Genera, iii. t. 89, f. 5—5a. Mörch. Cat. p. 3. Fischer, Journ. Conch. 2d ser. iii. p. 50. Chenu, Man. ii. f. 26, 27.

*Zirphæa crispata*, Gray, Figs. Moll. Anim. t. 338, f. 5 and t. 339, f. 5. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385.

*Thurlosia crispata*, Leach, Moll. Gt. Britain, p. 252.

*Mya crispata*, Linn. Faun. Suec. 2125.

*Pholas bifrons*, Da Costa, Brit. Conch. p. 242, t. 16, f. 4.

*Solen crispus*, Gmelin, Syst. Nat. p. 3228.

*Pholas crispus*, Blainville, Malacol. t. 79, f. 7.

“ *parva*, Da Costa, Conch. p. 247. Donovan, Brit. Shells, ii. t. 69. Bruguière, Encyc. Meth. t. 169, f. 5. Lister, Hist. Conch. t. 436, f. 279.

*Hab.*—England, France, Sweden, Denmark, Northern Coast United States. West Coast America? (Carpenter.)

Coll. Acad. Nat. Sciences. Coll. Isaac Lea, LL. D. Coll. J. C. Jay, M. D. Coll. G. W. Tryon, Jr.

*Z. Julian*, Adanson. (Sp.)

*Pholas Julian*, Adans. Senegal, p. 260, t. 19, f. 1.

*Zirphæa Julian*, H. and A. Adams, Genera, ii. p. 327. Fischer, Journ. Conch. 2d ser. iii. p. 50.

*Zirphæa Julian*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385.

“ *Mulan*, Gray, Figs. Moll. Anim. t. 338, f. 2.

*Hab.*—Senegal.

1862.]

## Subfamily JOUANNETINÆ, Tryon.

## Genus PHOLADIDEA, Turton.

PHOLADIDEA, Turton, Conch. Dict. p. 147, 1819. Gray, Zool. Proc. p. 188, 1847.  
Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. 1851. Chenu, Man.  
Conchyl. ii. Fischer, Journ. Conchyl. 2d ser. iii. H. and A. Adams,  
Genera, ii.

*Pholadidoidea*, Goodall, teste Blainville, Dict. Sci. Nat. xxxix. p. 535, 1826.

*Pholadididea*, Agassiz, Nomenc. Zool. 1846.

*Cadmusia*, Leach, Moll. Gt. Brit. p. 254, 1852.

*Pholidae*, Leach, teste Swainson, Malacol. 1840.

*\*Siphonal valves without any tubular elongation and not folded.*

*P. papyracea*, Solander. (Sp.)

*Pholas papyracea*, Solander, MSS. Turton, Conch. dith. Brit. p. 2, t. 1, f. 1—4. Brown, Ill. Brit. Conch. p. 114, t. 49, f. 4, 6, 7, 8, 9. Catlow, Conch. Nomenc. p. 4. Chenu, Ill. Conch. *Pholas*, t. 3, f. 1. Fleming, Brit. Anim. p. 456. Hanley, Desc. Cat. p. 9. Jay, Cat. 4th edit. p. 10. Mawe, Conch. t. 3, f. 5. Philippi, Conchyl. iii. *Pholas*, t. 2, f. 3. Reeve, Conch. Syst. t. 2, f. 3. Sowerby, Genera, *Pholas*, f. 3. Sowerby, Conch. Man. f. 56. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 497, t. 106, f. 66. Thorpe, Brit. Mar. Conch. p. 29. Wood, Index Test. Supp. t. 1, f. 3.

*Pholadidea papyracea*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 384. Gray, Figs. Moll. Anim. t. 338, f. 8. H. and A. Adams, Genera, iii. t. 90, f. 1, 1a, 1b. Chenu, Man. Conch. ii. f. 30, 31. Fischer, Journ. Conch. 2d ser. iii. p. 51. Forbes and Hanley, Brit. Moll. i. p. 123, t. 5, f. 3—6; Animal t. F, f. 4. Sowerby, Ill. Brit. Shells, t. 1, f. 12. Woodward, Man. t. 23, f. 20.

*Pholas lamellata* (young shell), Turton, Conch. Dith. Brit. p. 4, t. 1, f. 5, 6. Brown, Ill. Brit. Conch. p. 114, t. 49, f. 10, 11. Chenu, Ill. Conch. *Pholas*, t. 3, f. 2. Fleming, Brit. Anim. p. 456. Wood, Index Test. Supp. t. 1, f. 3.

*Pholas striata*, Blainville, Man. Malacol. t. 8 bis, f. 7. Cuvier, Reg. Anim. (edit. Griffith), t. 8, f. 1. Cuvier (Henderson, edit.), t. 41, f. 1. Wyatt, Conch. t. 3, f. 5.

*Pholadidea loscombia*, Turton, Conch. Dict. p. 147.

*Pholadidea Goodallii*, Blainville, Dict. Sc. xxxvii. p. 532.

*Cadmusia Solanderiana* Leach, Moll. Gt. Brit. p. 254, t. 12, f. 1, 2.

*Pholas Visonensis*, (fossil,) Philippi, Enum. Moll. Sicil. ii. p. 4, t. 13, f. 5.

*Zirfœa? Visonensis*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385.

*Hab.*—Europe.

Coll. Acad. Nat. Sci. Coll. Isaac Lea, LL. D. Coll. J. C. Jay, M. D. Coll. Geo. W. Tryon, Jr.

*Pholas lamellata* of Turton is the young of this species, although for a long time it was considered distinct. The differences between the young and mature shells in this family are so great, that in several cases the former have been described as different. Even the mature shell varies much, and the result has been the creation of a number of species which more recent authors have been obliged to suppress.

*P. spathulata*, Sowerby. (Sp.)

*Pholas spathulata*, Sowerby, Zool. Proc. p. 162, 1849. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 497, t. 106, f. 69, 70.

*Pholadidea spathulata*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 384. H. and A. Adams, Genera, ii. p. 329. Fischer, Journ. Conch. 2d ser. iii. p. 51.

*Hab.*—New Zealand.

[April,

This shell somewhat resembles *P. papyracea* in its external markings, but it is narrower, longer, more acuminate posteriorly and the impressed rib more oblique. The form of the cup-shaped appendage is also different.

*P. sulcata*, Brown. (Sp.)

*Pholas sulcata*, Brown, Ill. Conch. Gt. Brit. p. 115, t. 48, f. 17, 18.

*Pholadidea sulcata*, H. and A. Adams, Genera, ii. p. 329. Fischer, Journ. de Conchyl. 2d ser. iii. p. 51. Forbes and Hanley, Brit. Moll. i. p. 128.

*Hab.*—England.

Only a single valve of this shell has been found; it agrees very nearly with the young of *P. papyracea*, but Capt. Brown is confident of its specific value.

*P. ovoidea*, Gould. (Sp.)

*Pholas ovoidea*, Gould, Jour. Bost. Soc. N. Hist. vi. p. 388, t. 15, f. 1.

*Parapholas ovoidea*, H. and A. Adams, Genera, ii. p. 330. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Pholadidea ovoidea*, Carpenter, Rep. on W. Coast Shells. Carpenter, Zool. Proc. 1856, p. 198.

*Hab.*—Lower California.

Coll. A. A. Gould, M. D.

This species probably belongs in the genus *Pholadidea*, although its position cannot be accurately determined on account of the loss of its dorsal valves. Its form and sculpture will readily distinguish it from the other species.

#### Subgenus TALONELLA, Gray.

*TALONELLA*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385, 1851.

*Siphonal valves without any tubular prolongation, and with a longitudinal and transverse fold.*

*P. tridens*, Gray.

*Pholas (Talonella) tridens*, Gray, Brit. Mus. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 498, t. 106, f. 60, 61.

*Pholadidea tridens*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385. H. and A. Adams, Genera, ii. p. 329. Fischer, Journ. Conchyl. 2d ser. iii. p. 51.

*Hab.*—Monte Christo.

The form of the cup distinguishes this curious little species from all others. Although so small, the shell is adult, as is evidenced by the presence of the anterior ventral callous plate.

#### Subgenus HATASIA, Gray.

*HATASIA*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385, 1851.

*Siphonal valves with a tubular shelly prolongation.*

1. *P. melanura*, Sowerby. (Sp.)

*Pholas melanura*, Sowerby, Proc. Zool. Soc. p. 70, 1834. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 499, t. 107, f. 78, 79. Catlow, Conch. Nomencl. p. 4. Conrad, Journ. Acad. Nat. Sc. 2d ser. ii. p. 335, 1854. D'Orbigny, Moll. Voy. Amer. Merid. p. 499. Müller, Syn. Test. Viv. p. 238.

*Pholadidea melanura*, Gray, Ann. and Mag. 2d ser. viii. p. 385. H. and A. Adams, Genera, ii. p. 329. Carpenter, Rep. on West Coast Mollusca. Carpenter, Cat. Mazatlan Shells, p. 8. Chenu, Man. Conch. ii. f. 32, 33. Fischer, Journ. Conch. 2d ser. iii. p. 51.

1862.]

*Penitella Wilsonii*, Conrad, Proc. Acad. Nat. Sc. p. 156, Feb. 1849. Conrad, Journ. Acad. Nat. Sc. 2d ser. i. p. 279, t. 39, f. 4.

*Hab.*—Lower California.

Coll. Acad. Nat. Sci. Coll. J. C. Jay. M. D. Coll. G. W. Tryon, Jr.

This splendid shell may be readily distinguished from the other two species of the subgenus *Hatasia* by its much larger size. In the form of its cup-shaped appendage it is allied to the following species:

By a typographical error in Conrad's description of *P. Wilsonii* in the Journal of the Academy, reference is made to fig. 5 instead of fig. 4; this has led Dr. Gray to consider the figure a bad representation of the species, and to mistake the scope intended to be given by Mr. Conrad to the genus *Penitella*.

*P. quadra*, Sowerby. (Sp.)

*Pholas quadra*, Sowerby, Zool. Proc. p. 71, 1834. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 499, t. 106, f. 62, 63. Catlow, Conch. Nomenc. p. 4. D'Orbigny, Moll. Voy. Amer. Merid. p. 500. Hanley, Desc. Cat. 4th edit. p. 10. Müller, Syn. Test. Viv. p. 238.

*Pholadidea quadra*, Gray, Ann. and Mag. 2d ser. viii. p. 385. H. and A. Adams, Genera, ii. p. 329. Fischer, Journ. Conch. 2d ser. iii. p. 51.

*Hab.*—Monte Christo.

Coll. J. C. Jay, M. D.

Resembles *tubifera* very closely, but the posterior appendage is four-lobed, whilst in *tubifera* it consists of two reflected lobes; from *P. tridens* it may be distinguished, besides the subgeneric differences, by its anterior dorsal plates being more spread out over the dorsal surface of the shell.

*P. tubifera*, Sowerby. (Sp.)

*Pholas tubifera*, Sowerby, Proc. Zool. Soc. p. 71, 1834. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 499, t. 106, f. 64, 65. Adams, Panama Shells, p. 302. Catlow, Conch. Nomenc. p. 4. D'Orbigny, Moll. Voy. Amer. Merid. p. 499. Hanley, Desc. Cat. p. 8. Jay, Cat. 4th edit. p. 10. Müller, Syn. Test. Viv. p. 238.

*Pholadidea tubifera*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385. H. and A. Adams, Genera, ii. p. 329. Fischer, Journ. Conchyl. 2d ser. iii. p. 51.

*Hab.*—Panama; West Colombia.

Coll. J. C. Jay, M. D.

#### Genus PARAPHOLAS, Conrad.

*PARAPHOLAS*, Conrad, Proc. Acad. Nat. Sc. p. 121, Dec. 1848. Journ. Acad. Nat. Sc. 2d ser. i. pt. 3, p. 214, and ii. pt. 4, p. 335. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 380. H. and A. Adams, Genera, ii.

The genus *Penitella* has been referred by many authors to the synonymy of this genus. Mr. Conrad is almost universally credited with *Penitella*; which, however he merely adopted from Valenciennes, without giving any description of its characters.

Dr. Gray includes the *P. penita* of Conrad under a section of *Parapholas*, described as having a single impressed rib and single posterior umbonal valve; while the other species have two impressed ribs and the posterior dorsal cavity divided.

I have thought it best to restore for this shell the original generic name of *Penitella*.

*P. Californica*, Conrad.

*Pholas Californica*, Conrad, Journ. Acad. Nat. Sc. vii. p. 236, t. 18, f. 5. Catlow, Conch. Nomenc. p. 3. Hanley, Desc. Cat. p. 8, t. 9, f. 43.

[April,



Jay, Cat. 4th edit. p. 9. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 491, t. 102, f. 5, 6, 7.

*Parapholas Californica*, Conrad, Proc. Acad. Nat. Sc. p. 121, 1848. Conrad, Journ. Acad. Nat. Sc. 2d ser. i. p. p. 214, and ii. p. 335. Carpenter, Zool. Proc. p. 209, 1856. Carpenter, Rep. on W. Coast Mollusca. Carpenter, Check-List W. Coast Shells.

*Pholas Janelli*, Deshayes, Proc. Zool. p. 357, 1839. Deshayes, Guerin's Mag. Zool. t. 14, 15, 16, 1840. Catlow, Conch. Nomenc. p. 3. Chenu, Ill. Conch. Pholas, t. 3, f. 5.

*Parapholas Janelli*, H. and A. Adams, Genera, ii. p. 330. Chenu, Man. Conch. ii. f. 41, 42. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Martesia Californica*, Chenu, Mon. Conch. ii. f. 53.

*Hab.*—California.

Coll. Acad. Nat. Sciences. Coll. J. C. Jay, M. D. Coll. G. W. Tryon, Jr.

*P. quadrizonalis*, Spengler. (Sp.)

*Pholas quadrizonalis* (young shell), Spengler. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 492, t. 108, f. 88, 89.

*Parapholas quadrizonalis*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. H. and A. Adams, Genera, iii. t. 90, f. 4, 4a. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Pholas Incii* (adult), Sowerby, Zool. Proc. 1849. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 491, t. 105, f. 45, 46.

*Hab.*—Torres' Straits.

#### Genus PENITELLA, Valenciennes.

*PENITELLA*, Valenciennes, Voy. Venus, atlas, t. 24, (no description), (part.) Journ. Conrad, Acad. Nat. Sc. 2d ser. ii. p. 335.

*Parapholas* (part.), Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. Carpenter, Zool. Proc. 1856.

*Pholadidea* (part.), Carpenter, Rep. on W. Coast Mollusca and Check-List.

I cannot find that the text of the Mollusca of Voy. Venus was published, but the figure and the name printed on the plate sufficiently indicate the genus. The three other species of Valenciennes I am unable to make out. No. 2 resembles *Martesia striata*. No. 4 is a very young shell.

*P. penita*, Conrad. (Sp.)

*Pholas penita*, Conrad, Journ. Acad. Nat. Sc. vii. p. 237, t. 18, f. 7. Jay, Cat. 4th edit. p. 10.

*Parapholas penita*, Carpenter, Zool. Proc. p. 210, 1856. Carpenter, Rep. on West Coast Mollusca.

*Pholadidea penita*, Carpenter, Check-List W. Coast Shells. Carpenter, Rep. on W. Coast Mollusca.

*Pholas concamerata*, Deshayes, Rev. Zool. p. 357, 1839. Deshayes, Guerin's Mag. Zool. t. 17, 1840. Chenu, Ill. Conchyl. Pholas, t. 3, f. 4. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 497, t. 106, f. 67, 68.

*Parapholas concamerata*, Chenu, Man. ii. f. 43, 44. Fischer, Journ. Conch. 2d ser. iii. p. 52. H. and A. Adams, Genera, ii. p. 330. Gray, Ann. and Mag. N. H. 2d ser. viii. p. 383.

*Pholas cucullata*, Gray, Syn. Br. Mus. 1840.

*Penitella Conradi*, Valenciennes, Voy. Venus, atlas, t. 24, f. 1. Conrad, Journ. Acad. Nat. Sc. 2d ser. ii. p. 335.

*Pholas Darwinii*, Sowerby, Monog. Pholas, Thes. Conch. ii. p. 490, t. 107, f. 76, 77.

*Zirfca?* *Darwinii*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 385.

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*Jouannetia Darwinii*, H. and A. Adams, ii. p. 330. Fischer, Journ. Conch. 2d ser. iii. p. 51. Chenu, Manuel, ii. f. 39, 40.

*Pholas cornea*? Sowerby, Zool. Proc. 1834, p. 72. Catlow, Conch. Nomencl. p. 3. Hanley, Desc. Cat. p. 9.

*Hab.*—California, (penita.) W. Columbia, (cornea.) Chiloe (*Darwinii*.) Coll. Acad. Nat. Sciences.

*P. Darwinii*, Sowb. is the young of this species; I have also included Sowerby's *P. cornea*, as his description seems in the main to correspond, I cannot understand why several of Sowerby's and D'Orbigny's species were omitted from Sowerby's Monograph and are not contained in Gray. Nor is any reference made to them.

#### Genus JOUANNETIA, Desmoulins.

JOUANNETIA, Chas. Desmoulins, Bull. Linn. Soc. Bordeaux, ii. p. 244. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. H. and A. Adams, Genera, ii. p. 330. Chenu, Man. ii. f. 36. Fischer, Journ. Conch. 2d ser. iii. p. 51.

*Triumphalia*, Sowerby, Monog. Thes. Conch. ii. p. 500, 1849. Sowerby, Zool. Proc. 1849.

*Pholas*, (part.) Deshayes, in Lam. An. sans Vert. vi. p. 46.

\* *Valves with two impressed radiating grooves.*

*J. Cumingii*, Sowerby. (Sp.)

*Triumphalia Cumingii*, Sowerby, Zool. Proc. p. 161, 1849. Sowerby, Monog. Triumphalia, Thes. Conch. ii. p. 502, t. 106, f. 56, 57.

*Jouannetia Cumingii*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. H. and A. Adams, Genera, ii. p. 330. Chenu, Man. Conch. ii. f. 38. Fischer, Journ. Conch. 2d ser. iii. p. 51.

*Hab.*—Philippines.

This beautiful little species merits the name of the following instead of that which it bears, being almost entirely spherical.

*J. globosa*, Quoy. (Sp.)

*Pholas globulosa*, Quoy, Voy. Astrolabe, Mollusques, p. 549, t. 85, f. 16—18.

*Triumphalia globosa*, Sowerby, Proc. Zool. Soc. p. 160, 1849. Sowerby, Monog. Triumph. Thes. Conch. ii. p. 501, t. 106, f. 54, 55.

*Jouannetia globosa*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 382. H. and A. Adams, Genera, iii. t. 90, f. 3, 3a, b. Chenu, Man. ii. f. 36. Fischer, Journ. Conch. 2d ser. iii. p. 51.

*Jouannetia globulosa*, Gray, Figs. Moll. Anim. t. 338, f. 3.

*Hab.*—Philippines.

Coll. Acad. Nat. Sci. Coll. G. W. Tryon, Jr.

This shell is not so round as *J. Cumingii*, being somewhat ovate in form. It is also a smaller species, and differs in the posterior margin of the right valve being toothed. In the latter respect it resembles *J. pectinata*, but the teeth are larger and not so numerous, and the surface of the valves is bisulcate.

\*\* *Valves with a subcentral impressed radiating groove.*

#### Subgenus PHOLADOPSIS, Conrad.

Genus PHOLADOPSIS, Conrad, Proc. Acad. Nat. Sci. p. 156, 1849.

As Conrad's type species differs from the others in having but one radiating groove, Dr. Gray has very properly separated it as a subgenus.

*J. pectinata*, Conrad. (Sp.)

*Pholadopsis pectinata*, Conrad, Journ. Acad. Nat. Sci. 2d ser. i. p. 279, t. 39, f. 3.

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*Jouannetia pectinata*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 383.  
H. and A. Adams, Genera, ii. p. 330. Fischer, Journ. Conch. 2d ser.  
iii. p. 51.

*Triumphalia pulcherrima*, Sowerby, Zool. Proc. p. 161, 1840. Sowerby,  
Monog. Triumph. Thes. Conch. ii. p. 501, t. 106, f. 58, 59.

*Jouannetia pulcherrima*, Chenu, Man. ii. f. 37.

*Hab.*—California. W. Colombia.

Genus *MARTESIA*, Leach.

*MARTESIA*, Leach, MSS. Blainville, Dict. Sci. Nat. 1824. Blainville, Malacol.  
p. 632, 1825. Gray, Zool. Proc. p. 188, 1847. Gray, Ann. and Mag.  
Nat. Hist. 2d ser. viii. p. 380.

*Mactresia*, Gray, Syn. Brit. Mus. p. 91, 1842. (Typographical error.)

\**Valves with two impressed ribs, the hinder one oblique; the anterior dorsal marginal reflection depressed.*—Gray, Ann. and Mag. Nat. Hist. p. 383, 1851.

*M. branchiata*, Gould. (Sp.)

*Pholas branchiata*, Gould, Bost. Proc. p. 290, 1845. Jay, Cat. p. 9.  
Sowerby, Monog. Pholas, Thes. Conch. ii. p. 493, t. 108, f. 82, 83.

*Martesia branchiata*, Gray, Ann. and Mag. 2d ser. viii. p. 383. H. and A.  
Adams, Genera, ii. p. 331. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Hab.*—Africa.

Coll. J. C. Jay, M. D.

This shell differs from the following in the dorsal plate being bilobed posteriorly, around a portion of the dorsal posterior integument, and in the absence of radiating crenulations on the anterior third of the surface of the valve.

*M. calva*, Sowerby. (Sp.)

*Pholas calva*, Sowerby, Proc. Zool. Soc. p. 69, 1834, and p. 162, 1835.  
Sowerby, Monog. Pholas, Thes. Conch. p. 493, t. 105, f. 51—53.  
Catlow, Conch. Nomencl. p. 3. Müller, Syn. Test. Viv. p. 237.  
Hanley, Desc. Cat. p. 7.

*Parapholas calva*, Carpenter, Mazatlan Shells, p. 9.

*Martesia calva*, Gray, Ann. and Mag. viii. p. 383. H. and A. Adams, Genera,  
ii. p. 331. Carpenter, Rep. on W. Coast Mollusca. Chenu, Man. ii.  
f. 45—47. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Pholas acuminata*, Sowerby, Zool. Proc. p. 70, 1834. Sowerby, Monog.  
Pholas, Thes. Conch. ii. p. 492, t. 105, f. 48—50. Catlow, Conch.  
Nomencl. p. 3. Hanley, Desc. Cat. p. 8, t. 9, f. 30. Jay, Cat. 4th ed.  
p. 10. Müller, Syn. Test. Viv. p. 237.

*Parapholas acuminata*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. H. and  
A. Adams, Genera, ii. Carpenter, W. Coast Report, Check List, and  
Mazatlan Shells, p. 12.

*Martesia acuminata*, Chenu, Man. ii. f. 56.

*Parapholas bisulcata*, Conrad, Journ. Acad. Nat. Sci. 2d ser. i. p. 270, t. 39,  
f. 5.

*Hab.*—California. Mazatlan. Panama.

Cab. Acad. Nat. Sci. Cab. J. C. Jay, M. D. Cab. G. W. Tryon, Jr.

The very variable nature of the dorsal plate has caused the erection of three species for this shell. Mr. P. P. Carpenter, in his Catalogue of Mazatlan Shells, says of *P. acuminata*, "The author of this species distinguishes it from *calva* by the shape of the laminae and posterior portion, which are variable in both forms, and by the character of the umbonal shield. This last is the only constant character of difference. It is not only smaller, not projecting beyond the dorsal plate, (which is not the result of age, being found in

1862.]

all the specimens,) but, in all the specimens allowing of observation, it is turned in all around, instead of at the anterior portion only, as in *calva*. The external surface also is generally rougher, and the posterior gap smaller, not displaying the bipartite lamina so clearly. Still, as the shells exactly agree in all other respects, it is probable that these differences only result from changes in situation. All the *calvæ* were taken out of *Spondylus*; all the *acuminatæ* were sent loose; and, from their extremely perfect condition, were probably extracted from clay or wood. If the latter, the irregularities of the decaying timber might cause the roughening of the plate-surface. The original specimens of *acuminata*, however, were taken out of argillaceous limestone."

Specimens in Coll. Acad. Nat. Sci. exhibit intermediate characters.

*\*\*Valves with a single subcentral impressed rib; the anterior dorsal reflection close-pressed, and furnished with an elevated internal rib.*—Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 383.

*M. curta*, Sowerby. (Sp.)

*Pholas curta*, Sowerby, Zool. Proc. p. 71, 1834. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 944, t. 104, f. 33, 34. Hanley, Desc. Cat. p. 9. Jay, Cat. 4th ed. p. 10. Müller, Syn. Test. p. 239, t. 108, f. 105.

*Pholadidea curta*, Carpenter, Rep. on W. Coast Mollusca.

*Martesia curta*, Gray, Ann. and Mag. viii. p. 384. H. and A. Adams, Genera, ii. p. 331. Chenu, Man. ii. f. 51. Fischer, Journ. Conch. 2d ser. iii.

*Hab.*—Panama.

Coll. Acad. Nat. Sci. Coll. J. C. Jay, M. D.

*M. intercalata*, Carpenter.

*Martesia intercalata*, Carpenter, Cat. Mazatlan Shells, p. 13.

*Hab.*—Mazatlan.

*M. multistriata*, Sowerby. (Sp.)

*Pholas multistriata*, Sowerby, Zool. Proc. 1849. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 494, t. 104, f. 35, 36.

*Martesia multistriata*, H. and A. Adams, Genera, ii. p. 331. Fischer, Journ. Conch. 2d ser. iii. p. 52. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 383.

*Hab.*—Australia.

"Resembling *Ph. curta*, but the striæ on the umbonal part of the anterior are very much finer, and the posterior termination is elongated. The dorsal shield is more oval, rounded anteriorly, and acuminate posteriorly."—Sowerby.

*M. obtecta*, Sowerby. (Sp.)

*Pholas obtecta*, Sowerby, Zool. Proc. 1849. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 496, t. 108, f. 80, 81.

*Martesia obtecta*, Gray, Ann. and Mag. 2d ser. viii. p. 384. H. and A. Adams, Genera, ii. p. 331. Fischer, Journ. Conchyl. 2d ser. iii. p. 52.

*Hab.*—Philippines.

Coll. Acad. Nat. Sci. Coll. G. W. Tryon, Jr.

The two-lobed dorsal plate, (which from numerous specimens appears to be a permanent character,) together with the greater size of the shell and some difference in the sculpture, are the characters which distinguish this shell from *M. multistriata*; it would not be surprising, however, if specimens from other localities would prove that this shell is only a well-grown form of *multistriata*.

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**M. ovum, Gray.**

*Pholas ovum*, Gray, in Wood, Index Test. Supp. f. 4. Catlow, Conch. Nomenc. p. 4. Hanley, Desc. Cat. p. 7.

" *ovata*, (Gray,) Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 493, t. 107, f. 71, 72. Jay, Cat. 4th ed. p. 10.

*Martesia ovum*, Gray, Ann. and Mag. viii. p. 383. H. and A. Adams, Genera, ii. p. 331. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Hab.*—West Indies. *Hanley*.

Much larger than either of the other species of this section of the genus.

\*\*\**Valves with a single subcentral impressed rib; the anterior dorsal reflection erect, separated from the outer surface of the valve.*—Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 384.

**M. aperta, Sowerby. (Sp.)**

*Pholas aperta*, Sowerby, Zool. Proc. 1849. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 491, t. 108, f. 99, 100.

*Martesia aperta*, Gray, Ann. and Mag. 2d ser. viii. p. 384. H. and A. Adams, Genera, ii. p. 331. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Hab.*—Straits of Sunda.

The character of the striae is different in this species from *M. cuneiformis*, the undulations being finer and more angular. The shell is a young one, the ventral plate being absent.

**M. Australis, Gray.**

*Martesia Australis*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 384. H. and A. Adams, Genera, ii. p. 331. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Hab.*—N. W. Australia.

This species has not yet been figured, but Dr. Gray states that the anterior waved concentric edges are rather distant,—fewer than in *M. striata*.

**M. cuneiformis, Say. (Sp.)**

*Pholas cuneiformis*, Say, Journ. Acad. Nat. Sci. ii. p. 322. DeKay, Moll. New York, p. 248. Kurtz, Cat. p. 3. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 495, t. 104, f. 38, 39, t. 108, f. 86, 87. Wheatley, Cat.

*Pholadidea cuneiformis*, Stimpson's Check List.

*Martesia cuneiformis*, Fischer, Journ. Conch. 2d ser. iii. p. 52. H. and A. Adams, Genera, ii. p. 331. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 384.

*Pholas Edwardsii*, Gray, Syn. Brit. Mus. 1820.

" *rudis*, " " " " " "

*Hab.*—Southern United States. West Indies.

Coll. Acad. Nat. Sci. Coll. Isaac Lea, LL. D. Coll. G. W. Tryon, Jr.

**M. rivicola, Sowerby. (Sp.)**

*Pholas rivicola*, Sowerby, Zool. Proc. 1849. Sowerby, Monog. *Pholas*, Thes. Conch. ii. p. 496, t. 108, f. 90, 91. Adams and Reeve, Moll. Voy. Samarang. p. 84, t. 23, f. 5.

*Martesia rivicola*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 384. H. and A. Adams, Genera, ii. p. 331. Fischer, Journ. Conch. 2d ser. iii. p. 52.

*Hab.*—Pantai River.

This very distinct species is found burrowing in floating piles, on the Pantai River, twelve miles from its mouth, where the water is perfectly fresh.

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*M. striata*, Linnæus. (Sp.)

*Pholas striata*, Linnæus, Syst. Nat. p. 1111. Beau, Cat. Coq. Guadeloupe, p. 27. Bosc, Hist. Nat. des Coq. ii. p. 195. Brown, Ill. Brit. Conch. p. 115, t. 49, f. 5—8. Catlow, Conch. Nomenc. p. 4. Chemnitz, Conch. Cab. t. 102, f. 867—871. Donovan, Brit. Shells, t. 116. Forbes and Hanley, Brit. Conch. i. p. 120. Gualtieri, Test. t. 105, f. F. Dillwyn, Desc. Cat. p. 37. Gmelin, Syst. Nat. p. 3215. Hanley, Desc. Cat. p. 7. Jay, Cat. 4th ed. p. 10. Mawe, Conch. t. 3, f. 1. Menke, Syn. p. 73. Montagu, Brit. Test. pp. 26 and 559. Reeve, Conch. Syst. t. 24, f. 2. Rumphius, Mus. t. 46, f. 8. Sowerby, Genera Pholas, f. 2. Sowerby, Illust. Brit. Shells, t. 1, f. 13. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 494, t. 104, f. 40—42. Spengler, Besch. Berl. Naturg. iv. t. 5, f. 1—5. Thorpe, Brit. Mar. Conch. p. 31. Wood, Gen. Conch. p. 83, t. 16, f. 1, 2, 3, 4, 8. Wood, Index Test. Pholas, t. 2, f. 7. Turton, Conch. Dict. p. 147. Turton, Conch. dith. Brit. p. 11.

*Martesia striata*, Leach, Gray Ann. and Mag. Nat. Hist. 2d ser. viii. p. 384. H. and A. Adams, Genera, iii. t. 90, f. 5, 5a. Chenu, Man. Conch. ii. f. 48—50. Fischer, Journ. Conch. 2d ser. iii. p. 52. Mörch, Cat.—p. 2. Woodward, Manual, t. 23, f. 21.

*Pholas pusilla*, Linnæus, Syst. Nat. p. 1111. Bosc, Hist. Nat. des Coq. ii. p. 195. Catlow, Conch. Nomenc. p. 4. Dillwyn, Desc. Cat. i. p. 38. D'Orbigny, Moll. Voy. Amer. Merid. p. 497. D'Orbigny, Moll. Sagra's Cuba, p. 214. Donovan, Brit. Shells, iv. t. 117. Schumacher, Essai d'un Nov. Syst. p. 96. Spengler, Skrivt. Nat. ii. pt. 1, p. 95.

*Pholas clavata*, Lamarck, Anim. sans Vert. v. p. 446. Lamarck, (ed. Desh.) vi. p. 46. Anton, Verzeichn. Conch. p. 1. Bruguière, Encyc. Meth. t. 170, f. 1—3. Hanley, Desc. Cat. p. 7.

*Martesia clavata*, Swainson, Malaeol. f. 122, 1.

*Pholas conoides*, Fleming, Brit. Anim. p. 457.

“ *lignorum*, Spengler, Berl. Ges. Nat. iv.

“ *nana*, Pultney, Dorset. Cat. p. 27.

“ *falcata*, (Junior,) Wood, Gen. Conch. t. 16, f. 5—7. Wood, Index Test. Pholas. t. 2, f. 8? Hanley, Desc. Cat. p. 7.

“ *terediniformis*, (Junior,) Sowerby, Zool. Proc. 1849. Sowerby, Mon. Pholas. Thes. Conch. ii. p. 490, t. 108, f. 97, 98.

*Pholas semicostata*, (Junior,) Lea, Bost. Proc., Nov., 1844, t. 24, f. 1. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 495, t. 108, f. 84, 85. Jay, Cat. 4th ed. p. 10. Stimpson's Check List.

Coll. Acad. Nat. Sci.; specimens from England, West Indies and Philippines. Coll. J. C. Jay, M. D. Coll. Isaac Lea, LL.D. Coll. G. W. Tryon, Jr.

Linnæus described the West Indian shell as a distinct species, under the name of *Pholas pusilla*, but Lamarck united the two, as *P. clavata*; *P. Terediniformis* and *P. falcata* are about half-grown shells, and *P. semicostata* is a very young individual. The Philippine Island specimens do not differ in any respect from the West Indian. This species differs from *M. cuneiformis* in the shape of the dorsal plate and in the anterior concentric striæ being angular instead of regularly curved.

*M. corticaria*, Adams. (Sp.)

*Pholas corticaria*, Gray, MSS. Sowerby, Monog. Pholas, Thes. Conch. ii. p. 495, t. 108, f. 94—96. C. B. Adams, Contrib. to Conch. p. 75.

*Pholas Beauviana*, Recluz, Journ. Conch. iv. p. 49, t. 2, f. 1, 2, 3. (1853.)

*Zirphæa Beauviana*, H. and A. Adams, Genera, ii. p. 327. Beau. Cat. Coq. Guadeloupe, p. 27. Fischer, Journ. Conch. 2d ser. iii. p. 50.

*Pholas Caribæa*, D'Orbigny, Moll. Sagra's Cuba, p. 216, t. 25, f. 20—22, 1853.

“ *Hornbeckii*, D'Orb. “ “ “ p. 217, t. 25, f. 23—25, 1853.

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*Martesia Hornbeckii*, Chenu, Manuel, ii.

*Hab.*—West Indies.

The *Pholas Beauviana*, of Recluz, and *P. Caribæa*, D'Orb., are descriptions of the full growth of this shell. *P. Hornbeckii* is a young shell, and is considerably magnified in the plate of Sagra's Cuba, although no reference to that fact is contained there. The shell is figured without the dorsal plate.

The date 1846 is affixed to the descriptions by D'Orbigny, but he does not mention where they were described previously.

This shell was sent to England from Jamaica, by Prof. Adams, with the MSS. name of *P. rosea*, subsequently altered to *P. corticaria*. Mr. Hanley affirmed them to be a variety of *P. striata*, and, in deference to his opinion, Adams suppressed the description.

Sowerby quotes "Gray MSS." for this shell, but Dr. Gray relinquishes his name in favor of Adams, although he considers the shell a synonym of *M. cuneiformis*. I have not seen this species, but conceive from the figures of Sowerby that it is a good one.

I find the following differences in the dorsal plates of the three allied West Indian species:—

In *striata*, somewhat hexagonal, the anterior and posterior margins emarginate, the anterior lateral margins slightly concave, and the posterior lateral margins somewhat convex.

In *cuneiformis*, diamond-shaped, the anterior portion broader and more obtuse.

In *corticaria*, broadly halberd-shaped, truncate and three-sided at the posterior end, with the central margin emarginate.

#### *Addenda.*

*Pholas cordata*, Schröter, Conch. iii. p. 544, t. 9, f. 22—24. Bosc, Hist. Nat. des Coq. ii. p. 196. Bruguière, Encyc. Meth. t. 169, f. 8—10. Catlow, Conch. Nomenc. p. 3. Gmelin, Syst. Nat. p. 3216. Wood, Gen. Conch. p. 85. Wood, Index Test. f. 9.

*Hab.* — ? Two specimens found in a mass of Madreporæ.

I am not able to place this shell in any of the foregoing genera. It appears to be immature, and it is probable that the anterior ventral hiatus is closed in the adult by a callous plate, as in *Martesia*, etc.; but it differs from that genus in the single dorsal plate being placed anterior to, instead of over, the umbones.

Gray, Adams and Sowerby do not mention the species. Should this species be rediscovered, and found to exhibit the above distinctive characters, as indicated by Schröter's plate, I would suggest for it the generic name *SCHROTTERIA*, in honor of its describer.

#### Descriptions of certain Species of DIURNAL LEPIDOPTERA, found within the limits of the United States and of British America. No. 3.

BY WM. H. EDWARDS.

- |   |   |
|---|---|
| 1. <i>Argynnis Nokomis</i> , nov. sp.   | 7. <i>Lycæna Pembina</i> , nov. sp.         |
| 2. <i>Grapta Faunus</i> , nov. sp.      | 8. " <i>Shasta</i> , nov. sp.               |
| 3. <i>Thecla Californica</i> , nov. sp. | 9. " <i>Scudderii</i> , Edw. female.        |
| 4. " <i>viridis</i> , nov. sp.          | 10. <i>Parnassius Smintheus</i> , Doubleday |
| 5. " <i>affinis</i> , nov. sp.          | 11. <i>Limenitis Eulalia</i> , Doubleday.   |
| 6. <i>Lycæna Behrii</i> , nov. sp.      |   |

*ARGYNNIS NOKOMIS*, nov. sp.

Male. Expands  $3\frac{1}{4}$  inches.

Upper side uniform bright fulvous, a little dusky next base; hind margin edged with a fine black line which is preceded by a heavy parallel line, the 1862.]

nervures between being black; both wings marked and spotted with black as in *Cybele* and allied species; the marginal spots are lanceolate on primaries; on secondaries the mark in the cell takes the form of an S. Under side: base and inner margin of primaries bright red fulvous; towards the apex buff; six silver triangles within the hind margin next apex, each surmounted with black, and three silver spots on the costa; the anterior one minute.

Secondaries cinnamon brown, somewhat mottled with buff, and having a green tinge next abdominal margin; between the two outer rows of silver spots a broad, immaculate, bright buff belt; hind margin yellowish brown; the silver spots are twenty-one in number, all but those next the base heavily bordered above with black, viz: seven marginal spots, which are edged below also with black; a second row of eight spots, the one next the abdominal margin small and about the size of the fifth; a third row of three large spots, a black point between the first and second from costa; preceding these is a circular spot, and nearer the abdominal margin an oval, both ringed with black; above, near the base, a light spot or bar of silver divided by the sub-costal nervure; costa at base broadly, and abdominal margin very lightly silvered; body above same dusky fulvous as the base of the wings; below light red brown; antennæ long, club massive, dark brown, tipped with fulvous.

Rocky Mountains, and Mountains of California.

This is much the largest of the Pacific species, equalling the largest specimens of *Cybele*. In color it most resembles *Aphrodite*. The female I have not seen.

#### GRAPTA FAUNUS, nov sp.

Expands two inches.

Primaries deeply emarginate on both hind and inner margins; a prominent rounded tail on the middle of secondaries and a smaller one between this and the anal angle.

Male. Upper side deep orange fulvous, paler next apex of primaries; base of both wings and abdominal margin of secondaries a little dusky, the latter clothed with long hairs; primaries have a broad black hind margin, dilated at the apex, bordered within by a series of obsolete tawny lunules; on the inner margin a large black spot joins the marginal band, there enclosing a tawny spot; on the costal margin near apex, a broad abbreviated bar, black without, ferruginous within, runs obliquely back almost to the marginal band; from the middle of the costa a broad black bar extends to the median nervure, covering the arc; within the cell two round black spots in a transverse line and a third a little back of the same line near inner margin, divided unequally by the third median nervule; in the median interspaces, two rounded black spots placed nearly at right angles to the first three; costal edge of both wings and the incision of inner margin of primaries sprinkled with black and tawny; the hind margin of secondaries is black slightly tinted with fulvous, clouded within, and passes gradually into the basal color, occupying nearly half the wing; costal margin broad and brownish black; on this is an elongate black spot, below which, nearer the cell, is a second, and in the middle of the wing a third, divided by the nervure; fringe white in the emarginations.

Under side. Both wings dark brown next base, with an irregular common blackish band across the middle, darkest on its outer edge and within the abdominal margin, where its outline is obliquely serrated; beyond this band, the color is paler brown mottled with grey white, which is clearest on costa of primaries; the whole surface clouded with vinous, and more or less crossed by fine abbreviated streaks of dark brown; apex of primaries yellow brown, with three small, lanceolate, ferruginous spots, the lower one enclosing a blue or green point; the hind margin of both wings, below these, is bordered by a series of confluent blue black, sometimes olive green spots, following the outline of the wing; a little anterior to this, another series of rounded spots of same

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color, those on secondaries largest and sometimes having black centres, on primaries minute, except the two at the ends of the row; in the disc of secondaries, a white G, varying in form, but usually thick and angular with each end sharp and barbed; body above black, covered with greenish hairs; below, brown grey; antennæ dark brown above, whitish below; club black with a yellow tip.

Female. Under side more greyish, the marginal spots less distinct, and the silver mark more open, sometimes like the L of *Progne*, sometimes like the mark of *Comma*.

This species is found abundantly in certain localities on the Catskill Mountains, New York. It is also found at Fort Simpson, at Albany River, and Lake Winnipeg. It resembles *C. album*, of Europe, and has been supposed to be identical with that species. It differs, however, in many respects. I am informed by Mr. H. T. Stainton, that it is the species which follows *Vanessa Progne* as "*Vanessa* —?" in the list of *Lepidoptera* of the British Museum, Part I, 1844, and that it is regarded as "a distinct unnamed species."

**THECLA CALIFORNICA, nov. sp.**

Expands 1.3 inch. Size and form of *Falacer*.

Male. Upper side light brown; primaries with a smooth oval spot on disc; near the inner angle two faint fulvous submarginal spots, and at anal angle of secondaries three fulvous lunules, the middle one deepest colored, and sometimes the two next anal angle resting on black spots; tail long, black tipped with white; a white line from its base to anal angle; the fringe against this line is black, but elsewhere whitish without, brown next the margin; anal angle black.

Under side grey with a reddish brown tint; both wings have a straight discal bar edged with white; primaries have, beyond the cell, a transverse band of seven black spots, the one on costa, minute and preceding the others, the seventh duplex; each edged without by white; a marginal row of pale fulvous lunules almost obsolete towards apex, each surmounted with black, which is edged above with white. Secondaries have a transverse band of seven large black spots and a streak turning upward at the abdominal margin; the fifth of these spots from costa precedes the line, and the seventh is largest and cordate; all edged without by white; a marginal row of orange lunules, small or obsolete towards the outer angle, but large and deep colored next anal angle, extending up the abdominal margin and at the angle enclosing a pale blue spot which is sprinkled with black atoms; the lunule beyond this rests upon a small black triangle, and all the lunules are surmounted with black, which is edged above with white; the whole hind margin of both wings is edged with a white line.

Female. The inner angle of primaries and the hind margin of secondaries next anal angle suffused with pale fulvous; under side soiled white.

California, from Dr. H. Behr.

**THECLA VIRIDIS, nov. sp.**

Expands 1.2 inch.

Upper side of both sexes blackish; the male has a smooth oval spot on disc of primaries; hind margin of secondaries a little crenated towards anal angle; fringe whitish, at anal angle brown.

Under side uniform deep green, except on inner margin of primaries, where it is brownish grey; costal edge of primaries fulvous; across the green shade runs a common sinuous band of elongated, clear-white spots; fringe of secondaries brown at the extremities of the nervures; antennæ white; club dark brown.

California, from Dr. H. Behr.

**THECLA AFFINIS, nov. sp.**

Expands 1.1 inch.

Both sexes glossy red brown, brightest in female; the male has a smooth

oval spot on disc of primaries; costa of primaries and base of both wings blackish brown; whole hind margin edged with same color; fringe white.

Under side uniform apple green, except on inner margin of primaries, where it is pale, brownish grey; both wings immaculate; costal edge of primaries grey; hind margin of secondaries without crenations.

Utah, from Mr. C. Drexler.

Both *viridis* and *affinis* are allied to *T. Rubi* and to *T. Dumetorum* of Boisduval. The latter I have not seen, but it is briefly described as being "entirely like *Rubi*, and to be considered a local variety of that species," a description which does not apply to either of the above named species. *Affinis* approaches most nearly to *Rubi* in color below, but the upper side is much brighter, and the white spots of under side are wanting. *Viridis* has similar spots to *Rubi*, but the color of both sides is different, as is that of the antennæ, edge of costa and fringe.

LYCÆNA BEHRII, nov. sp.

Expands 1·2 inch.

Male. Upper side glossy lilac blue, silvery on costa of primaries; hind margin of both wings fuscous; fringe long and white.

Under side uniform dark brownish grey sprinkled with blue scales near base of both wings; edge of hind margin dark brown, along which within runs a fine white line; primaries have a black discal bar edged with white, and mid-way towards the margin, a transverse, sinuous row of six black spots, the fourth and fifth from costa reniform, the others smaller and round, all of them broadly encircled with white. Secondaries have a small white spot on costa, a discal bar and a transverse double curved row of eight small round black spots, each encircled with white; the three spots next abdominal margin minute; antennæ black with fine white rings; club black.

Female. Like the male, except that the color above is fuscous, bluish near base.

California, from Dr. H. Behr.

This species is allied to *Lygdamas*, *Doubleday*.

LYCÆNA PEMBINA, nov. sp.

Expands 1·2 inch.

Male. Upper side violet blue; hind margin of primaries, and entire margin of secondaries fuscous; a discal spot on primaries from the transparency of the wing; fringe white without, next the margin blackish.

Under side pale brownish grey; base of both wings and abdominal margin of secondaries sprinkled with black scales; primaries have a large reniform black discal spot and a transverse row of six black spots bent near costa into a curve which embraces and terminates at the discal spot, the first spot being as near the discal as to the second; the first and sixth are smallest and round, the sixth is also sometimes duplex; the second and third nearly round, fourth and fifth oval and largest; half-way between this row and the margin is another row of obsolete dark points. Secondaries have two small round black spots on costa, each in a white ring, a black point in the disc near base, a white discal spot and a transverse row, nearly parallel to the margin, of faint white spots, one or two of which have a dark centre; between this row and the margin an obsolete series of dark points as on primaries; this row terminates at the anal angle in a large dusky spot.

Female. Brown, slightly bluish at base of both wings; the discal spot on primaries conspicuous.

Lake Winnipeg, from R. W. Kennicott.

This species is allied to *Pheres*, *Boisduval*.

LYCÆNA SHASTA, nov. sp.

Expands one inch.

Male. Upper side violet blue with a pink tinge; hind margin broadly fus-

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cous; a large black discal spot on each wing: two or three obsolete spots near anal angle, the second from the angle with a faint yellow lunule; fringe brownish white.

Under side greyish white, bluish next base; primaries have a fuscous spot near base, a discal bar and a transverse sinuous row of elongated fuscous spots, each edged with whitish; along the margin obsolete spots surmounted by faint lunules.

Secondaries have three fuscous points near base; a discal bar and a transverse sinuous row of fuscous spots; whole hind margin bordered by small metallic blue spots, each surmounted by a blackish lunule.

Female. Upper side clear brown; the obsolete spots next anal angle surmounted by a narrow crenated yellow band; under side as in male, but the five spots next anal angle are surmounted by ochrey yellow lunules edged above with black; fringe long and fuscous at the extremities of the nervures.

California, from Dr. H. Behr.

*LYCÆNA SCUDDERII*, Edw.

Female. The more common form differs somewhat from that heretofore described, which appears to have been a variety, in that the base of both wings is violet blue, and the black marginal spots of secondaries distinct, the two or three next anal angle surmounted with fulvous; under side as in the male.

This species is found abundantly near London, Canada West, as I am informed by Mr. W. Saunders. I have also received it from Fort Simpson.

*PARNASSIUS SMINTHEUS*, Doubleday: figured in *Genera of Diurnal Lepidoptera*, but not described.

Expands  $2\frac{1}{2}$  inches. Size and form of *Clarius*.

Male. Both wings pure white, semi-transparent at apex of primaries; hind margin of primaries sprinkled with black scales which take the form of indistinct lunules; a second similar series anterior to these; a black bar on the arc, and, within the cell, a transverse, elongated black spot that terminates a little short of the median nervure; on the costa beyond the cell, a crimson spot in a black ring, and below this a black spot with crimson centre; a small black spot within the inner margin; base of wing and edge of costa thickly sprinkled with black scales; fringe white, cut with black at the ends of the nervures.

Secondaries black at the base and along the abdominal margin, from which black scales extend to the cell and around the arc; a submarginal row of obsolete black spots; a small crimson spot on costal margin and a larger and brighter one in the disc, both in black rings.

Under side with all the markings of the upper, but less vivid in color; secondaries have an additional small crimson spot within the abdominal margin near the anal angle, and at the base four crimson spots in a curved band, each more or less edged with black: the spot in the disc with white centre.

Female. A little larger than the male; the whole hind margin of primaries semi-transparent, enclosing a transverse row of white lunules, but without other spots; the red spots larger and paler, the one on disc of secondaries with white centre; on the under side of secondaries the costal spot also has a white centre, and near the anal angle are two red spots.

California.

*LIMENITIS EULULIA*, Doubleday: figured in *Genera of Diurnal Lepidoptera*, but not described.

Expands  $2\frac{3}{4}$  inches.

Male. Upper side of both wings olive brown, with a blackish tinge upon the outer limb; hind margin bordered by a broad crenated band of lighter color, through which runs a black line; a large golden yellow apical spot fills the space between the marginal band and narrow costal border of primaries; across

1862.]

the middle of the wings a common white band, commencing on the costa of primaries, with a large spot cut into three by the nervures, followed by a second, oval, separated from the first by a wide space, and out of the line in the direction of the inner angle; after this the band is uninterrupted except by the nervures, and diminishes to a point a little within the abdominal margin, on the arc of primaries a narrow, transverse, ferruginous band, and another in the cell, each edged on either side by a black wavy line; a similar line mid-way between these bands; the cell and costa next base have a dull green tinge; at anal angle a black spot within a fulvous lunule; fringe brown, white in the emarginations.

Under side pale brown, with a bronze lustre on secondaries; primaries have a broad hind margin, crenated next the inner angle, with a faint, pale blue line running through it and edged anteriorly by a narrow, pale blue band; the yellow spot as above, but paler; below this and between the marginal and white bands, smoky black; the white band as above but a little enlarged; the bars in the cell larger and fulvous; inner margin next base greyish; hind margin of secondaries narrower than that of primaries, wholly crenated, with a pale blue line running through it and bordered anteriorly by a broad, pale blue band; the white band is edged without, and near its point suffused with light purple; inside the band to the base, are alternate, irregular, transverse bands of purple and lustrous yellow brown; abdominal margin pale blue; the nervures much bordered by purple or blue scales; body above olive brown; beneath, bluish white; antennæ and club dark brown.

Female scarcely differs from the male.

California, from Dr. H. Behr.

#### Synopsis of the North American Forms of the COLYMBIDÆ and PODICIPIDÆ.

BY ELLIOTT COUES.\*

#### Family COLYMBIDÆ.

*Char.* Feathers of forehead reaching to the nostrils. Nostrils narrow and linear; their upper edge with a dependent lobe. Lores densely feathered. Tertiaries short and stiff. Tail fully developed. Tarsus and toes covered with small, regular, polygonal, reticulated plates. Tibiæ feathered on the joint. Toes fully webbed. Claws strong, narrow, oblong, very convex superiorly. Posterior edge of tarsus smooth, formed by a single row of very convex overlapping scales. Lobe of hind toe moderate. Size large; general form stout and strong; body robust; neck short and thick, without crests or ruffs; the back spotted.

#### Genus COLYMBUS Linnæus.

*Colymbus*, Linn. 1735, et auct. nec Ill. 1811; nec Pallas, 1811; nec Briss. 1764.

?*Cepphus*, Mœhring, 1752, secundum G. R. Gray.

*Cepphus*, Pallas, 1811, partim.

*Mergus*, Brisson, 1764, fide G. R. Gray; nec auct.

\* The great accession of new material in the Museum of the Smithsonian Institution has furnished the means of making some additions and corrections to the last account of the Loons and Grebes of North America—that by Mr. Lawrence in the General Report. The writer having lately been occupied, in connection with Dr. Geo. Suckley, U. S. A., in the preparation of a Government Report, took the opportunity to institute a thorough revision of the two families. The results of that investigation will be found in full in the Report alluded to; but as it may be some time before its publication, it has been thought advisable to issue in advance this brief synopsis. Particular attention has been paid to the characters of the families and subfamilies, and to the arrangement of the species under their appropriate genera.

*Urinator*, Cuvier, 1799-1800, fide G. R. Gray.  
*Eudytes*, Illiger, 1811; (*Eudites*, Kaup, 1829.)

1. *COLYMBUS TORQUATUS* Brünnich.

*C. torquatus*, Brünn. 1764; *C. glacialis*, Linn. 1766, auctor. pleriq; ad.—  
*C. immer*, Brünn. 1764; Linn. 1766; Gmel. 1788; Lath. 1790; juv.—  
*Cephus torquatus*, Pall. 1811, ad.; *C. imber*, Pall. 1811, juv.; *Eudytes*  
*glacialis*, Illiger, 1811; *Eudites glac.* Kaup. 1829.

2. *COLYMBUS ADAMSI* G. R. Gray.

*Colymbus Adamsii*, Gray, Proc. Zool. Soc. Lond. 1859, 167.

*Sp. Ch.* Form and general appearance that of *C. torquatus*, but larger, with the bill disproportionately larger, and differently shaped.

Bill very large and strong, about equal in length to the head, longer than the tarsus, greatly compressed, the tip very acute, not decurved. Culmen very slightly, scarcely appreciably, convex. Commissure perfectly straight. Gonys straight, or very nearly so, to the angle, which is prominent, well defined; and straight, or even a little concave, to the tip. Feathers of forehead extending beyond the middle of the nostrils. Groove along the symphysis of the lower jaw extending but little beyond the angle.

*Adult*.—Bill light yellowish, growing dusky at the base. Head and neck all round deep steel blue, with purplish and violet reflections, and glossed on the back of the neck with deep green. Gular patch of white streaks very small, less than in *torquatus*, but the individual streaks larger, as are also those on the side of the neck. Upper parts generally as in *torquatus*, but the spots considerably larger, and on the scapulars and tertials rectangular, instead of nearly square, being much longer than broad. Otherwise like *torquatus*.

Plumage of the young unknown.

Bill above 3·70; along gape 5·25; height of nostril anteriorly 1·10; width, ·50; tarsus 3·50; outer toe 4·65 inches. "Irides light reddish-brown, legs and feet olivaceous."

*Habitat*. Russian America (Gray). Arctic America (Ross, Kennicott).

*Table of Distinctive Characters.*

*C. torquatus*. Bill 2·75 inches, not longer than the tarsus; moderately compressed; black; the tip only sometimes yellowish. Culmen very convex. Commissure decurved. Gonys regularly convex throughout its whole length, the angle scarcely appreciable; the groove along symphysis extending nearly to tip. Feathers of the forehead falling short of the middle of the nostrils. Head and neck mostly deep glossy green. White spots of back moderate, scarcely longer than broad.

*C. Adamsii*. Bill 3·75; longer than the tarsus; exceedingly compressed; light yellow, except at base. Culmen very slightly convex. Commissure straight. Gonys straight, or nearly so, to the angle, straight, or even a little concave to the tip, the angle prominent, well defined. Groove along symphysis very short. Feathers of forehead extending beyond the middle of the nostrils. Head and neck mostly deep steel blue. White spots of back large, much longer than broad.

There cannot be, I think, the slightest doubt of the specific distinction of the present species and the *C. torquatus*. The difference in the size, shape, and color of the bill alone would separate the two, were there no other characters involved. It is every way a much larger bird. The species is, so far as we are aware, now for the first time presented in an American work. The original description, by Gray (as above), is very brief, but the distinctive characters of the species are so concisely stated that we have no difficulty in identifying the large series before us with the description. The Loon mentioned by Audubon, as having "the point of the bill recurved, and of a fine yellow tint," was very possibly an individual of this species. The type of 1862.]

the species is from Russian America. The large series which the Smithsonian possesses, were collected in the vicinity of Great Slave Lake and McKenzie's River, by R. Kennicott and B. R. Ross, Esqrs. It has not been obtained from the Atlantic coast.

3. *COLYMBUS ARCTICUS* Linnæus.

*C. arcticus*, Linn. 1735, et auct. *Cephus arct.* Pall. 1811. *Eudytes arct.* Illig. 1811.

4. *COLYMBUS PACIFICUS* Lawrence.

*C. pacificus*, Lawr. Gen. Rep. Birds, 1858, 889.

*Sp. Ch.* Generally similar to *C. arcticus*, but every way smaller; the wing from an inch to two inches shorter, the legs and feet proportionately shorter, and the bill smaller, shorter, weaker, usually with a less decurved culmen, and more acute tip. Colors precisely as in *C. arcticus*. "Length 25 inches; wing  $11\frac{1}{4}$ ; bill 2.12; tarsus 2.75."

*Habitat.* Northern North America. Pacific coast.

The types of Mr. Lawrence's *C. pacificus* are young birds, and their relationship can only be determined by their size and form. A comparison of these types with an extensive series of skins of the adult bird, from the interior of Northern North America, has shown them to be beyond a doubt identical. The entire series differs from a fine adult European bird furnished for examination by the Copenhagen Museum, in those points which are given in the diagnosis. The difference is very marked indeed, and while all the birds in the North American series agree perfectly with each other, there is, at the same time, not the slightest graduation between them and the European bird. This would seem to indicate that the North American bird is distinct from the European; or, in other words, that "*Colymbus pacificus* Lawr." is the "*Colymbus arcticus ex America*." Upon this supposition it would be necessary to exclude the *C. arcticus* from our avi-fauna. There is in the collection, however, a specimen (from Puget Sound) which is fully as large as the European bird, with which it agrees in the minutest particulars, and is much larger and stouter every way than the rest of the series. I have, therefore, at present no other alternative than to admit the *C. pacificus* as distinct from the *arcticus*, in view of the differences constantly observable, and at the same time to retain the latter as an inhabitant of North America. I think it probable, however, that if the true *arcticus* is really found in North America, it is rather as an infrequent visitor than as a permanent resident. I do not regard the question as yet definitely settled, especially as the single European skin examined may have been an unusually large specimen. Further investigation will be necessary to definitely settle the point.

Should the *pacificus* prove to be really distinct from the *arcticus*, it would be another example of a peculiar law which prevails extensively throughout the *Colymbide* and *Podicipide*. This is, that nearly all the species have, so to speak, their analogues, agreeing in colors and general appearance, but differing in size, and in the size, shape, and stoutness of the bill. Instances are seen in the cases of *Colymbus Adamsii* and *torquatus*; *Podiceps grisegena* and *Holbölli*; *P. cornutus* and *?arcticus*; *Aichmophorus occidentalis* and *Clarkii*; *Podilymbus podiceps* and *brevirostris*, etc. This law seems capable of very extensive application.

5. *COLYMBUS SEPTENTRIONALIS* Linnæus.

*Colymbus septentrionalis*, Linn. 1766, et auct. *C. lumme*, Brünn. 1764, ad. *C. stellatus*, Brünn. 1764; Gmel. 1788; Lath. 1790; juv. *C. striatus*, Gmel. 1788; Lath. 1790; juv. *C. borealis*, Brünn. 1764; Gmel. 1788; Lath. 1790. *Cephus septentrionalis*, Pall. 1811. *Cephus stellatus*, Pall. 1811.

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## Family PODICIPIDÆ.

*Char.* Feathers of forehead not reaching to the nostrils. Nostrils linear, oblong, sometimes quite broadly oval, without dependent lobe. Lores naked. Tertials long, reaching to the tip of the primaries in the closed wings. Tail rudimentary. Tarsus and toes covered with regular, long, narrow, transverse scutellæ. Toes lobed, connected at base by a membrane. Tibiæ feathered to the joint. Claws weak, broad, short, flat. Posterior edge of tarsus serrated, formed by a double row of small, pointed scales. Lobe of hind toe large. Size moderate, or very small; general form rather slender; body depressed; neck long; crests or ruffs usually present; the back never spotted.

The preceding diagnosis expresses very briefly the more prominent characters of a group of birds composing the subfamily *Podicipinæ* of modern authors. It corresponds with the *Colymbi pedibus palmatis* and *pedibus lobatis* of Gmelin, nearly with the *Cepphi* and *Colymbi* of Pallas, and with the genera *Colymbus* and *Podiceps* of Latham. Although related to the *Colymbidæ* in most points of structure and habits, they nevertheless differ in so many and so essential characters, that a single family cannot, without great latitude of definition, contain the two groups. We have, therefore, restricted the *Colymbidæ* to the *Colymbinæ* of authors, and raised the *Podicipinæ* to the rank of a distinct family.

Two subfamilies are represented in North America.

## Subfamily PODICIPINÆ.

*Char.* Bill moderately stout, or very slender. Commissure not abruptly deformed at the end. Nostrils linear. Bare loreal space narrow and linear. Feathers of the head with their shafts normal. Tarsus at least three-fourths the middle toe; generally but little, if any, shorter. Toes connected at base for a moderate distance, the lobe of the hind toe broad. Usually (always?) with more or less conspicuous crests and ruffs.

## Genus I. ÆCHMOPHORUS Cuv. N. G.

*Gen. Char.* Bill very long, exceeding the head, straight or very slightly recurved, slender, attenuated towards the tip, which is very acute. Culmen straight or slightly concave. Commissure about straight. Gonys convex throughout its whole length, the angle scarcely appreciable. Nasal groove long, shallow, and narrow. Bare loreal space very narrow. Wings rather long, pointed, the outer primaries much attenuated. Legs very long. Tarsus as long as the middle toe and claw, exceeding the bill, excessively compressed. Outer lateral toe much longer than the middle. Lobes united at base for a very short distance. Size large; body slender; neck very long. Head with moderate crests, but without decided ruffs?

*Type.* *Podiceps occidentalis*, Lawr.

## 1. ÆCHMOPHORUS OCCIDENTALIS (Lawr.)

*Podiceps occidentalis*, Lawr. 1858.

*Char.* Length about 29 inches; wing 8.25; bill or tarsus 3.00. Bill equal to tarsus, straight, dark colored, except terminally and along the cutting edges. Gonys straight from base to angle, and nearly so from angle to tip. Feathers between eye and nostril grayish ash.

*Habitat.* Pacific coast of North America.

## 2. ÆCHMOPHORUS CLARKII (Lawr.)

*Podiceps Clarkii*, Lawr. 1858.

*Char.* Much smaller than *A. occidentalis*. Length 22 inches; wing 7; bill 2.25; tarsus 2.75; bill rather shorter than tarsus, exceedingly acute, slightly recurved; the gonys regularly much curved from base to tip, the angle scarcely apparent. Feathers between eye and nostril white.

*Habitat.* Pacific coast of North America.

1862.]

## Genus II. PODICEPS Latham.

*Colymbus*, Briss. 1760, nec Linn. et auct. Ill. 1811; Pall. 1811.

*Podiceps*, Lath. 1790; (typus *Col. cristatus*, Linn.) nec Kaup. 1829.

*Pedetaithya*, Kaup. 1829; typus *Col. griseigena*, Budd. 1783.)

*Lopharthyia*, Kaup. 1829; (typus *Col. cristatus*, Linn. *Podiceps*, Lath. 1790.)

*Dytes*, Kaup. 1829; (typus *Col. cornutus*, Gmel.)

*Proctopus*, Kaup. 1829; (typus *Col. auritus*.)

*Otodytes*, Reichenbach, 1853; (typus idem.)

*Gen. Char.* Bill moderately stout; usually more or less compressed; as long as, or rather shorter than, the head; not equalling the tarsus. Culmen convex, occasionally nearly or quite straight. Commissure about straight, Tarsus shorter than the middle toe and claw. Outer lateral but little, if any, longer than the middle toe. Body depressed, moderately full; head always with more or less conspicuous crests and ruffs.

Although the characters of the genus are drawn so as to exclude both the foregoing and succeeding genus, the North American species comprised in it, are sufficiently dissimilar in form to have caused the instituting of several subgenera. These may be characterized and arranged as follows:—

## A. Tarsus equal to the middle toe without the claw.

I. Bill equal to the head, four-fifths the tarsus. Bill much compressed, lateral outlines a little concave. Crests and ruffs very long and conspicuous..... *Podiceps*, Lath.

II. Bill much shorter than the head, but little more than half the tarsus.

1. Bill compressed, higher than broad at the nostrils; crests and ruffs, especially the latter, very long and full..... *Dytes*, Kaup.

2. Bill depressed, broader than high at the nostrils; crests and ruffs more moderate..... *Proctopus*, Kaup.

## B. Tarsus about four-fifths the middle toe and claw.

III. Bill variable in length, always quite stout; outer lateral but little longer than the middle toe; crests and ruffs rather short..... *Pedetaithya*, Kaup.

## 1. PODICEPS CRISTATUS Latham.

*Colymbus cristatus*, Linn. 1766; Pall. 1811; Ill. 1811. *C. urinator*, Linn.

1766, juv. *Podiceps crist.* Lath. 1790, et auct.

*Habitat.* Europa; Amer. Sept.

## 2. PODICEPS COOPERI Lawrence.

*Sp. Char.* Bill large and strong, as long as the head, very stout at the base, the tip very acute and considerably decurved. Upper mandible with the culmen very slightly concave on the basal half, the terminal portion regularly convex. Commissure irregularly sinuate to the nostrils, then regularly decurved, the radius of curvature decreasing towards the tip. Lower mandible without a groove along the symphysis of the rami beyond the angle, the tip decurved and very acute. Lower outline concave, both anterior and posterior to the angle, which is prominent and marked; the concavity is very decided in the former. First and second primaries longest, third but little shorter. Tarsi and toes as in *P. cristatus*.

*Young.* Upper mandible dusky, except the tip and extreme base, which are yellowish, as is also the lower mandible, except a central dusky greenish space. No white space between eye and nostril. Slight indications of a crest, but none at all of a ruff. Crown, and median dorsal line of neck, deep blackish brown, darkest on the former. Upper parts brownish black, darkest on the scapulars and lower part of the back, all the feathers, especially an-

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teriorly, edged with grayish. Primaries rather light chocolate brown, their shafts and tips black. Secondaries white, their inner vanes brown towards their extreme tips. Wing coverts wholly chocolate brown.

*Dimensions.* Bill above 2.40, along gape 3.10, height at nostril .55, from angle of gonys to tip 1 inch; wing 8.80; tarsus 2.40; middle toe, 3.10.

*Habitat.* Shoalwater Bay, W. T.

A species admitted with some doubt, but probably distinct from the preceding. It must be obtained in full plumage before the question of its relationship can be definitely settled. We do not consider it by any means certain that it will possess the conspicuous ruffs of *P. cristatus*. In that event, it would more probably fall in some other subgenus.

### 3. PODICEPS (DYTES) CORNUTUS (Gmelin.)

*Colymbus cornutus*, Gmel., 1788; Pall., 1811; ad. *C. obscurus*, Gmel., 1788, et *C. caspicus*, Gmel., 1788; juv. *C. nigricans*, Scopoli, fide Lawr. *Podiceps cornutus*, Lath., 1790, et auct. ? *P. arcticus*, Boie.

*Habitat.* Europ. Amer. Sept.

### 4. PODICEPS (PROCTOPUS) CALIFORNICUS Heermann.

*Podiceps auritus ex Americâ*; e. g. Aud. B. Am., 1844, vii. 322. Lawr. Gen. Rep. 1858, synon. excl. Nec *Colymbus aur.* Linn.; nec script. Europ. *P. Californicus*, Heermann, 1854; Lawr., 1858.

*Char.* Generally similar to *P. auritus* of Europe; all the primaries chocolate brown throughout their whole extent, with a more or less notable amount of dull reddish externally. Secondaries white, the two outer ones dusky along their centres for their whole length, and the bases and shafts of all of the same color.

*Habitat.* Western and Northern North America; California; Great Slave Lake.

In 1854, a *Podiceps californicus* was characterized, as above, based upon an immature or winter specimen. Examination of the type, and quite a series of additional specimens, has shown that it is merely the American form of *P. auritus*. The name would, therefore, become a synonym were it not for the fact that, in all probability, the American and European birds are specifically distinct. The differences are those given in the diagnosis. In the American Eared Grebe, all the primaries are throughout their whole extent dark chocolate brown, with a more or less notable amount of dull reddish in the adult. The two first secondaries are of the color of its primaries, and bordered with white; and the basal portions and shafts of all, for the greater part of their length, are of the same chocolate brown. In all the specimens of the European type examined, the characters of the wing are very different. The four inner primaries are wholly pure white; the next is white with a sprinkling of brown on the outer web; the next is white, its outer vane brown; and all the others have more or less white at their bases and on the inner webs. All the secondaries, except the three innermost are entirely pure white, and their shafts are white to the very base. The three innermost have a dusky spot near the end of the outer web. These differences, so far as we can discover, are constant; and if so, quite sufficient to separate the two.

Although "*californicus*" was not so characterized as to show any tangible distinctive features from the *auritus*, we prefer to adopt it, as the necessity for a new name will thereby be obviated.

### 5. PODICEPS (PEDETAITHYA) HOLBÖLLI Reinhardt.

*Pod. rubricollis*, Audub. et al. script. Amer.; nec Lath., 1790, et auct. Europ. *P. griseigena*, Lawr., 1858, excl. synon. Nec *Colymbus griseigena*, Bodd. *P. Holbölli*, Reinhardt, 1853.

*Sp. Char.* Generally similar to *P. griseigena*, but larger, with the bill disproportionately longer, stouter, and differently colored. Bill about equal to 1862.]

the head, shorter than the tarsus. Length about 19 inches, wing 7·60. Bill above 1·90, along gape 2·40, height at nostril ·55. Tarsus 2·10; middle toe and claw 2·65.

*Habitat.* North America, generally.

The present species has by most authors been considered identical with the *P. griseigena* Bodd. (*rubricollis* of Latham,) of Europe. The differences, however, as pointed out by Reinhardt, are quite tangible, and so constant as to render it very probable that they are of specific value. In the European bird the bill measures 1·50 along the culmen, 2·00 along the gape, and ·50 in height at the nostrils; the wing less than 7 inches. (See diagnosis for comparison). In color, too, the bills differ. In *P. griseigena* the extreme base of the under mandible only is yellow, the color extending a little on the cutting edge of the upper mandible at base. In *Holbölili* nearly the whole of the under mandible, and the cutting edge of the upper, are yellow.

#### Genus III. SYLBEOCYCLUS Bon.

*Podiceps*, Kaup, 1829, nec Lath.

*Sylbeocyclus*, Bonaparte, 1832. (Typus *Pod. minor*, fide G. R. Gray.)

*Tachybaptus*, Reichenbach, 1851. (Typus idem.)

*Gen. Char.* Bill very short, much less than the head, scarcely more than half the tarsus; very stout, little compressed, the tip obtuse; lateral outlines about straight; culmen a little concave at the nostrils, convex throughout the rest of its length; gonyes straight to the angle, and from angle to tip; the former well defined. Wings short; attenuation of primaries considerable; abrupt on the inner web. Tarsus stout for this family, much abbreviated, scarcely more than three-fourths the middle toe and claw. Outer lateral toe about equal to the middle. Size small; body full; neck short; without decided crests or ruffs.

#### 1. SYLBEOCYCLUS DOMINICUS (Linn.)

*Podiceps dominicus*, Linn., 1766. *Sylbeocyclus dominicus*, —?

*Sp. Char. Adult.*—Without decided crests, but indications of them in the length and fullness of the feathers of the parts. Crown and occiput deep glossy steel blue. Sides of head, and neck all round dark ashy gray, deepest behind, where it is tinged with bluish. Chin variegated with ashy and white. Upper parts generally brownish black, with glossy greenish reflections. Primaries chocolate brown, the greater portions of the inner vanes of all, the whole of the four or five inner, except just at tip, together with the secondaries, pure white. Under parts silky white, thickly mottled with brownish dusky; the abdomen uniform dusky gray. Upper mandible dusky, the lower mostly yellowish.

*Dimensions.* Length 9·50; wing 3·60; bill above ·70; along gape 1·00; tarsus 1·25; middle toe 1·75.

*Habitat.* Central America; Mexico; Antillean Is.; Gulf of California (Gambel); Rio Grande (eggs in Smiths. Coll.).

[NOTE.—*Sylbeocyclus minor*, the type of the genus, is given by Nuttall as an inhabitant of North America; but its existence in this country is very doubtful.]

#### Subfamily PODILYMBINÆ.

*Char.* Bill exceedingly stout. Commissure abruptly decurved at the end. Nostrils broadly oval. Bare loreal space broad. Feathers of the forehead with their shafts prolonged into stiff bristles. Tarsus not three-fourths the middle toe. Toes connected at base for a considerable distance; the lobe of the hind toe moderate. Without decided crests or ruffs.

#### Genus IV. PODILYMBUS Lesson.

*Podilymbus*, Lesson, 1831. (Typus *Colymbus podiceps*, Linn.)

*Hydroka*, Nuttall, 1834.

*Dasyptilus*, Swainson, 1837, fide G. R. Gray.

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*Gen. Char.* Bill shorter than the head, compressed, exceedingly stout, obtuse at the end; culmen straight to the nostrils, then very convex to the decurved and acute tip of the upper mandible. Commissure slightly sinuate at the base, straight to near the tip, where it is suddenly deflected. Gonys regularly convex, the angle scarcely appreciable. Upper mandible covered with soft skin from the base to the nostrils, between which are two fossæ, the anterior shallow and oblong, the posterior triangular and deep, opening into the bare loreal space; the two separated by an oblique ridge. Nostrils situated near the extremity of the anterior fossa. Outer three or four primaries abruptly attenuated near the end. Tarsus much abbreviated, comparatively stout, about three-fourths the middle toe and claw. Middle and outer toe nearly equal. Lobes of toes broad, connected at base for a greater distance than in other genera.

# 1. PODILYMBUS PODICEPS (Linn.)

*Colymbus podiceps*, Linn., 1766. *Podilymbus pod.* Lawr., 1858. *Podil. lineatus*, Heerm., 1854. *Colymbus ludovicianus*, Gmel., 1788. *Podiceps ludov.* Lath., 1790. *Pod. carolinensis*, Lath., 1790. *Sylbeocyclus carol.*, Bon., 1838.

*Habitat.* Continent of North America.

On a new genus of Fishes allied to AULORHYNCHUS and on the affinities of the Family AULORHYNCHOIDÆ, to which it belongs.

BY THEODORE GILL.

In the Proceedings of the Academy of Natural Sciences for July, 1861, (p. 168), I have described a new type of fishes, and referred it to the family of Aulostomatoids, with which it agreed in the elongation of the body, form of the head, opposition of the dorsal and anal fins and the development before the former of free spines as well as the presence of four branchiostegal rays. In the MSS. remarks on the relations of the genus, intended for the Report on the Fishes collected by the Northwestern Boundary Commission, I had commented on the relations of the new form and its affinity to the Gasterostoid genus *Spinachia*. I have now the pleasure of making known a genus which is still more closely related to *Spinachia*, and which it would not be even very improper to refer to the family of Gasterosteoids. It has, however, the four branchiostegal rays of *Aulostoma* and *Solenostomus*, as well as the more elongated tube. But I am disposed to believe that the four subfamilies\* of the Aulostomatoid fishes proposed in my former paper, are true families, and that *Aulorhynchus*, and especially the new genus are at least as closely related to the Gasterosteoids as to the Aulostomatoids. They agree with the former family in

1st. General form. 2d. Development of the dorsal and anal fins and the antecedent spines. 3d. Development of the forearm (ulnar and radial bones) and of the pectoral fin. 4th. Position of the ventral fins. 5th. Development of the caudal fin.

The affinity of the two families is further shown by the possession of other characters in common by the *Spinachianæ* and *Aulichthys*.

\* The genus *Siphonognathus* of Richardson appears to be the type of a peculiar family (Siphonognathoidæ), more nearly related to the Labroids than to the typical Aulostomatous fishes, although having the four branchiostegal rays, tubular snout, &c. of the latter. Dr. Gunther has first perceived its affinities, but appears to be wrong in referring it to the same family with the other Labroids.

1st. The special form. 2d. The extension of the facial bones. 3d. The armature of the lateral line. 4th. Extent of spinigerous dorsal surface.

When it is remembered how important and how peculiar are many of the characters thus enumerated, no one will hesitate to admit the close affinity of the two families. The tendency will be doubtless rather to unite the two, but after reflecting on the importance of the coincidence between the development of the facial bones and the number of branchiostegal rays, I would be very unwilling to do so myself.

With regard to the affinities of *Centriscus* and *Amphisile*,\* I have considerable doubt. If, on the one hand, an affinity to the Aulostomatous fishes is indicated by the development of the facial bones, the anchylosis of the anterior vertebræ, the development of the ventral fins, and, in the *Amphisiloids*, of the forearm; on the other hand, by the reduced number of the vertebræ and some other peculiarities, they evince at least a singular analogy to the Plectognaths.

#### Genus *AULICHTHYS*, Brevoort.

Body moderately elongated and almost cylindrical; the tail from the anus to the caudal fin is much elongated and gradually merges into the very slender caudal peduncle; the latter is little depressed, but its dorsal and inferior surfaces are nearly plane. Anus subcentral. Skin mostly naked; the lateral line is protected by a row of nearly concealed plates, which are each surmounted by a longitudinal carina ending in a spine directed backwards. Head oblong and quadrangular behind the eyes, and corrugated above. Tube slightly longer than the rest of the head, rigid and inflexible, tapering to the front, and subquadrate. Mouth terminal and small. The intermaxillary bones have moderate diverging limbs and the posterior processes longer than the limbs. Teeth on the jaws very fine. Nostrils nearly simple, situated at about a third of the distance from the eyes to the end of the tube. Branchiostegal rays four on each side. Dorsal and anal fins nearly intermediate between the head and caudal; they are opposite to each other, oblong, and have bifurcated rays. Anal fin close behind the anus. Dorsal spines extending from the nape to the fin; they are extremely short, subtriangular and compressed from before backwards, and each one is depressible in a groove, intervening between which and the succeeding spine are small corrugated plates. Caudal fin small or moderate. Pectoral fins oblong, with the rays

\* *Amphisile* and *Centriscus* appear to represent two distinct but allied groups, distinguished by the difference of form as well as the difference in the development of the radial and ulnar bones. *Centriscus velitaris* Pallas, is an intermediate form.

The *Amphisilinae* would then have two genera:

1st. *Amphisile* Klein. Posterior process of dorsal cuirass with a spine articulated to its summit. Ribs 10—11. B 4. V. 4.

A. punctulata Brev. A. strigata Gthr.

2d. *Acentrachme* Gill. Posterior process of dorsal cuirass acute and not spinigerous. Ribs 6. B. 3. V. 3.

*Amphisile scutata* Cuv.

The *Orthichthyinae* with one genus:

*Orthichthys* Gill, with a straight body and longer anal.

*Centriscus velitaris* Pallas.

The *Centriscinae* are represented by two genera:

1st. *Centriscops* Gill. Body abruptly constricted behind the vertical fins. Breast with three longitudinal rows of plates.

*Centriscus humerosus* Rich.

2d. *Centriscus* L. Body oblong, slowly merging into the caudal peduncle. Breast with three longitudinal rows of plates.

1. *Centriscus scolopax* L. 2. *C. gracilis* Lowe. 3. *C. japonicus* Gthr.

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apparently subequal and bifurcated. Antepectoral region longitudinally oblong. Ventral fins small, inserted a short distance behind the pectorals, and separated by the comparatively wide pubic bones. There are less than five rays to each ventral, the number being apparently a spine and four rays, which are simply articulated.

This genus is nearly related to *Aulorhynchus*, but differs in the ossified snout, which, like the crown, is corrugated, the structure of the jaws, the lateral row of plates, the form of the dorsal spines and the presence of intervening plates, and, finally, in the structure of the ventral fins and the armature of the pubic bones. The pectoral fins are mutilated, and it is therefore difficult to decide whether their form was similar to those of *Aulorhynchus*, but it is probable that such was the case, or that at least the inferior rays were as long as those immediately above, and consequently the posterior margins of the fins truncated.

#### AULICHTHYS JAPONICUS, Brevoort.

The snout forms 7-12ths of head's length, exceeds twice the height of the body and is nearly 1-7th of its length.

B. 4. D. XXV. S. A. I. 10. C. 5. 13. 4. P. 11. V. I. 4. Lat. line 52. Purplish brown, darker over tube, lighter on abdomen; opercles silvery iridescent; humeral area bluish silvery, (*Brevoort.*)

*Habitat.*—Japanese coast.

### Remarks on the relations of the Genera and other groups of CUBAN FISHES.

BY THEODORE GILL.

My attention having been attracted to the fishes of the Island of Cuba and some points in their classification and arrangement by the recent researches of Prof. Poey and his correspondence, it is here proposed to offer some observations on the affinities of the genera and higher groups found in the waters surrounding that island,\* the groups being discussed in the order of M. Poey's Conspectus.

M. Poey's arrangement differs chiefly from that proposed in the "Catalogue of the Fishes of the Eastern Coast of North America" by the precedence given to the subclasses Elasmobranchii and Ganoids, and to the Teleostean orders of Plectognathi and Lophobranchii. The distribution of the sharks and rays among families has also been omitted, as well as the subdivisions of families into subfamilies.

Seven of the families of Squali are represented in Cuban waters. They are the Galeorhinoidæ, Cestraciontoidæ, Lamnoidæ, Alopecoidæ, Notidanoidæ, Spinacoidæ and Ginglymostomatoidæ. The *Squalus tiburo* and *S. acronotus* belong to the genus *Isoplagiodon*, Gill; the *S. platyodon*, *S. obtusus* and *S. longimanus* to *Eulamia*. For the *Oxyrhina glauca* and its allies,† the genus *Isuropsis* has been lately proposed.

Of the Rays, five families are represented:

The Plectognathi are rather numerous. The most interesting is the *Hollardia Hollardi*, (Poey,) which is nearly allied to the *Triacanthodes anomalus* of Japan; the two genera appear to belong to a peculiar subfamily (Triacanthodinae) of the family of Triacanthoidæ.

The Percoids of Cuba are represented by many genera, and may be distributed in the following manner: the subfamilies are only provisional ones.

\* I entertain doubts as to the validity of some of the species proposed by M. Poey, but have generally preferred to leave to that learned gentleman the determination of such doubtful species.

† The species of Cuba is probably the same as the *Isuropsis dekayi* of our own coast.

## PERCINÆ.

§ I. *Centropomus*, (Lac.) § II. *Liopropoma*, Gill, *Chorististium*, Gill.

## SERRANINÆ.\*

§ III. *Verilus*, Poey, *Elastoma*, Sw. § IV. *Haliperca*, Gill, (*Serranus bivittatus*, Val., *C. tigrinus*, Bloch, *Centropristis tabacarius*, Cuv. et Val., *C. phœbe*, Poey, *C. fuscus*, Poey,) *Diplectrum*, Holb., *Mentiperca*, Gill, (*Serranus lucioperca*, Poey.) § V. *Brachyrhinus*, Gill, (*Serranus creolus*, Cuv. et Val.) § VI. *Epinephelus*, Bloch, (*Serranus arara*, Val., &c.,) *Lioperca*, Gill, (*Serranus inermis*, Cuv. et Val.,) *Bodianus*, Bloch, (*Serranus outalibi*, Cuv. et Val., *S. punctatus*, L., *S. guativeri*, Cuv. et Val., *S. guttatus*, L., *S. apiarius*, Poey,) *Gonioplectrus*, Gill, (*Plectropoma hispanum*, Cuv. et Val.,) *Prospinus*, Poey, (*Plectropoma chloropterum*, Cuv. et Val.,) *Hypoplectrus*, Gill, (*Plectropoma puella*, Cuv. et Val., *P. indigo*, Poey, *P. vitulinum*, P., *P. bovinum*, P., *P. gummi-gutta*, P., *P. guttavarium*, P., *P. nigricans*, P., *P. accensum*, P. and *P. affine*, P.) and *Schistorus*, Gill (*Serranus mystacinus*, Poey.)

## RHYPTICINÆ.

*Rhypticus*, Cuv.

## LUTJANINÆ† (rather SPAROID.)

*Ocyurus*, Gill, (*Mesoprion chrysurus*, Cuv. et Val.,) *Lutjanus*, (Bloch,) Cuv., 1817, (*Mesoprion griseus*, Cuv. et Val., &c.,) *Rhomboplites*, Gill, (*Centropistes aurorubens*, Cuv. et Val.,) *Platyinius*, Gill, (*Mesoprion vorax*, Poey.)

The mutual relations of the genera of the Serraninæ are indicated in the following table:

- |   |                       |
|---|-----------------------|
| I. Dorsal deeply notched and nearly double. Caudal forked and acutely lobed.  |                       |
| B. 5 (?).....   | <i>Verilus</i> .      |
| B. 7.....   | <i>Elastoma</i> .     |
| II. Dorsal nearly or quite entire.  |                       |
| A. Caudal forked and acutely lobed. Dorsal low and uniform, (IX. 18—19).....  | <i>Brachyrhinus</i> . |
| AA. Caudal entire, or simply emarginated.                                     |                       |
| B. Body slender. Scales moderate, (50—75.) Teeth not recumbent.               |                       |
| Jaws subequal; preoperculum with a posterior and angular group of spines..... | <i>Diplectrum</i> .   |
| Jaws equal; preoperculum serrated .....                                       | <i>Haliperca</i> .    |
| Chin prominent. Caeca very few, (2).....                                      | <i>Mentiperca</i> .   |

\* The other genera confounded with *Serranus* and *Plectropoma* (Cuv.) are the following: *Uripheon*, Sw. (*Serranus pædon*, C. V.) *Variola*, Sw. (*S. louti*, C. V.) *Serranichthys*, Blkr., *Gonioperca*, Gill (*S. albomaculatus*, Jenyns), *Labroperca*, Gill (*S. labriformis*, Jenyns), *Mycteroperca*, Gill (*S. olfax*, Jenyns) *Serranus*, Cuv., *Hyporthodus*, Gill, *Plectropoma*, Cuv., *Hypoplectrodes*, Gill (*P. nigrorubrum*, C. V.) *Acanthistius*, Gill (*P. serratum*, C. V.) A synopsis of the subfamily may be hereafter expected.

The *Dules auriga* and *D. flaviventris* are probably true Serraninæ, and very distinct from *D. tenuis* and its allies, for which I have proposed the name of *Moronopsis*. *Dules ambiguus* belongs to still another genus (*Plectroplites*, Gill) widely distinct from *Moronopsis*.

† The remaining Lutjaninæ appear to represent at least four more generic types: *Macolor*, Blkr. (*DiaCOPE macolor*, Cuv. et Val.,) *Proamblys*, Gill (*DiaCOPE nigra*, Cuv.,) distinguished by its parabolic profile; *Hypoplites*, Gill (*Mesoprion retrospinis*, Cuv. et Val.) with several strong teeth along the preoperculum below; and *Exoplates*, Gill, (*Mesoprion pomacanthus*, Blkr.) the angle of whose preoperculum has a very stout spine. The differences existing between the other species of *Genyorge* (*DiaCOPE*, C.) and *Lutjanus* (*Mesoprion*, Cuv.) appear to be of less value than those between different sections of the combined genera, and are scarcely indicative of natural genera.

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BB. Body oblong. Scales small. Teeth recumbent behind canines.

Preoperculum entire, or simply serrated below.

Scales smooth and greasy to the touch. D. XI. .... Lioperca.

Scales rough. D. XI. (X., XII.) ... Epinephelus.

Scales rough. D. IX. .... Bodianus.

Preoperculum beneath with one or more spines recurved forwards.

Preoperculum with a single plectroid spine at its angle.

D. VIII. .... Gonioplectrus.

Preoperculum with one or two spurs below. D. XI.

D. XI. 18—19. Pyloric caeca 8. .... Prospinus.

D. XI. 14. Pyloric caeca numerous and subdivided. .... Schistorus.

Preoperculum serrated below. D. X. 14—15. .... Hypoplectrus.

The American genera of Lutjaninae may be distinguished as follows :

I. Caudal forked and with slender acute lobes. .... Ocyurus.

II. Caudal emarginated.

Vomerine teeth in a triangular patch.

Profile straight ; occiput crested. .... Lutjanus.

Profile gibbous ; occiput flattened. .... Platyinius.

Vomerine teeth in a rhombic patch. .... Rhomboplites.

The Chilodipteroidae of Bleeker are represented by three genera in Cuba, which ought, perhaps, to be placed among two subfamilies.

#### AMIINÆ or APOGONINÆ.

*Amia*, Gron. (= *Monoprion*, Poey.)

#### SCOMBROPINÆ.

*Scombrops*, Temm. et Schlegel, *Sphyrænops*, Gill.

The genera *Amia*, Gr. or *Apogon*, Lac. and *Apogonichthys*, Blkr. and Günther are also exceedingly closely related, and perhaps scarcely worthy of generic distinction.

The family of Berycoideæ, as established by Mr. Lowe, is, perhaps, natural, and possibly embraces all the forms referred to it by that gentleman and Dr. Günther, except *Polymixia*, Lowe, which is apparently the type of a distinct one, having analogical relations to the Mulloideæ. Of five subfamilies\* (Berycinæ, Holocentrinæ, Heterophthalmiinae, Trachichthyinae and Monocentrinæ) of the Berycoideæ, two are represented by four genera in Cuba,—*Holocentrum*, Art., *Plectrypops*, Gill (*Holocentrum retrospinis*, Guich.) and *Myriopristis*, Cuv. among the Holocentrinæ and *Beryx* among the Berycinæ. The living Holocentrinæ may be distributed as follows :

I. Snout more or less projecting.

Snout acute and trihedral. .... Rhynchichthys

Snout convex in front (*Rh. brachyrhynchus*, Blkr.). .... Rhinoberyx.

II. Snout not projecting in front.

A. Penultimate anal spine very long.

Preoperculum angulated and armed with a large spine, nearly continuous with the lower margin. .... Holocentrum.

AA. Penultimate anal spine moderate.

Preoperculum not rectangular nor with a single large spine.

α. Preorbital with large teeth curved backwards. .... Corniger.

β. Preorbital with large teeth curved forwards. .... Plectrypops.

γ. Preorbital simply dentated. .... Myriopristis.

\* These subfamilies, if such they be, are remarkably distinguished from each other by the difference in development of the fins, &c.

The Berycinæ are represented by two quite distinct genera,—*Beryx*, Cuv. with the *B. decadactylus* and *B. splendens*, Lowe, and *Centroberyx*, with *Beryx lineatus*, Cuv. et Val. and *B. affinis*, Günther. They are chiefly distinguished by the structure of the fins.

I. D. VI—VII | 12—13. A. IV., 12—15. V. I. 7..... *Centroberyx*.  
 II. D. IV. 13—19. A. IV. 26—30. V. I. 10 or I. 10 +  $x$ ..... *Beryx*

The family of Mænoidei of Cuvier scarcely appears to be a natural one. *Gerres* is probably the type of a distinct family (Gerreoidæ, *Blkr.*) which has two subfamilies and four genera. The Gerreinae are divisible into three genera :

I. Preoperculum serrated. Second dorsal and second anal spines  
     very large..... *Gerres*.  
 II. Preoperculum entire. Second dorsal and second anal spines  
     moderate.  
     Dorsal deeply notched..... *Diapterus*.  
     Dorsal entire..... *Synistius*.

*Diapterus* is the prior name of *Eucinostomus*, Baird and Girard. On that account the name must be retained, although the gentlemen just named first properly limited the genus, while Ranzani named it under a misapprehension as to its affinities. *Diapterus* happens to be a very distinctive name, although intended to allude to the supposed separation of the soft rays. It embraces the *Gerres aprion*, Cuv., *G. zebra*, M. T., *G. gula*, Cuv. and many others. *Synistius* has only one species,—the *Gerres longirostris*, (Rapp.) of Günther.

The Pristipomatoids are represented by one subfamily and four genera,—*Anisotremus*, Gill, *Pristipoma*, Cuv., *Orthopristis*, Girard and *Hæmulon*, Cuv. *Lobotes* Cuvier and *Danioideis*, Blkr., rather represent a family perhaps somewhat allied to the Nandoideæ.

The Scienoids are comparatively few in number. The *Corvina ronchus*, Cuv., appears to belong to the genus *Bairdiella*. The *Johnius dentex*, Cuv., is the type of the genus *Odontoscion*, Gill : before its position in the family can be determined, it is requisite to know the proportions of the abdominal and caudal vertebrae.

The Pomacentroid genus *Furcaria* is scarcely distinct from *Chromis*, C. (*Heliases*, C. V.) The *Chromis tetracanthus*, Poey represents a new genus (*Nandopsis*, Gill.)

The Chaetodontoids are represented by the genera *Sarothrodus*, Gill (= *Chaetodon*, Cuv. non Art.) *Prognathodes*, Gill, (*Chelmo peltæ*, *Gthr.*) *Holocanthus*, Lac., *Chaetodon*, Art. (= *Pomacanthus*, Lac.)

The Ephippioids by *Parephippus*, Gill. The genus *Pempheris*, Cuv., is the type of a well-marked family, (Pempheroidæ.)

The *Coryphææ* and *Lampugi* of Val. do not appear to be generically distinct ; if, however, the latter are distinct, the name of *Caranxomorus* of Lacépède and Cuvier should be accepted.

The family of Tænoides of Cuvier, or Cepolidæ, is not a natural one, the *Trachipteri* and *Lepturi* of Artedi being little related to each other. The name *Lepturus* is sufficiently distinct from *Leptura*.

The Scombroids, as now limited, embrace the genera *Scomber*, *Oryzenus*, (Cuvier,) *Cybiium*, *Ruvettus*, Cocco, *Epinnula*, Poey and *Gempylus*. *Oryzenus* may be substituted for *Thynnus*, the latter having been previously used in entomology for a valid genus.

The Carangoids may be distributed as follows: *Caranx*, C., Blkr., *Carangoides*, Bleeker, *Carangops*, Gill,\* (*C. heteropygus*, Poey,) *Trachurops*, Gill, (*Caranx*

\* In this genus there appears to be an unusual variation in dentition. In the specie found along the coast of the Southern States of the Union (*C. falcatus*, Holbrook), find in a specimen eleven inches long, a scarcely perceptible row of rather distant teet



Plumieri, Bloch,) *Decapterus*, Blkr., *Blepharichthys*, Gill, *Alectis*, Raf. (= *Galus*, Lac., = *Gallichthys*, C., = *Scyris*, C.,) *Hynnus*, Cuv., *Argyriosus*, Cuv., *Selene*, Lac., *Vomer*, Cuv., *Chloroscombrus*, Grd., *Elagatis*, Bennett, (= *Decaptus*, Poey,) *Zonichthys*, Sw., *Naucrates*, Raf., *Trachynotus*, Lac. and *Elacate*, Cuv., but the latter probably represents another family. Next to *Elacate* follows the family of *Echeneidoidæ*.

Prof. Poey, believing that there were two groups of Echeneioids characterized by differences of dentition,—homodont and isodont,—has invited me to name and describe them as genera.\* I cannot, however, regard those variations as indicative of generic distinction, nor as coincident with any other peculiarities which would entitle the homodont and isodont species to be generically distinguished, the differences being simply very slight differences of degree.

The Echeneioids appear, however, to form two very distinct groups of higher value than genera, each of which is again divisible into two others, which appear to be true genera. They are recognizable as follows:

- I. Body and tail slender and subcylindrical. Ventral fins with their inner rays more or less connected by a membrane which is partly free from the abdomen; pectorals angulated; caudal with the median rays produced in the young, emarginated in the adult. Lower jaw with a cutaneous symphyseal projection ..... ECHENEIDES.
  - α. Discal laminae 21—26, (*E. naucrates*, L.) ..... Echeneis.
  - β. Discal laminae 10—11, (*E. lineata*, Menz.) ..... Phtheichthys.
- II. Body and tail robust and compressed. Ventral fins with the inner rays more or less attached to the abdomen, and folding in an abdominal depression; pectorals rounded; caudal generally more or less emarginated in the young, as well as in the adult. Lower jaw with no flap ..... REMORA.
  - α. Discal laminae 12—19, (*E. remora*, L.) ..... Remora.
  - β. Discal laminae 27, (*E. scutata*, Gthr.) ..... Remilegia.

If the principles of Dr. Günther are correct, all the forms described by Prof. Poey would be probably referrible to five known species. That gentleman and Sir John Richardson have demonstrated that the form of the caudal fin (only, however, to any extent among the typical Echeneides) varies with age; consequently divisions based on the outline of that fin are illusive. The species described by M. Poey would be referred by Dr. Günther to the following species; the figures in parenthesis indicate the respective size of the fishes on which M. Poey founded his several species:

1. Echeneis naucrates, Lin. = *E. guaican*, P. (800 mill.) = *E. metallica*, P. (600 mill.)
2. Echeneis albicauda, Mitchill = (*E. holbrookii*, Gthr.) = *E. verticalis*, P. (half grown, 380 mill.)
3. Phtheichthys lineatus = *E. apicalis*, P. (260 mill., half grown) = *E. sphyrenarum*, P. (75 mill., very young.)

on each palatine bone, and in another thirteen inches long, a narrow band of villiform teeth on the same bones, while Dr. Holbrook asserts, that in a specimen nine inches long, he found a "small patch of minute teeth on the vomer, and a small, narrow group of similar teeth on each palate-bone." M. Poey denies to his *C. heteropygus* (which I am unable to distinguish from the *C. falcatus*) any palatal teeth. Are the palatal teeth then deciduous and lost with age, but still more or less persistent in different individuals? Such is probably the case.

\* M. Poey has since communicated to me his discovery of the more or less heterodont dentition of all the species of the family known to him.

4. *Remora jacobæa* = (*E. remora*, *Gthr.*) = *E. postica*, *P.* (105 mill.)

5. *Remora osteochir* = (*E. tetrapturorum*) (200 mill.)

We may await the publication of the second edition of the "Conspectus Piscium Cubensium," before accepting the preceding identifications as correct; in that publication, M. Poey, influenced as usual by his desire for truth, will correct the nomenclature of his species, and have no hesitation in reuniting some of them if a future examination should lead him to doubt the correctness of his former views. I shall only remark that, among the species of the group of *Echeneides*, there is a definite ratio in the form of the caudal to the size of the species, and that the difference of dentition has been exaggerated. After an examination of many specimens from the most distant seas, I have also been, like Günther and Richardson, unable to discover any differences which could be regarded as specific. The habits of the representatives of this family would indeed render it not improbable that they should be very widely distributed.

The genus *Nomeus* of Cuvier probably belongs to a peculiar family (*Gasteros chismatoidæ*.) *Lampris* likewise represents a special family (*Lamprioidæ*.)

With Dr. Bleeker, I am now disposed to believe that *Aulostoma*, Lac. and *Solenostomus*, Gron. belong to different families, but, contrary to his opinion, think that they are very nearly related.

The Malacanthini of Poey form a natural family. The *Latilus chrysops*, Val. does not, however, appear to be congeneric with the type of *Latilus*, but is distinguished by its form and the structure of the fins. It may be called *Caulolatilus chrysops*.

The Labroidæ are represented by six genera,—*Lachnolæmus*, Cuv. *Harpe*, Lac. (= *Cossyphus*, Cuv.), *Decodon*, Gthr. (*Cossyphus puellaris*, Poey) (= *Labrinæ*), *Choerajulis*, Gill (*Halichares*, Rüppell), (= *Julides*), *Xirichthys*, Cuv. (= *Xirichthyinæ*), and *Clepticus*, Cuv. (= *Clepticinæ*). In retaining the Labroids at the end of the symmetrical physoclostous Teleocephali in the Catalogue of the Fishes of the Eastern Coast, it was by no means intended to convey the ideas of the author as to the affinities of that family. Its affinities have indeed expressly been said (p. 7) to be "probably rather with the *Sciænoids*, the *Chaetodontoids* and even the *Percoids*," &c. As, however, they were not quite evident, the *Pharygognathi* were provisionally retained where Müller had placed them. The families are nearly related to each other and should not be scattered. The most appropriate position is probably near the *Centrachoids*.

The single Cuban species of Polynematoid belongs to the genus *Trichidion* of Klein, as recently restored.

The Gobioids are represented by four subfamilies and ten genera.

The Gobiinæ with four genera,—*Gobius*, Art. (*mapo*, P., *lacertus*, P.); *Lo-phogobius*, Gill (*crista-galli*), characterized especially by a longitudinal coronal crest; *Gobionellus*, Grd. (= *Samaragdus*, Poey); *Awaous*, Val. (= *Rhinogobius*, Gill = *Chonophorus*, P.) Eleotridinæ with three genera,—*Eleotris*, Gron. (*gyrinus*, *guavina*); *Dormitator*, Gill (*Gundlachi*, P., *omocyaneus*, P.), readily distinguished by the form, the cleft or extension forwards of the branchial apertures above the operculum and the large scales; *Philypnus*, Val. and *Erotelis*, Poey.

Amblyopodinae with the genus *Gobioides*, Lac.

Sicydiinæ with the genus *Sicydium*, Val.

The Eleotridinæ cannot be separated from the Gobiinæ, as the physiognomy is not only similar, but there is almost a transition from one form to the other.

The Cyclopteroids are certainly not natural associates of the Gobiocoids, the latter forming a very distinct family. Prof. Poey has committed the same error as Dr. Girard in describing the ventral fins as lower pectoral rays, and

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the disk as the ventral fins. His *Gobiosox rupestris* belongs to the genus *Sicyases* of Müller and Troschel.

The subfamily of Blenninæ includes only three genera. The *Salarias margaritaceus* may be referred to the genus *Entomacrodus*, Gill, if the presence of superciliary tentacles is not considered to be of generic importance.

The Opisthognathinæ are represented by three forms, which appear to me to merit generic rank. The similarity between the three groups is that which should naturally exist between allied genera of a natural tribe or family; the differences of detail of structure represent generic value. The three genera are *Opisthognathus*, Cuv. (*macrognathus*, P.), with minute scales and extended maxillars; *Gnathypops* (*maxillosus*, P., *macrops*, P.), with moderately small scales and maxillars passing little beyond the eyes, and *Lonchopisthus* (*micrognathus*, P.), with normal maxillars, moderately small scales and lanceolate caudal fin. *Opisthognathus macrognathus*, P., if not identical, is at least very closely allied to the slightly previously named *O. megastoma* of Günther.

The families of Antennarioidæ and Maltheoidæ, as suggested by Dr. Bleeker, appear to be good. *Antennarius* must be substituted for *Chironectes*, as the latter had been previously used for a valid genus of marsupial mammals.

The family of Ophidioids naturally contains only the genus *Ophidium* (L.). *Fierasfer* (C.) is the type of a distinct family, known by the position of the anus, the development of the fins, &c.; the other genera are the very distinct genus *Echiodon* of Thompson and the *Encheliophis* of Müller, which differs from *Fierasfer* only by the absence of the pectoral fins. The Cuban species is very closely related to *Fierasfer Homei* (Kaup.) *Synbranchus* is the type of a peculiar family (Synbranchoidæ, Lat. of Apodes.)

The true Salmonoidæ are not represented in Cuban nor any tropical waters. *Alepidosaurus*, Lowe is the type of a very distinct and remarkable family, which is probably most nearly related to the Scombroids and Lepturoids. The Cuban species belong to a peculiar group or genus (*Caulopus*, Gill.) The genus *Saurus*, Cuv., whose prior name is *Synodus*, Gron., is the type of a special family related to the Scopeloids. The *S. brevirostris*, Poey has an abbreviated trachinoid muzzle and an oblong anal fin, and therefore belongs to the genus *Trachinocephalus*, Gill.

*Astronesthes*, Rich. is a Chauliodontoid.

Among the Clupeoids, the *Meletta thrissa*, Val. belongs to the genus *Opisthonema*, Gill, which is more distinct than most of the genera of Clupeoids.

The "*Pleuronectes ocellatus*, Agz." of Poey and its allies belong to the genus *Platophrys*, Swainson.

*Ophisurus* is the type of a peculiar family (Ophisuroidæ.)

There is a quite strong analogy between the faunæ of the Japanese and West Indian archipelagoes and the neighboring seas. Dr. Günther has in two instances alluded to the resemblance between West Indian and Japanese fishes. He has remarked,\* in his observations on his *Serrans margaritifera*, a South American species, that it "very much resembles the *S. tsiremenara*, Faun. Japon., p. 7, pl. 40, fig. 3, which is said to be common in Japan and to have sixteen soft rays in the dorsal fin. Still more remarkable is it that the same plate represents another fish, *S. octocinctus*, so similar to a West Indian fish, *S. mystacinus*, that they cannot be separated." Again,† the same gentleman has observed that the Japanese "*Mesoprion sparus* appears to be closely allied to the" Cuban "*Mesoprion dentatus*," "and it is a very remarkable fact, in the geographical distribution of fishes, that we find several species, described by Schlegel in the 'Fauna Japonica,' represented in the Atlantic by others, not or scarcely different,—viz., among the Serranina, *Anthias oculatus*, *Serranus tsirimenara* and *margaritifera*, *Mesoprion sparus* and *dentatus*."

\* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. i. p. 132.

† Günther, op. cit., vol. i. p. 89.

The recent discoveries by Prof. Poey have much increased the number of representative species. The *Haliperæ* of the West Indies are represented by one Japanese species, (*H. hirundinaceus*). The other Serraninæ have been already enumerated by Dr. Günther. The *Elastoma oculatum* of the Caribbean Sea is represented by a form so closely allied that the distinguished authors of the Fauna Japonica were unable, after a critical comparison, to discover any difference. *Verilus* of Poey is allied to *Elastoma* and *Etelis*, and is perhaps also represented by *Caprodon* (T. & S.) in Japan. The species of the genus *Scombrops*, T. & S. has only two species, one of which is Japanese and the other Cuban; the nearest relation of the genus is also a West Indian, the *Sphyrænop* *Bairdianus* (Poey.) *Emmelichthys* has equally Japanese and West Indian species. The peculiar *Priacanthus nipponius* (Cuv. et Val.) and *Myriopristis Japonicus* (Cuv. et Val.) are most nearly allied to West Indian and North American fishes—the *Priacanthus altus* (Gill) and *Myriopristis trachypoma* (Günther). Finally, the species recently described as *Hollardia Hollardi* by M. Poey, is closely related to a Japanese fish, the *Triacanthodes anomalus*, Blkr. The forms enumerated are very peculiar and distinct ones, and have no near allies in other seas. Many other genera of more universal distribution or with less characteristic species, which are represented by allied forms in the two seas might be added. Sufficient has been said to indicate that the law which has been enunciated by botanists relating to the similarity of the plants of Eastern Asia and Eastern America, may be extended within more restricted limits, to the inhabitants of the sea as well as to those of the land; for the invertebrated animals,—the crustaceans, the mollusks and the radiates,—to a greater or less extent, are subject to the same rule as the fishes.

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Catalogue of the FISHES of Lower California, in the Smithsonian Institution,  
collected by Mr. J. Xantus.

PART II.

BY THEODORE GILL.

In this paper are continued the descriptions of the fishes collected at Cape St. Lucas, by Mr. John Xantus. The sequence of the families is not entirely in accordance with their natural affinities.

Family TEUTHYDOIDÆ (Cuv.)

Genus PRIONURUS C. et V.

PRIONURUS PUNCTATUS Gill.

The greatest height equals two-fifths of the total length (.40,) the head forms more than a fourth (.27.) The length of the snout much exceeds half of the head's length (.15,) and is a half greater than the diameter of the orbit (.10;) it is produced and its upper profile very obliquely incurved. There are on each side of the upper jaw eight teeth, and in the lower jaw six. The tail has three median laminae, the anterior of which are conic, and the last bifid, and one smaller one above and below at the base of the caudal.

D. VIII. 26. A. III. 22. (V. I. 5.)

The color is whitish gray, spotted with black on the head, body, dorsal, and anal fins; the caudal peduncle and fin, pectoral and ventral fins are immaculate.

Many specimens of this species were obtained at Cape St. Lucas. It widely differs from the previously known species by its spotted body; in other  
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respects it is most nearly allied to the *Prionurus laticlavus* Val., from the Gallapagos Islands.

Family CHÆTODONTOIDÆ.

Subfamily CHÆTODONTINÆ.

Genus SAROTHRODUS Gill.

SAROTHRODUS NIGRIROSTRIS Gill.

The body is elevated, the height being nearly equal to three-fifths of the extreme length. The snout is little produced, and shorter than the diameter of the eye. The pectorals equal the head's length, and are scarcely longer than the ventrals. The lateral line is slowly curved upward as far as the vertical of the fourth soft dorsal ray, and is there nearly parallel with the back, from which it is mostly separated by an interval equal to the width of the interorbital area.

D. XII. 24. A. III. 20.

Scales lat. line 44.

The ground color is apparently light and uniform. The head is whitish; the muzzle has a blackish band; there is a transverse interorbital band emarginated behind and much narrower than the orbit. A band between the dorsal fin and the interorbital area descends to the temples and is bordered by whitish. Another obliquely crosses the dorsal fin, caudal peduncle and near the margin of the anal, the anterior margin of which extends from the base of the anterior soft rays to the axilla of the anal fin; the band is bordered by whitish. The caudal, the produced portion of the dorsal, margin of the anal, and all the pectoral and ventral fins appear to have been uniformly light.

This species is allied to *Sarothrodus ulietensis* (*Chætodon ulietensis* Blkr.) *S. robustus* (*C. robustus* Gthr.), *S. humeralis* (*C. humeralis* Gthr.) *S. gracilis*, (*C. gracilis* Gthr.), and *S. maculo-cinctus* Gill; but is readily distinguished by the above diagnosis.

Two specimens, about two inches and a half long, were sent by Mr. Xantus to the Institution; the alcohol having evaporated, both have been dried up.

Genus HOLACANTHUS (Lam.) C. et V.

HOLACANTHUS STRIGATUS Gill.

The greatest height exceeds two-fifths ( $\cdot43$ ) of the length. The length of the head forms almost a quarter ( $\cdot24$ ;) the diameter of the orbit equals a third ( $\cdot08$ ) of that length, and is less than the length of the snout ( $=\cdot09$ ), and greater than that of the preopercular spine ( $\cdot07$ .) The margin of the dorsal and anal fins are slightly convergent backwards; the angle of the former is little acuminate, and passes beyond the anterior half of the caudal, the longest rays nearly equalling the head's length; the anal angle is obtuse or slightly rounded. The caudal is scarcely convex, and slightly oblique, its upper angle passing beyond and less blunt than the lower; the length is less than a fifth ( $\cdot19$ ) of the total. The pectoral exceeds a fifth ( $\cdot21$ ) and the ventrals nearly equal a quarter ( $\cdot24$ ) of the total length.

D. XIV. 17. A. III. 16.

The color is dark purplish brown, crossed below the seventh spine by a whitish band attenuated and curved backwards below; four nearly equidistant indistinct vertical bluish lines cross the body between the band and the base of the caudal. The head is girdled with two broader and more distinct bluish bands, one in front of the eyes, and the other in front of the dorsal and behind the eyes. The dorsal and anal have two indistinct lines parallel with the borders, and the posterior margins are also bluish. The pectorals, dorsal and caudal are yellow; the latter alone margined with brown.

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This species, like the *Pimelepterus*, is related to a species of the Red Sea, the *Holacanthus maculosus* C. et V., but is readily distinguished by the less elevated body and fins, number of rays and details of coloration. It is also related to the *H. formosus* Cast. of Brazil, and more remotely to *H. passer*, Val., of the Gallapagos Islands, and *H. diacanthus*, Gthr., of the Indian Ocean.

Genus POMACANTHODES Gill.

POMACANTHODES ZONIPECTUS Gill.

The form much resembles that of *Pomacanthus*. The greatest height equals three-fifths ( $\cdot 59$ ) of the length. The head forms about a quarter ( $\cdot 26$ ) and the caudal fin about a sixth ( $\cdot 17$ ) of the total length. The diameter of the orbit enters nearly four times ( $\cdot 726$ ) in the head's length, the snout two and a half times, ( $\cdot 10$ ) and the preopercular spine six times and a half ( $\cdot 04$ .) The dorsal is considerably produced at the sixth ray which passes behind the rounded posterior margin and nearly equals a third ( $\cdot 31$ ) of the total length. The anal is simply rounded behind, and the caudal truncated. The pectorals equal a fifth ( $\cdot 21$ ) and the ventrals three-tenths ( $\cdot 30$ ) of the length. The back behind the nape is gibbous or protuberant.

D. XI. 23—24. A. III. 20.

The color is brownish margined with light on each scale. A very dark brown band girdles the breast behind the ventral and pectoral fins; the dark color is prolonged upwards to the fifth dorsal spine, and merges into the lighter color of the head. The pectorals and caudal are marbled, the other fins nearly uniformly dark.

One specimen eight inches long was collected by Captain Dow, at San Salvador.

PIMELEPTEROIDÆ Gill.

This family may be modified to embrace those fishes with the outline correspondingly developed above and below the median axis of the body, and by scaly fins and compressed teeth, as well as the development of numerous pancreatic caeca. The principal types are the Pimelepterinae, Girellinae, and Scorpinae. Two of those types are represented on the California coast.

Subfamily GIRELLINÆ Gill.

Genus GIRELLA (Gray,) Gthr.

GIRELLA NIGRICANS Gill.

*Camarina nigricans* Ayres, Proc. California Academy of Natural Sciences, pt. ii. p. 81, fig. 22. Oct. 1861.

*Girella nigricans* Gill, Proc. Acad. Natural Sciences, vol. xiv. p. 16. 1862.

This species appears to be a true *Girella*, and I had referred it to that genus early in 1850, when hastily examining the species then sent by Mr. Xantus. I have always found fourteen dorsal spines. There is a more or less distinct white spot under the spinous dorsal. If distinct, then it may be named *G. dorsomacula*.

D. XIV. 13. A. III. 11.

The genus *Girella* as limited by Dr. Günther, scarcely appears to be homogeneous. The *Girella simplex*, (*Crenidens simplex* Rich.) has the incisors entire and undivided, and therefore represents a distinct genus to which the name of *Incisidens* may be given.

Subfamily PIMELEPTERINÆ Gthr.

Genus PIMELEPTERUS (Lac.)

This genus as adopted here is intended to embrace only those species with  
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nearly uniformly low dorsal and anal fins, and consequently excludes *Pimelepterus tahmel* Rüppell, *P. Dussumieri* C. et V. and *P. raynaldi* C. et V., in which the soft parts of the dorsal and anal fins are much elevated. It is therefore proposed to refer them to a distinct genus under the name of *OPISTHISTIUS*.

The *Pimelepterus waigensis* has been stated by Cuvier and Valenciennes to apparently have five or six pyloric caeca.\* In the species of our eastern coast which I have examined, as well as in *T. fuscus* and *Opisthistius tahmel*, they are present in very great number. There is, therefore, an anomalous range of variation for so very closely related species, or appearances have been deceptive to Messrs. Cuvier and Valenciennes. In two specimens of the very closely related *P. analogus* opened by us, the intestines were completely decayed, although the fishes were externally in a fine state of preservation.

The *Pimelepterus laevis* of Tschudi is not at all related to this genus.

#### PIMELEPTERUS ANALOGUS Gill.

The greatest height enters 2.6-7 (.35) times in the *extreme* length. The head forms about two-ninths (.22) and equals the length of the caudal; the snout enters three times in that length, and is less than the width of the interorbital area (.08½): the median rays of the caudal are half as long as the longest, and rather more than half as long as the head (.11½.) The dorsal is highest at its sixth spine, the length of which enters eleven times (.09) in the total, and is twice as great as the last spine; the greatest height of the soft portion equals a quarter of the head's length (.05½.) The pectorals and ventrals have the same length, and are contained more than eight times (.12) in the total.

D. XI. 14. A. III. 13. C. 1. I. 7. 6. I. 1. P. 2. 14. V. 1. 5.

The teeth are about twenty-two in number in each jaw. The vertical part in the adult is as long as the heel or horizontal part, and the apex subtriangular.

13  
Scales 75 —  
20

The color of the adult is grayish on the back, and on the flanks indistinctly longitudinally banded alternately with yellow and grayish or silvery, the former along the middle of the scales, and the latter along the adjoining sides. In the young, large yellowish spots are distributed on the body. The preorbital is silvery. The fins are rather dark.

Nearly related to *Pimelepterus waigensis* (Quoy and Gaimard) and *P. incisor* C. et V., but apparently differing slightly in its proportions.

Family GERREOIDÆ Blkr.

Subfamily GERREINÆ Blkr.

Genus DIAPTERUS (Radzani.)

DIAPTERUS CALIFORNIENSIS Gill.

The greatest height nearly equals a third (.32) of the *extreme* length; the caudal peduncle is slender and attenuated at the middle. The head forms less than a quarter (.22) of the length; the diameter of the orbit enters two lines and two-thirds (.09) in the head's length, the snout three times and a third. The interorbital area is flattened, and the groove for the posterior processes of the intermaxillary bones is broad, scaleless, semioval between the eyes, and attaining to the vertical of the ends of the maxillary bones; the exposed portions of the latter bones are convex above, semicordate, and twice as long as broad. The lateral line is sigmoidally curved.

\* "Le nombre des coecums qui entourent le pylore nous a paru de cinq ou six."

The second and third dorsal spines are nearly equal, angulated at the terminal third (normally ?) contained rather more than seven times ( $\cdot 13 \frac{1}{2}$ ) in the total length, and nearly twice as long as the last one ( $\cdot 07$ .) The third anal spine is larger than the second, shorter than the last dorsal one and a quarter ( $\cdot 06$ ) of the head's length. The caudal forms between a third and fourth ( $\cdot 29$ ) of the length, equals the pectorals, and is twice as long as the ventrals.

1	1	6
D. IX. 9 —.	A. III. 7 —.	Scales 44 —.
1	1	13

The color is silvery with steel blue reflections above; the fins immaculate.

#### DIAPTERUS GRACILIS Gill.

The greatest height scarcely equals a quarter ( $\cdot 23$ ) of the extreme length; the caudal peduncle is robust and regularly attenuated to the base of its fin. The head forms between a fourth and fifth ( $\cdot 22$ ) of the length; the diameter of the orbit enters nearly three times ( $7\cdot 22$ ) in length of the head, exceeds the length of the snout ( $\cdot 06$ ) and equals the interorbital area. The maxillary groove is linear, naked, and extends beyond the vertical from the anterior third of the pupil. The exposed surface of each maxillary bone is long, oblique and uniformly wide to its anterior third, whence the upper margin is bent forwards. The posterior half of the lateral line is rectilinear and parallel with the dorsal outline.

The second and third dorsal spines are slender, nearly straight, contained eight or nine times ( $\cdot 12$ ,  $\cdot 11$ ) in the total length, and almost four times longer than the last spine ( $=\cdot 04$ ). The third anal spine is longer than the second, and equals about a third of the head's length, ( $\cdot 06$ ,  $\cdot 06\frac{1}{2}$ .) The caudal fin forms more than a fifth ( $\cdot 22$ ) of the length, equals the pectoral, and is nearly twice as long as the ventrals ( $=\cdot 12$ .)

1	1	5
D. IX. 9 —.	A. III. 7 —.	Scales 45 —.
1	1	10

The color is silvery, and on the back tinged with purplish and with a steel blue reflection. The margin of the spinous dorsal, especially at its angle, is black.

This species is allied to *Diapterus aprion* (*Gerres aprion* C. et V.) *D. macrosoma* (*G. macrosoma* Blkr.) *D. argyreus* (*G. argyreus* C. et V.,) and *D. oblongus* (*G. oblongus* C. et V., but is distinguished by the combination of characters indicated in the diagnosis.

#### Descriptions of two new species of VESPERTILIONIDE, and some remarks on the genus ANTROZOUS.

BY HARRISON ALLEN, M. D.

I have been permitted, by the Smithsonian Institution, to publish the following descriptions from specimens in its collection.

##### LASIURUS INTERMEDIUS, nob.

Head large, flat and hairy. Snout high, emarginate and of a brown color. Nostrils opening sublaterally. Sides of face moderately inflated. Mouth and lower jaw fringed with short hair. There is a small naked space at mentum. The ears are high, elliptical, pointed and nearly naked; they are strongly convex on their inner border, nearly straight on their outer; the lobe at the base of the outer border is very well developed. The tragus is similar in shape to that of *L. cinereus*, but has a blunter incurved tip; it is slightly haired on facial surface. Eyes diminutive, placed near the ear. Thumb rather small. Feet moderate.

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Fur not so extensive as in other species of the genus. Posteriorly extending on to the wing membrane from body, as in *L. cinereus*,—running down the interfemoral membrane two-thirds the distance and on to the foot; a very small brownish tuft is seen at base of thumb, and on the membrane at and above the elbow, while the fourth and fifth fingers are naked. Anteriorly the hair spreads up under the arm to wrist as in other species, but less thickly. It also runs down a little way upon the interfemoral and is observable upon the membrane between the ulna and humerus. The wing membrane extends to base of toes. The calcaneum is moderately developed.

General hue olive brown. Blackish at base, dirty brown at centre, with a clearer tip. The color is somewhat darker behind than in front.

4	1	2	1	4
Dentition, m	c,	in.	c,	m
5	1	6	1	5

==30.

The small premolar placed behind the canine of the upper jaw of *L. cinereus* and *novaboracensis* is here absent.

This species in size, physiognomy, number of incisors, and character of the distribution of the fur resembles the type of *Lasiurus*, while in shape of the ears and disposition of molars it is akin to *Scotophilus*. The interfemoral membrane is scarcely more hairy than in *S. noctivagans*, yet the entire contour of the animal is strongly *Lasiurian*,—and in fixing it thus we must decide that the small premolar in the upper jaw, the rounded ear and hairy interfemoral, are not essential characters to the genus.

As a species it is intermediate between *L. Grayi* Tomes, and *L. cinereus*, Pal. de Beau. It is larger than *L. Grayi*, and smaller than the majority of specimens of *L. cinereus*; the thumb is small as in the former, but the wing membrane extends to the base of toes as in the latter; it is distinct from both in the brown fur, in the high ear and the scantiness of the hair on the interfemoral membrane.

*Habitat.* Matamoras, Tamaulipas. L. B. Conch.

#### MEASUREMENTS.

Expanse .....	13.6
Height of ear.....	2.06
“ “ tragus.....	0.3
Length of forearm.....	2.0
“ “ tibia.....	0.9
“ “ tail.....	2.0
“ “ thumb.....	0.5
“ “ foot .....	0.4
“ “ longest finger.....	2.0

#### VESPERTILIO NITIDUS, nob.

Body small; head and face very hairy, the nostrils separated by a narrow slightly emarginate space; ears longer than head, slightly emarginate on outer edge, curving somewhat outwards, hairy at basal third behind, extending up a greater distance on the inner side; tragus tapering, leaning a little outwards, and about half the height of auricle; lips extensively whiskered; thumb and foot small; interfemoral membrane ample; calcaneum rather long, with an excaleaneal membrane; color of membranes darkish brown.

Fur long and silky. Color plumbeus at base with russet tips behind and lighter russet or ashy cinereus in front. Interfemoral membrane naked, except the usual tuft at the base behind, and a few lightish hairs arranged transversely in front.

Skull inflated, rather flattish.

6	1	4	1	6
Dentition, m	c,	in.	c,	m
6	1	6	1	6

==38.

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Upper jaw. Incisors equal; centrals bifid, laterals unicuspid, intervening space in the mesial line.

Canines simple. Premolars three in number, anterior ones small. Third large. The remaining molars as usual.

Lower jaw. Incisors trilobed, excepting those contiguous to the canines, which are quadrilobed. Of the premolars the first is larger than the second; the third is larger than both. Remaining molars not peculiar.

In the bat labelled 1745, Gaudaloupe, the second premolar both above and below is so wedged in between the first and third that it is scarcely visible from the outside.

It bears a strong resemblance to *V. mystacinus*, Leis. The emarginate ear, elongate tragus, and whiskered lips are seen in both; but our species is larger than *V. mystacinus*, while the thumb is smaller; the tail is shorter, and calcaneum more produced.

It differs also in color, *V. mystacinus* being a grayish brown; *V. nitidus* a reddish brown.

#### MEASUREMENTS.

Expanse.....	8.0
Height of ear .....	0.5
“ “ tragus.....	0.3
Length of forearm.....	1.3
“ “ tibia.....	0.5½
“ “ tail.....	1.1
“ “ thumb.....	0.2
“ “ foot.....	0.3
“ “ longest finger.....	0.2

#### Habitat. California.

No. 1981. Monterey. W. Hatton.

“ 522—1665. Fort Steilacoom. Dr. Suckley, U. S. A.

“ 523—1656 “ “ “ “ “

“ 524—1657 “ “ “ “ “

“ 525—1658 “ “ “ “ “

In 1855, Major Le Conte, in the 7th Vol. Proc. Acad. Nat. Sci. p. 437, described a bat from California under the name,—*V. pallidus*.

The changes which have taken place in the classification of Cheiroptera of late years and especially the greatly restricted sense in which the genus *Vespertilio* as now received, is sufficient apology for the insertion of this bat under the genus which I am about to propose.

ANTROZOUS, n. g.—Head rather large; nose high, tapering, narrow; snout angular, blunt; nostrils apical, outer borders joining above in a transverse line; eyes large; ears longer than head, not joined. Skull long, not depressed, slightly crested at posterior part, tapering anteriorly.

4   1   2   1   4  
Dentition, m —, c —, in. —, c —, m —, = 28.  
5   1   4   1   5

Upper jaw. The sup. incisors large pointed, separated by a narrow space. Canines well developed with a small basal internal cusp. No small premolar posterior to canine, as in *Lasiurus*; molars as in that genus.

Lower jaw. Incisors trilobed, the two centrals placed anteriorly to laterals. Canines with an acute basal cusp which nearly touches the second premolar. The first premolar simple and smaller than the second. Molars not peculiar.

This genus differs from *Vespertilio* in the high and slender snout; the crested and narrow skull; the elevated broad ears, and in one incisor less in the upper jaw, and two less in the lower. Indeed the latter fact is alone sufficient to separate it, for although the incisors in the upper jaw as a general rule are subject to considerable variation, a departure from the usual number in the lower jaw is a matter of more significance. *Antrozous* is the only instance in the extensive family of *Vespertilionidæ* of such variation.

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May 6th, 1862.

Dr. LE CONTE in the Chair.

Sixteen members present.

Mr. Cope stated that one of the few described species of North American serpents not known to the zoologists of our country, the *Carphophis Harpesti* of Dum. and Bib., had been recently discovered in Texas. It belongs to the genus *Virginia*, of Baird and Girard.

May 13th, 1862.

Mr. VAUX, Vice-President, in the Chair.

Nineteen members present.

May 20th, 1862.

Mr. LEA, President, in the Chair.

Twenty-seven members present.

The following papers were presented for publication, and referred to Committees :

Catalogue of the Fishes of Lower California, in the Museum of the Smithsonian Institution, etc. Pt. III. By Theo. Gill.

List of the Pseudo-neuroptera of Illinois, etc. By Benjamin D. Walsh, M. D.

Revision of the Gulls of North America. By Elliott Coues.

Catalogue of Birds, collected by the North Pacific Exploring Expedition, etc. By John Cassin.

May 27th, 1862.

Dr. BRIDGES, Vice-President, in the Chair.

Twenty-one members present.

On Report of the respective Committees, the following papers were ordered to be published in the Proceedings :

Catalogue of the **FISHES** of Lower California, in the Smithsonian Institution, collected by **Mr. J. Xantus**.

BY THEODORE GILL.

PART III.

Family *PERCOIDÆ* (Cuv.)

Subfamily *SERRANINÆ* (Sw.) Gill.

Genus *BRACHYRHINUS* Gill.

*BRACHYRHINUS CREOLUS* Gill.

*Synonymy.*

*Serranus creolus* Cuv. et Val. Hist. Nat. des Poissons, tome ii. p. 265.

" " Cuv. Règne Animal, ed. III., *Ichthyologie*, pl. 8, fig. 1.

The *Brachyrhinus* of Lower California is undistinguishable by me from the *B. creolus* of the West Indies and South America. The proportions, number

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of rays (D. IX—19. A. III. 9,) and of scales (L. 1. 85—95,) and color, especially the four round violet dots, are the same in the fish of the Pacific Ocean as in that of the Caribbean Sea; I am therefore compelled to regard the two as identical. The *Brachyrhinus colonus* (*Serranus colonus* Val.) of the Gallapagos Islands appears to differ in color, the number of the rays and the size of the scales.

Genus EPINEPHELUS (Bloch) Gill.

EPINEPHELUS SELLICAUDA Gill.

The height equals about three tenths ( $\cdot 29$ ) of the total length. The head forms considerably more than a third ( $\cdot 36$ ) of the same length; it is wholly covered with small, closely appressed scales, the only naked external parts being the supramaxillary bones and lips. The eye in diameter equals a sixth of the head's length, and is distant more than a fourth ( $\cdot 8\frac{1}{2}$ ) from the snout. The preoperculum is oblique and scarcely denticulated along its upper half, vertical and more coarsely denticulated towards the angle and thence decurved forwards. There are three opercular spines, the upper of which is concealed. The caudal enters nearly five times and a half ( $\cdot 18$ ) in the length and nearly equals the pectoral fins. The ventrals scarcely equal a seventh ( $\cdot 14$ ) of the length.

D. XI. 17. A. III. 8.

The color is purplish brown, sparsely covered with white spots which extend more or less on the dorsal, anal, pectoral, and ventral fins. The caudal peduncle has a black saddle-like spot behind the dorsal fin. The posterior margins of the pectoral and external margins of the ventrals have white lines. The spinous dorsal has the incised membrane hyaline bordered below by a linear black band. The caudal is immaculate.

The species is perhaps most nearly allied to the *E. awoara* (*Serranus awoara* Fauna Japonica) of Japan, and the *Epinephelus niveatus* (*Serranus niveatus* C.V.) of the West Indies.

Genus DERMATOLEPIS Gill.

This genus is very closely related to *Lioperca*, of which the *Serranus inermis* Val. of the Caribbean Sea, is the type. It differs from *Lioperca* by the absence of the canine teeth on each side of the front of the upper jaw, by the little increase in size of the teeth of the posterior rows near the symphysis, the short and bluntly rounded pectoral fins, the regular increase of the three small anal spines, and the obsolescence of the upper spiniform process which is concealed in the skin. The teeth are in broad bands in front, separated by a narrow smooth symphysial area, and become recumbent backwards and inwards in the internal rows. The usual trilobation (not spines) of the operculum is indistinct.

DERMATOLEPIS PUNCTATUS Gill.

Proc. Acad. Nat. Sciences of Phila., vol. xiii. 1861, p. 54.

One specimen stuffed is in the museum.

Subfamily RHYPTICINÆ Gill.

Genus RHYPTICUS Cuv.

RHYPTICUS XANTI Gill.

The greatest height equals a fourth or more of the total length. The head to the end of the opercular membrane equals three-tenths ( $\cdot 30\frac{1}{2}$ ) and projects considerably beyond the spine ( $\cdot 01\frac{1}{2}$ ); its height behind the eyes enters nearly five times and a half ( $\cdot 18$ ) in the total length, and the greatest height at the nape more than five times ( $\cdot 21$ .) The eye is moderately small, its diameter ( $\cdot 4$ ) being more than half as long as the snout. The pectoral fin enters more than  $6\frac{1}{2}$  times ( $\cdot 15\frac{1}{2}$ ) in the total length.

D. III. 24. A. 16.

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The color is a very dark purplish brown, darker on the fins and on the trunk, irregularly mottled with lighter brown spots.

Two specimens of this species are in the collection, one thirteen inches and a half long, and the other little more than five inches long. In color it most resembles the *Rhypticus nigripinnis* (Gill) from Panama, but that has only two dorsal spines, and might therefore perhaps more properly be referred to the genus *Promicropterus*. I dedicate it to Mr. Xantus, who has made the magnificent collection, of which a part is here described.

**RHYPTICUS MACULATUS Gill.**

The greatest height equals a quarter of the total length. The head, exclusive of the membrane, forms 27-100, and inclusive of it 29-100 of the length; the height immediately behind the eyes equals 13-100, and at the nape 18-100 of the same. The eye of the single small specimen in the collection has a diameter longer than the snout, and equal to a fifth of the head's extreme length. The pectoral fin equals a sixth of the total length.

D. III. 24.

The color is reddish brown on the body and head, thickly covered with yellowish spots about as large as the pupil of the eye. The fins are blackish and immaculate, except the caudal, which is dotted on its basal half.

A single specimen, less than two inches and three quarters long, was collected.

**Family CHILODIPTEROIDÆ Bleeker.**

**Genus AMIA Gronovius.**

**AMIA RETROSELLA Gill.**

The greatest height exceeds a quarter (.28) of the total length; of that length the head forms more than three-tenths (.31.) The diameter of the orbit enters three times and a half (.09) in the head's length, and the snout four times and a half (.07.) The hinder margin of the preoperculum is finely denticulated; the crest entire. The spinous dorsal, at the third spine, has a height equal to an eighth (.12) of the total length, and the soft a sixth (.17) of the same. The caudal fin enters four times and a half (.23;) the pectoral fin equals a fifth (.19) and the ventral a sixth (.16) of the length.

D. VI. I. 9. A. II. 8. C. 4. I. 8. 7. I. 3. P. 2. 10. V. I. 5.

2

Scales 25—.

8

The color is reddish yellow, minutely dotted with black, with a black spot on the operculum, another on the end of the caudal peduncle, and a vertical band below the soft dorsal fin. The unpaired fins are more or less thickly punctulated with black.

This species is related to *Amia dovii* (*Apogon dovii* Gthr.) but the saddle-like band under the second dorsal fin at once distinguishes it; is also closely allied to *A. maculata* (*Monoprion maculatus* Poey.)

**Family SPAROIDÆ Cuv. Gill.**

**Subfamily LUTJANINÆ Gill.**

**LUTJANUS NOVEFASCIATUS Gill.**

The greatest height exceeds a quarter of the extreme length. The head forms rather more than three-tenths of the same, (.31;) the snout enters three times and a half (.09) in the head's length, and the diameter of the eye about four times and a half (.07.) The teeth are in a longitudinal band on the tongue. The anterior nostril has a membranous flap or lid behind. The preoperculum has a shallow emargination; the interoperculum a blunt trihedral

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tubercle. The fourth dorsal spine equals a tenth of the total length and is a quarter longer than the ninth, which is shorter than the tenth. The second anal spine is strongest and rather larger than the ninth dorsal one. The caudal is nearly truncate when expanded, and forms a fifth of the total length. The pectoral and ventral fins are equal, and contained about five times and a half in the length.

D. X. 13-14. A. III. 8.

7  
Scales 48—  
18

The color is purplish brown, lighter at the centres of the scales, and with nine faint vertical bands, the second under the front of the dorsal, the sixth under the union of the spinous and soft parts, and the last behind the dorsal. The margin of the dorsal and caudal is dark. The front of the soft anal near the angle white; the base of the pectoral dark.

### Subfamily HOPLOPAGRINÆ Gill.

#### Genus HOPLOPAGRUS Gill.

Proc. Academy of Nat. Sciences of Phila., 1861, p. 78.

Body oblong-ovate, compressed, with the caudal peduncle short, covered with moderate or rather large oblique scales, similar to those of the typical Sparoids and arranged in longitudinal rows parallel with the lateral line. Head moderate, with the profile not much arched but declining rapidly downwards. The operculum and suboperculum are covered with large scales; the cheeks with about five rows of scales; the limb of the preoperculum naked. The preorbital bone is very high, and its hinder margin concealed. The preoperculum is notched above its angle for the reception of a knob of the interopercular bone. Its ascending margin and angle are finely pectinated, as is also the suprascapular bone. The operculum is obtusely biangulated behind. Mouth of normal size; the ascending branches of the intermaxillaries are shorter than the horizontal ones. Teeth on the jaws and *front of the vomer*; there are four robust but blunt canines in each jaw, near the symphysis in an anterior row; another row of obtusely conical ones, behind in which, in the upper jaw, is at least one row of smaller molar or fusiform ones. Behind the row of conical ones of the lower jaw, there is, on each side of the median line, about one molar. There are also about three short and obtusely conical molars on the front of the vomer. Nostrils distant; the posterior are elongated oval slits in front of the eyes; the anterior are tubular and situated at the anterior margin of the snout. Branchiostegal rays five on each side. Dorsal fin with a deep notch between its spinous and soft portions; the anterior part with ten spines. Anal fin with three moderate but stout spines, the second of which is largest. Caudal fin emarginated. Pectoral fins subfalcate and acuminate. Ventral fins acuminate, with its axillar scales well developed.

The species for which we have framed the genus above described, is one of the most interesting that has been for some time made known. It furnishes additional evidence of the slight value of the presence or absence of teeth on the palatine arch as a character for distinguishing families, and at the same time it confirms the propriety of approximating the Sparoids and the Percoids, or at least the Lutjaninæ.

At first sight the observer would be inclined to refer the type of the new group to the genus *Diapope* of Cuvier, or *Genyoroge* of Cantor, or to *Mesoprion* of Cuvier. There is indeed no essential difference in external form or appearance between those several genera. There is the same nudity of the superior surface of the head and preorbital region: the same sinus above the angle of the preoperculum, and the corresponding knob of the interoperculum; the same serration of the preoperculum and suprascapular; the same two blunt spinous

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processes of the operculum; the same form and disposition of the fins, and the same structure of the scales. Almost the only external difference that would be esteemed as of more than specific value relates to the position and form of the nostrils. And yet the fish now to be described does not belong to the same family as *Diacope* or *Genyoroge*, if the Sparoids and Percoids are regarded as being distinct families simply on account of dentition. For the present species is found, on further investigation, to be provided with teeth like those of the Sparine subfamily of the Sparoids, while *Diacope* or *Genyoroge* has teeth somewhat like *Serranus*, and has been by all naturalists referred to the family of Percoids and placed near *Serranus*. The number of branchiostegal rays is also less than that of the Lutjanine genus.

HOPLOPAGRUS GUENTHERII Gill.

Proc. Academy of Nat. Sciences of Phila., vol. 1861, p. 78.

The greatest height equals a third ( $\cdot 35$ ) of the extreme length. The head forms three-tenths ( $\cdot 30$ ) of the same. The profile is scarcely curved; the forehead slightly gibbous. The snout equals nearly half ( $\cdot 14\frac{1}{2}$ ) of the head's length; the height of the suborbital from the eye to the angle of the mouth is less than a third of the same ( $\cdot 09$ .) The diameter of the orbit equals a fifth of the head's length. The posterior nostril tube is an elliptical aperture. The preopercular sinus is semicircular; the interopercular knob moderate and oblique. The spine of the dorsal increases in a curve to the fourth spine, which equals an eighth of the total length, and is more than twice as long as the last two ( $= 05\frac{1}{2}$ .) The anal spines regularly increase, the first being contained seven times and a half ( $\cdot 04$ ) in the head's length, while the second is nearly and the third quite twice as long as the first. The caudal fin is little emarginated, and the angles nearly rectangular; the external rays equal about  $\cdot 22$  and the median about  $\cdot 18$  of the total length. The pectoral fins are produced and pointed as usual, and nearly equal three-tenths of the length ( $\cdot 28$ ), the ventrals equal a fifth ( $\cdot 20$ .) The rows of scales above the lateral line are parallel with it, and those below nearly straight and longitudinal.

D. X. 14. A. III. 9. C. 2. I. 8. 7. I. 1. P. 2. 15. V. I 5.

8    4  
Scales 43 (3)—  
17   6

The color of the stuffed specimen is uniform purplish brown.

I dedicate the fine species to the excellent Günther in token of appreciation.

Subfamily PRISTIPOMATINÆ Gill.

Genus HEMULON Cuvier.

This genus as here adopted is restricted to Pristipomatinae, with large mouths, the spinous dorsal increasing in a curved line towards the third, fourth or fifth spines and thence gradually decreasing, and the scales of moderate size, arranged in more or less oblique rows, so that the nuclei or the spots on each scale form interrupted lines that tend obliquely upwards and form acute angles with the lateral line. The anal spines are robust, and the second is generally largest. The genus, however, requires still further restriction.

HEMULON SCUDDERII Gill.

The greatest height enters less than three times and a half ( $\cdot 28$ ) in the total length, and is little greater than the length of the head ( $= \cdot 27$ .) The diameter of the eye equals a third of the head's length, and is nearly as long as the snout. The supramaxillary bones reach behind nearly to the vertical of the pupil. The teeth of the front row in each jaw are strongly and abruptly curved. The preoperculum is emarginated behind and is pectinated, especially at the angle. The dorsal fin increases in a curve to the fourth spine, which is half as

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long as the body beneath, ( $\cdot 14$ ), and two and a third times as long as the eleventh spine. The second anal spine is longest and nearly equals the fourth dorsal one. The caudal forms more than a fifth ( $\cdot 22$ ) of the length, and the pectoral equals a fifth ( $\cdot 20$ .)

D. XI. I. 16. A. III. 7  $\frac{1}{1}$ . Scales 52  $\frac{6}{14}$ .

The color is greenish silvery, with faint oblique lines formed by the central dots on the scales above the lateral line, and less oblique ones below. There are two lateral bands; one from the snout over the eye to the end of the dorsal, and the other from the back of the eye to an oblong spot on the caudal peduncle. The fins are nearly colorless. The preoperculum has a blackish brown spot behind partly concealed.

I dedicate this species to Mr. Scudder, already favorably known as an Entomologist, and now engaged in the study of *Hæmulon* and the allied genera.

#### HÆMULON SEXFASCIATUS Gill.

The greatest height is nearly equal to three-tenths ( $\cdot 29$ ) of the extreme length, and barely exceeds the head's length ( $=28$ .) The diameter of the eye nearly equals a third of the latter length as well as the length of the snout. The supramaxillary bones reach behind nearly to the vertical from the front of the pupil. The teeth of the external row in the upper jaw are strongly curved; those of the lower much less. The preoperculum is emarginated behind by the production of its angle and is dentated. The dorsal fin is highest at its fourth or longest spine, which nearly equals an eighth ( $\cdot 13$ ) of the total length, and its last spines are much abbreviated, the eleventh little exceeding a quarter of the fourth ( $\cdot 63$ .) The second anal spine is as long or longer than the fourth dorsal. The caudal and pectoral fins are nearly equal, and contained about four and a half times ( $22-23$ ) in the total length.

D. XI. I. 16. A. III. 9  $\frac{1}{1}$ . Scales 50  $\frac{7}{18}$ .

The color is greyish-silver, with six broad bands on the body, the *first* between the nape and dorsal fin; the *second* under the first five spines; the *fourth* under the last spines, and the sixth mostly behind the dorsal fin.

#### HÆMULON FLAVIGUTTATUS Gill.

The greatest height does not much exceed a quarter of the extreme length, ( $\cdot 27$ ), of which the head forms a quarter. The eye's diameter equals a quarter of the head's length, and is less than the length of the snout. The supramaxillary bones end under the front of the pupils. The preoperculum is little emarginated behind and is pectinated. The fourth dorsal spine is longest, and equals a ninth ( $\cdot 11$ ) of the total length; the eleventh is as long or longer than the twelfth or second dorsal one, and equals a twentieth ( $\cdot 5$ ) of the length. The second anal spine equals an eleventh of the length. The caudal fin forms scarcely a fifth of the length, and the pectoral enters four times and a half in the same.

D. XI. I. 16. A. III. 10.  $\frac{7}{16}$ . Scales 53  $\frac{7}{16}$ .

The color is greyish, with sulphur-colored spots in the centre of each scale, forming above the lateral line and below the spinous dorsal oblique lines tending upwards and backwards, and on the caudal peduncle longitudinal lines, while under the lateral line they form longitudinal undulating lines.

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## Genus ORTHOSTÆCHUS\* Gill.

This genus is proposed for species which differ from *Hæmulon* by the arrangement of the scales above as well as below the lateral line in longitudinal rows, and the straight course of the anterior portion of the lateral line. In other respects it resembles *Hæmulon*. The arrangement of the scales approximates it rather to the genera *Pristipoma* (*hasta*) and *Conodon* of Cuvier, but the dorsal and anal fins in both of those genera are scaleless.

## ORTHOSTÆCHUS MACULICAUDA Gill.

The greatest height equals 28-100ths of the total length, and the head rather more than a quarter. The diameter of the orbit equals a quarter ( $\cdot 07$ ) of the greatest height, and is less than the length of the snout ( $= \cdot 08$ .) The supra-maxillary bone ends under or somewhat behind the front of the pupil. The teeth of the external row are of moderate size and moderately curved. The preoperculum is emarginated behind and pectinated or dentated. The fourth dorsal spine equals or exceeds a ninth of the total length, and is scarcely shorter than the third and fifth, while it is nearly three times as long as the twelfth, which itself is shorter than that in front of the second dorsal. The second anal spine equals a tenth of the total length. The caudal fin forms less than a fifth, and the pectoral fin enters about four times and a third in the length.

D. XII. I. 16. A. III. 10.

7  
Scales 47 —.  
16

The color is purplish grey, with longitudinal lines on the body formed by yellow spots in the centre of each scale, and with an oblong black spot on each side of the end of the caudal peduncle.

There are sometimes irregularities in the squamation. In the collection are four varieties.

1st. With all the rows straight.

2d. With the third row below the lateral line in front decurved and continued, as the fourth row, to the caudal.

3d. With the second row below the lateral line in front bent upwards and confluent with the first row.

4th. With the first row above the lateral line in front bent upwards and continued as the second row to the caudal.

These aberrations are caused by the displacement of the rows, and correspondingly affect the rows above or below. They exhibit the tendency to revert to the arrangement of scales of *Hæmulon*.

## Genus MICROLEPIDOTUS Gill.

The present is closely related to *Hæmulon* and *Orthostæchus*; it differs from the latter by the arrangement of the scales above the lateral line in oblique rows, and from both in the following characters:—

1st. The scales are small. 2d. The mouth is rather small. 3d. The second dorsal spine is at least half as long as the third, which equals or surpasses the others. 4th. The anal spines are rather small and graduated, the third being longest. 5th. The dorsal and anal fins are scaleless. In other respects the genus resembles *Hæmulon*.

It differs from *Pristipoma* (*hasta*) by—

1st. The small scales, obliquely arranged. 2d. The rather smaller mouth. 3d. The development of the anterior dorsal spines. 4th. The small and graduated anal spines.

The name *Microlepidotus* is given to the genus in imitation of *Hemilepidotus*.

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\* *Ὀρθός* (straight) and *στύχης* (row.)

## MICROLEPIDOTUS INORNATUS Gill.

The greatest height equals or nearly equals a quarter of the extreme length. The head equals the height; the diameter of the orbit enters about four times and a third ( $\cdot 05\frac{1}{2}$ ) in the head's length, and the snout three times and a half, ( $\cdot 07$ .) The supramaxillary bone ends under the posterior nostril. The teeth of the outer row are moderate and curved. The preoperculum is little emarginated behind, and is pectinated as usual. The first dorsal spine is weak, and not half as long as the second; the second spine is two-thirds as long as the third; the latter equals a tenth of the length, and is about as long as the fourth and fifth; the rest decrease towards the thirteenth, which is half as long as the second spine. The third anal spine is largest; its length does not equal half that of the third dorsal spine ( $=\cdot 04\frac{1}{2}$ .) The caudal fin scarcely forms a fifth of the length ( $\cdot 19$ ), and equals the length of the pectoral.

D. XIII. I. 15. A. III. 12.

9  
Scales\* 80—85 —.  
23

The scales of the lateral line behind are as large as the others and as much exposed. The color is brownish, tinged with a golden hue.

## Genus GENYTREMUS Gill.

This genus is proposed for the *Pristipoma bilineatum* Cuv. et Val., the species described below and the *P. melanopterum*, which are the only ones that I am able to positively refer to the genus. They differ from the *Anisotremi* by the less elevated body, depressed nape, the dorso-ocular region being incurved, the oblique snout, the more rapid increase in width of the pharyngeal bones behind and the pattern of coloration.

The *Pristipoma bicolor* of Castelnau, which is supposed by Dr. Günther to be, perhaps, "a variety only" of *P. melanopterum*, "or the type of the species, but with the coloration made from life," appears to me to be a typical *Anisotremus*, alike distinguished as such by form and pattern of color.

The *Diagramma cavifrons* Cuv. appears to represent a genus separated from *Genytrems* by the absence of a chin groove, the low preorbital bones, decurved snout and the presence of thirteen dorsal spines, which less rapidly decrease in length. The genus may be called *Genyatrems*.†

## GENYTREMUS INTERRUPTUS Gill.‡

This species is so closely allied to the *G. bilineatus* that it might be even considered as a variety, but it appears to differ by the steel blue color of the back and the discontinuance of the lateral band a short distance before the spot on the tail; at its end, the band is bounded below by the lateral line. In other respects, the two species are so similar that a detailed description would be only a repetition of that of *G. bilineatus*, and is not necessary in the present paper.

## Family MULLOIDÆ.

## Genus UPENEUS Cuvier.

## UPENEUS DENTATUS Gill.

The greatest height is less than a fifth ( $\cdot 18$ ) of the extreme length. The

\* The number of rows of scales and not the number through which the lateral line runs is counted.

† The *Pristipoma cantharinum* of Jenyns is the type of another Pacific genus, distinguished by the form of the head, the form of the fins and the squamation. The pre-orbital region is oblique and very deep. The genus may be named *Pristocantharus*.

‡ *Anisotremus tenuatus* Gill, Proc. Acad. Nat. Sciences, Phila., vol. xiii, p. 107.

*Pristipoma rodo* Morris, Proc. Acad. Nat. Sciences, Phila. vol.

*Habitat*.—Panama.

This is another species closely allied to a West Indian fish, but is undoubtedly distinct.

head forms a quarter of the length, and its height at the nape equals a sixth of same; the snout is gradually decurved, and its length equals an eleventh ( $\cdot 09$ ) of the total; the height of the preorbital bone at the angle of the mouth equals two-thirds ( $\cdot 06$ ) the length of the snout. The diameter of the eye nearly equals a third ( $\cdot 08$ ) of the head's length. The barbels extend nearly to the vertical of the preoperculum. The teeth are rather strong; in the upper jaw uniserial, in the lower biserial in front. The caudal fin forms more than a fifth ( $\cdot 22$ ) of the total length, and the pectoral fin equals a sixth of the same.

$\begin{array}{ccc} 1 & 1 & 2 \\ \text{D. VII. I. 7 --.} & \text{A. I. 5 --.} & \text{Scales 37 --.} \\ 1 & 1 & 6 \end{array}$

The color is a bright pink or rose, with a broad red band extending from the eye to the caudal fin, and suffusing the caudal itself.

This species is as closely related to the *Upeneus flavivittatus* (Poey) of the Caribbean Sea as any other species, but differs widely in dentition as well in the size of the scales, &c.

Three specimens, nearly four inches long, are in the collection.

Family *SCLENOIDÆ* (Cuv.) Gthr.

Subfamily *SCLENINÆ* (Bon.) Gill.

*UMBRINA DORSALIS* Gill.

The greatest height equals three-tenths ( $\cdot 30$ ) of the extreme length. The head forms a quarter ( $\cdot 25$ ) of the length and declines nearly in a straight line; at the vertical of the preopercular angle its height equals  $\cdot 22$ , and at the pupil  $\cdot 17$  of the total length. The diameter of the eye equals a third of the head's length, and that of the snout a quarter. The barbel is very short and thick. The preopercular teeth behind are small and distant.

The spinous dorsal is convex; the second anal spine strong and equal to a tenth of the total length. The caudal fin is subtruncated, and forms a fifth of the length. The pectoral enters six times and two-thirds ( $\cdot 15$ ) and ventral five times and a half ( $\cdot 18$ ) in the same length.

D. X. I. 33. A. II. 7.

$\begin{array}{c} 8 \\ \text{Scales 56 --.} \\ 14 \end{array}$

The color is silvery, tinged on the back with rose. The upper half of the dorsal fins are sometimes punctulated with black.

*UMBRINA XANTI* Gill.

The height is rather less than a quarter ( $\cdot 23$ ) of the total length. The length of the head equals the greatest height, and is nearly a quarter greater than the height at the preopercular angle ( $\cdot 18$ ) and twice that at the pupil ( $\cdot 12$ ). The diameter of the orbit nearly equals a third ( $\cdot 07$ ) of the head's length, while the snout enters about four times and a half ( $\cdot 05$ ) in the same. The barbel is short and moderately thick. The teeth of the preoperculum behind small and distant. The spinous dorsal is rather angular; the second anal spine not robust and equalling an eleventh ( $\cdot 09$ ) of the total length. The caudal enters five times and a half in the length; and its margin is nearly truncated. The pectoral fin rather exceeds an eighth ( $\cdot 13$ ) and the ventral a seventh ( $\cdot 15$ ) of the length.

D. X. I. 28. A. II. 6.

$\begin{array}{c} 7 \\ \text{Scales 51 --.} \\ 12 \end{array}$

The color is silvery, tinged with purplish on the back, and with faint oblique  
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lines running upwards and backwards. The first dorsal is generally more or less punctulated with black.

Many specimens were obtained. The species is, perhaps, most nearly related to the *U. broussonettii* (Cuv. et Val.) of the West Indies, but differs widely in color, size of the scales, &c.

A species of Sciænoid of California has been described by Dr. Girard as *Umbrina undulata*. I have not been able to examine the species, the only specimen having been lent to Mr. Scudder, of the Cambridge Zoological Museum, who is now engaged in the study of *Hamulon* and the related genera. I am unable to judge, from the description of Girard, to what this species is most nearly related. On account of the presence of a single spine and nine rays in the anal fin, it was formerly referred to *Menticirrhus*, but if Girard is correct in describing the caudal fin as "posteriorly subtruncated," it can scarcely belong to that genus. Girard states that "a small spine is placed between the two dorsal fins, and a similar one at the anterior margin of the second dorsal," and attributes "XI." spines to the first dorsal. Doubtless the membrane had been simply torn from the "small spine," and it is possible that he included the spine of the second dorsal as the eleventh. He must certainly be mistaken when he attributes only four (IV.; IV.) branchiostegal rays to the species. The color resembles that of *Umbrina Xanti*.

#### Family POLYNEMATOIDÆ Bleeker.

##### TRICHIDION APPROXIMANS Gill.

Proc. of the Academy of Nat. Sciences of Phila., vol. xiii. p. 275.

Polynemus approximans *Lay and Bennett*, Beechey's Voyage to the Pacific, Zoology, p. 57.

Polynemus xanthonemus? *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 325.

Many specimens were collected.

#### Family NEMATISTIOIDÆ Gill.

##### Genus NEMATISTIUS Gill.

Body oblong or rather elongated, compressed, regularly diminishing in height towards the caudal; the caudal peduncle is slender but robust. Scales cycloid and small, but very conspicuous, and arranged in moderately oblique rows above and less oblique ones below. Lateral line simple and unarmed, scarcely convex before and not angulated. Head little longer than high, compressed and trenchant above, with the profile strongly decurved from the dorsal fin to the eyes, and with the snout oblique. Eyes in the anterior half of the head, near the snout and the profile. Nostrils double, in front of the eyes. Sub-orbital bones low. Opercula unarmed. Mouth rather large; the cleft very oblique and continued under the eyes. Teeth villiform and small, especially on the vomer and palatine bones. Branchiostegal rays six. Dorsal fins two, folding in a deep sheath; the first with eight filamentous spines; the second low and elongated. Anal fin low and oblong, shorter than the second dorsal and with one spine. Caudal fin forked and acutely lobed. Pectoral fins acuminate. Ventral fins inserted under the bases of the pectorals; each with a long, slender, compressed spine contiguous to the first ray and with six rays, the internal of which is compound, and has several contiguous branches nearly or quite distinct.

This very remarkable genus may be most aptly compared to *Coryphæna*. A more vivid idea of its physiognomy can be obtained by a comparison with the *Coryphæna hippuris*; if that species was somewhat abbreviated, the eye placed over the posterior half of the cleft of the mouth and nearer the profile, the single dorsal replaced by two, the first commencing above the pectoral and 1862.]

with eight filamentous spines, and the pectoral fin elongated, it would resemble a *Nematistius*.

The peculiar modification of the ventral fins reminds the naturalist of the genus *Lampris*, the type of a peculiar family, but in other respects it is little related. On account of this modification of the ventral fins, as well as the development of the dorsal fins and the form, it appears expedient to consider it as the type of a distinct family, allied to the Carangoids and Coryphænoids.

#### NEMATISTIUS PECTORALIS Gill.

The greatest height equals or exceeds a quarter of the length from the snout to the end of the median caudal rays. The head nearly equals the height, and the height at the nape is not much less (.22—.24.) The direct distance between the orbits equals a third of the head's length; the orbit has a diameter equal to a fourth of the same length, is distant from the horizon of the forehead half a diameter, and from that of the snout little more than a diameter. The height of the suborbital bone equals a third of the diameter. The origin of the anal fin is nearly equidistant from the throat and the end of the caudal. The pectoral equals about three-tenths of the length and is nearly twice as long as the ventrals. The median rays of the caudal fin equal the length of the snout and quarter that of the longest.

D. VIII. I. 26. A. I. 15. P. I. 1. 14. V. I. 5—4.

The color of a dried specimen is plumbeous on the back and operculum, and silvery on the sides of the head as well as body. The dorsal filaments are black; the lower half of the pectoral fin is also blackish.

The following table of measurements is taken from the dried specimen, the only one obtained. It has been registered as No. 2421.

Length from snout to end of median caudal rays (16 inches) 100. Body—greatest height 26. Height behind dorsal and anal .09. Height of caudal peduncle .06. Length of caudal peduncle .11.

Head—Length laterally 24. Height at nape 22. Width between orbits  $8\frac{1}{2}$ .

Length of snout  $6\frac{1}{2}$ . Height of suborbital bone 2.

Eye—Diameter 6. Distance from profile 3.

Dorsal (spinous)—Length of first spine  $6\frac{1}{2}$ . Length of second spine 31.

Length of third spine 55. Length of fourth spine 53. Length of fifth spine 52.

Length of sixth spine 41. Length of seventh spine 36. Length of eighth spine 43.

Caudal—Length of median rays  $6\frac{1}{2}$ . Length of longest rays 25.

Pectoral—Length 31.

Ventral—Length 16.

#### Family CIRRHITOIDÆ (Gray.)

##### Subfamily CIRRHITINÆ (Blkr.) Gill.

##### Genus CIRRHITUS Lac.

##### CIRRHITUS RIVULATUS Val.

Voyage de la Vénus, Zoologie, p. 309, pl. 3, fig. 1. *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 519. *Gill*, Proc. Academy of Nat. Sciences of Phila., &c., vol. xiv. 1862, p. 107.

A single stuffed specimen, fifteen inches long, was sent to the Institution by Mr. Xantus.

##### CIRRHITUS BETAURUS Gill.

The greatest height exceeds a quarter (.27) of the extreme length, and the head forms nearly a third (.32) of the same. The preoperculum is serrated behind. In the small specimen now described, the diameter of the orbit is contained little more than three times and a half in the head's length and equals the snout. The fourth dorsal spine is longest, and equals a ninth of 1862.]

the total length. The second anal spine is largest, and equals the fourth dorsal one; the longest soft ray enters six times and two thirds in the total length. The caudal fin is slightly emarginated and nearly equals a fifth of the length. The produced pectoral ray rather exceeds a quarter of the length, and the ventral fins enter five times and a half in the same.

D. X. 11. A. III. 5 <sup>1</sup>-. P. 6. VI. V. I. 5.  
1

The color is *whitish* on the body, blackish on the shoulders and from the dorsal fin to the eyes, and with four complete, oblique, blackish bands; the first under the middle of the spinous dorsal; the second under the last spine; the third under the middle of the soft dorsal, and the fourth encircling the caudal peduncle. The head has three lateral bands, one on the preorbital region, a second on the cheek, and third on the posterior margin of the preoperculum. The operculum has a longitudinal oblong spot. The chin has four spots forming the angles of a rhomb, and there is another one behind, on the branchiostegal membrane near the margin. The spinous dorsal is margined with blackish, and the two bands beneath more or less ascend on it; anal blackish. The caudal has a blackish B-shaped mark and a band at its base divided by the lateral line. The pectoral is dusky, with a black spot at its base nearly surrounded by a clear area, and separated from a spot in front of the base. The ventrals are blackish, with nearly transparent sides and margin.

This species is very distinct, readily recognized by the color, and especially the large mark on the caudal fin,—in allusion to which the name has been given. It is, perhaps, most nearly allied to *Cirrhitus aprinus*. One specimen, scarcely an inch and a half long, was obtained.

Family *SCOMBROIDÆ* (Cuv.) Gill.

Subfamily *SCOMBRINÆ* Swainson.

Genus *SCOMBER* (L.)

*SCOMBER* DIEGO Ayres.

Proc. California Academy Nat. Sciences, vol. i. p. 92.

Three specimens of a species which is doubtless identical with the one described by Dr. Ayres, were obtained.

Family *CARANGOIDÆ* Blkr.

Subfamily *CARANGINÆ* (Bon.)

Genus *TRACHURUS* (Raf.)

*TRACHURUS* SYMMETRICUS Girard.

*Caranx symmetricus* Ayres, Proc. California Academy of Nat. Sciences, pt. 1, p. 62.

*Trachurus trachurus* pt. *Günther*.

After an examination of numerous specimens, I am unable to discover any valid reasons for uniting the European, Japanese and Californian fishes in one. They differ in the course of the lateral line, the comparative size of the pectoral, &c., and can be readily distinguished at the first glance. The Californian species has the flexure very abrupt and oblique, and the pectoral fin equal to the length of the head before the preoperculum. The *Trachurus declivis* of the Australian seas is not represented in the Smithsonian Collection, but I am disposed to believe that that species may also be distinguished from the Japanese species, to which it is most related. At another time I will again revert to this subject.

[May,

It may be remarked, that the *Trachurus boops* of Girard is a typical *Caranx* of Bleeker, and nearly allied to a species previously placed by Girard in a genus called by him "*Carangus* Girard." Dr. Günther has called attention to the discrepancy between Girard's diagnosis of *Trachurus* and that of *Trachurus boops*. The name of *Caranx boops* has been given by Cuvier and Valenciennes to a Carangoid, but, as the species belong to different genera, the name of *Caranx boops* may be retained for the Californian fish. A near ally is the common *Caranx chrysos* (Dekay) of the Atlantic coast.

#### Genus TRACHUROPS Gill.

##### TRACHUROPS BRACHYCHIRUS Gill.

This species is very closely related to the *Trachurops crumenophthalmus* of the Atlantic, but appears to differ by the less length of the pectoral fins. The description of form, &c. would be equally applicable for the two; for the present, therefore, the following formulæ for the two specimens in the collection and the annexed table of measurements are deemed sufficient. The tips of the caudal lobes are broken in both specimens.

D. VII. + I. I. 26. A. II. I. 22.

Lateral acute plates 36, 37.

*Trachurops* differs from *Trachurus* by the presence of scutellæ only on the hinder half of the lateral line.

Length to end of middle caudal rays (8 1-5th-8,) 100 (+ 14.) Body—Greatest height 26-25. Distance of vertical of end of dorsal to end of median caudal rays 16-16.

Head—Greatest length 29-29½. Distance from snout to end of spine 28-28½. Width of interorbital area .07. Length of snout 8-8½. Length of operculum .07.

Orbit—Diameter 9-9.

Dorsal—Height of third spine 13-13. Height at longest ray 12-11½.

Anal—Height at longest ray 11½-10.

Caudal—Length of middle rays 7½. Length of external rays 21 + 4.

Pectoral—Length 24-24.

Ventral—Length 14-13.

#### Genus DECAPTERUS Bleeker.

The genus *Decapterus* of Bleeker appears to be a natural and homogeneous one, but at the same time embraces species which differ considerably in dentition, and which may consequently be distributed among sections distinguished by such differences. The dentition appears to be constant in the species and to be at least of equal value with that which has induced naturalists to subdivide the analogous family of Clupeoids.

The sections known to us are the following:

**EUSTOMATODUS.** Teeth on the jaws (uniserial), vomer, palatine bones and tongue.

*Decapterus muroadsi* *Blkr.* *D. kurroides* *Blkr.*

**DECAPTERUS VERUS.** Teeth on the jaws (uniserial), vomer and palatine bones. Tongue smooth.

*Decapterus kurra* *Blkr.*

**GYMNEPIGNATHUS.** Teeth on the lower jaw (uniserial), vomer and palatine bones. Tongue and upper jaw smooth.

*Decapterus macrosoma* *Blkr.*

**EVERPIGYMUS.** Teeth on the lower jaw (uniserial), and tongue. Upper jaw and palate smooth.

*Decapterus hypodus* *Gill.*

1862.]

## DECAPTERUS HYPODUS Gill.

The greatest height is less than a fifth ( $\cdot 18$ ) of the total length. The head forms a quarter of the same. The diameter of the orbit equals a quarter of the head's length, and the snout enters three times and a third in the same. The lateral line has a very slight sigmoidal flexure and is covered with very conspicuous discoid scales; the lateral line is trifid on each scale, giving out an oblique process above and another below. The teeth on the lower jaw are small and uniserial; the tongue has a longitudinal narrow band.

D. VII. I. 31—I. A. II. I. 26—I.

Lateral line ( $70+$ ) 30.

The color above is greenish-blue; the opercular spot small.

Five specimens were obtained. It is, perhaps, most closely related to *Decapterus macarellus*,—the *Caranx macarellus* of Cuvier and Valenciennes, which differs at least in proportions as well as the number of rays and plates of the lateral line. The dentition has not been described, and the species is autotypically unknown to me.

## BLEPHARICHTHYS CRINITUS Gill.

I have not been yet able to satisfy myself as to the specific distinction between representatives of this genus from widely separated places, and therefore prefer for the present to refer two specimens obtained by Mr. Xantus at Cape St. Lucas to the species above named.

## Subfamily TRACHYNOTINÆ Gill.

## TRACHYNOTUS PAMPANUS Cuv. et Val.

As in the case of *Blepharichthys*, I cannot give any positive characters to distinguish the Atlantic and Californian representatives of *Trachynotus* from each other. With Günther, I believe that *Bothrolæmus pampanus* of Holbrook is the aged form of *Doliodon carolinus*, in which the teeth are lost. In the specimen described by Dekay, said to have the "teeth so minute as scarcely to be distinguished," I cannot distinguish even minute teeth. Trusting to the American naturalists who had, I supposed, fully studied the species, I retained in the Catalogue of the Fishes of the Eastern Coast the four species and three genera admitted by them; they are apparently, however, as stated by Günther, referrible to two species belonging to one genus.

NOTE.—Very young *Carangoids* have a *trispinous preoperculum*, and always a distinct spinous dorsal fin. *Nanclerus* and *Seriola dussumieri* are founded on young specimens of *Nancrates*.

## Description of a New Genus (GONIOBASIS) of the Family MELANIDÆ and eighty-two new Species.

BY ISAAC LEA

Family MELANIDÆ.

Genus GONIOBASIS.\*

Testa vel conica vel fusiformi. Apertura rhomboidea, infernè subangulata. Columella supernè interdum incrassata. Operculum corneum, ad spiram pertinens.†

In my paper on the genus *Trypanostoma*, proposed by me, I mentioned the

\* *Γωνία*, angle, and *βάσις*, base.

† This genus may be divided into two groups, one embracing the conical, the other, the fusiform species, and these into smooth, plicate, carinate, &c.



importance of eliminating as many species as possible from *Melania*, which is so enormously extended as almost to prevent the possibility of finding suitable names for its species. In the Proceedings of the Academy, December, 1861, I stated that Professor Haldeman's genus *Lithasia* formed a very excellent group. In working up a very large number of the family *Melanidæ*, obtained from the Southern and Western States, I have, notwithstanding the divisions which had been made, found myself embarrassed with that form of aperture, which is quite different from the auger-mouthed (*Trypanostoma*) species and the *Lithasia*, to which latter they are most nearly allied. I mean those which usually, though not always, have a slight thickening of the upper part of the columella and no callus below, and which are also without the notch of *Lithasia*, although subangular at base. In this subangular character they differ from *Melania* proper, which are round or loop-like at the base. For this group I propose the name of *Goniobasis*,\* which will give us for our American *Melanidæ* the following genera, all of them having spiral opercula:

*Melania*, † Lam. *Anculosa*, Say. *Io*, Lea. *Lithasia*, Hald. *Schizostoma*, Lea. *Strephobasis*, Lea. *Trypanostoma*, Lea. *Goniobasis*, Lea. *Ammicola*, Gould and Hald.

They may be known by

*Melania* having a regular loop-form aperture.

*Anculosa* having a rounded aperture and a callous columella.

*Io* having a greater or less elongate channel or spout at the base.

*Lithasia* having a callus on the columella above and below, and a notch at the base.

*Schizostoma* having a cut in the upper part of the outer lip.

*Strephobasis* having a retrorse callus at base and usually a squarish aperture.

*Trypanostoma* having an expanded outer lip and an auger-shaped aperture.

*Goniobasis* having usually a subrhomboidal aperture, subangular at base and without a channel.

*Ammicola* ‡ having a round mouth and no callus.

GONIOBASIS OSCULATA.—Testâ lævi, pupæformi, subelevatâ, subcrassâ, luteofusâ, quadrivittatâ; spirâ subelevatâ; suturis valdè et irregulariter impressis; anfractibus septenis, convexiusculis; aperturâ parvâ, constrictâ, subellipticâ, intus albidâ et vittatâ; labro acuto; columellâ albâ, inflectâ, ad basim contortâ et subangulatâ.

Hab.—Coosa River, Alabama, E. R. Showalter, M. D.

GONIOBASIS BRUMBYI.—Testâ lævi, attenuatâ, subtenui, cinereâ, quadrivittatâ; spirâ attenuatâ, ad apicem carinatâ; suturis valdè impressis; anfractibus instar octonis, convexiusculis; aperturâ parvâ, subrhomboideâ, intus albidâ et quadrivittatâ; labro acuto; columellâ inflectâ, ad basim obtusè angulatâ.

Hab.—Alabama, Prof. Brumby.

GONIOBASIS GROSVENORII.—Testâ lævi, subattenuatâ, tenui, corneâ, fulgidâ, evittatâ; spirâ subattenuatâ, mucronatâ, ad apicem carinatâ; suturis regulariter et valdè impressis; anfractibus octonis, convexis; aperturâ parvâ, subrotundâ; intus albidâ; labro acuto, paulisper sinuoso; columellâ inflectâ, tenui et contortâ.

Hab.—Fox River, Illinois, H. C. Grosvenor; and Quincy, Ohio, J. Clark.

\* Adams's *Elimia* takes in part of this genus.

† Cuvier describes *Melania* as having long tentacula, the eyes being on the exterior side about the third of the length. The eyes of *Melania Virginia*, Say, are at the base of short tentacula. I very much doubt if we have a single species in the United States which properly belongs to this genus, which Cuvier considered *amarula* as the type and Lamarck *asperata* as the type.

‡ *Ammicola*, although much like *Paludina*, is more nearly allied to the *Melanidæ*. The operculum is spiral, and therefore very different in this character from *Paludina*.

**GONIOBASIS PARVA.**—Testâ lævi, conicâ, tenui, corneâ, evittatâ; spirâ subelevationâ, mucronatâ; suturis impressis; anfractibus septenis, planulatis; aperturâ parviusculâ, intus albidâ, subrhomboideâ; labro acuto et sinuoso; columellâ inflectâ et paulisper incrassatâ.

*Hab.*—Georgia, Right Rev. Stephen Elliott.

**GONIOBASIS SPINELLA.**—Testâ lævi, valdè attenuatâ, tenui, tenebroso-olivâ, evittatâ; spirâ valdè elevatâ, mucronatâ; suturis regulariter impressis; anfractibus instar novenis, planulatis; aperturâ parvissimâ, ovatâ, intus albidâ; labro acuto, paulisper sinuoso; columellâ inflectâ et infernè paulisper incrassatâ.

*Hab.*—Sycamore, Claiborne County, Tennessee, J. Lewis, M. D.

**GONIOBASIS ESTABROOKII.**—Testâ lævi, conicâ, subtenui, rufo-corneâ, evittatâ; spirâ attenuato-conicâ, mucronatâ; suturis impressis; anfractibus denis, convexiusculis; aperturâ parviusculâ, ovatâ, intus albidâ; labro acuto, paulisper sinuoso; columellâ inflectâ.

*Hab.*—Knoxville, Tennessee, Prof. Estabrook.

**GONIOBASIS PRAIRIENSIS.**—Testâ lævi, attenuato-fusiformi, tenui, olivaceâ, fulgidâ, quadrovittatâ; spirâ elevatâ, mucronatâ; suturis regulariter impressis; anfractibus novenis, planulatis; aperturâ submagnâ, subrhomboideâ, intus albidâ et quadrivittatâ; labro acuto et sinuoso; columellâ inflectâ et contortâ.

*Hab.*—Big Prairie Creek, Alabama, E. R. Showalter, M. D.

**GONIOBASIS ETOWAHENSIS.**—Testâ lævi, conoideâ, tenui, tenebrosâ, bivittatâ; spirâ subelevatâ; suturis impressis; anfractibus septenis, convexiusculis; aperturâ submagnâ, subrhomboideâ, intus tenebrosâ et latè bivittatâ; labro acuto et sinuoso; columellâ inflectâ et valdè contortâ.

*Hab.*—Etowah River, Georgia, J. Postell.

**GONIOBASIS DRAYTONII.**—Testâ lævi, conoideâ, crassiusculâ, tenebroso-castaneâ, evittatâ vel obsoletè vittatâ; spirâ subelevatâ; suturis valdè impressis; anfractibus instar senis, convexis; aperturâ parvâ, ovatâ, intus tenebroso-fuscâ; labro acuto, paulisper sinuoso; columellâ valdè inflectâ et contortâ.

*Hab.*—Fort George, Oregon, J. Drayton; also at Walla.

**GONIOBASIS TENEBROVITTATA.**—Testâ lævi, elevato-conicâ, subtenui, flavesciente vel vittatâ vel evittatâ; spirâ subelevatâ; suturis paulisper impressis; anfractibus subgrandi, subrhomboideâ, intus albidâ; labro acuto, paulisper sinuoso; columellâ paulisper inflectâ.

*Hab.*—Coosa River, W. Spillman, M. D.

**GONIOBASIS SPILLMANII.**—Testâ lævi, fusiformi, tenui, virido-corneâ, fulgidâ, evittatâ; spirâ obtusè conoideâ; suturis linearibus; anfractibus instar senis, planulatis, infra suturis subimpressis; aperturâ magnâ, rhomboideâ, intus diaphanâ; labro acuto, paulisper sinuoso; columellâ paulisper inflectâ et tenui.

*Hab.*—Tennessee River, W. Spillman, M. D.

**GONIOBASIS FLAVA.**—Testâ lævi, obtuso-conicâ, subtenui, flavâ, trivittatâ; spirâ obtuso-conicâ; suturis valdè impressis; anfractibus instar senis, convexiusculis; aperturâ parviusculâ, ovatâ, intus albâ et trivittatâ; labro acuto, paulisper sinuoso; columellâ incurvâ, incrassatâ.

*Hab.*—Benton County? Northwest Alabama, G. Hallenbeck.

**GONIOBASIS ANTHONYI.**—Testâ lævi, obtuso-conicâ, subtenui, micanti, tenebroso-castaneâ, evittatâ; spirâ obtusâ; suturis impressis; anfractibus instar senis, convexiusculis; aperturâ subgrandi, elongato-rhombicâ, intus fuscesciente; labro acuto, ad marginem albidâ et paulisper inspissatâ; columellâ incurvâ et valdè contortâ.

*Hab.*—Tennessee, J. G. Anthony.

[May,

*GONIOBASIS GABBIANA*.—Testâ lævi, subfusiformi, subtenui, cornea, evittatâ; spirâ paulisper exertans, mucronatâ; suturis impressis; anfractibus instar octonis, convexis, varicosis; aperturâ parviusculâ, subrhomboideâ, intus albidâ; labro acuto, paulisper sinuoso; columellâ incurvâ et contortâ.

*Hab.*—Tennessee, Prof. G. Troost. Alabama, Prof. Tuomey.

*GONIOBASIS BRIDGESIANA*.—Testâ lævi, fusiformi, subinflatâ, subtenui, melleâ, evittatâ; spirâ obtusè conicâ, ad apicem carinatâ; suturis linearibus; anfractibus instar septenis, planulatis; aperturâ magnâ, subrhomboideâ, intus albidâ; labro acuto, vix sinuoso; columellâ subinflectâ, internè et supernè incrassatâ et paulisper contortâ.

*Hab.*—Cahawba River, Alabama, E. R. Showalter, M. D.

*GONIOBASIS INTERCEDENS*.—Testâ lævi, fusiformi, subtenui, melleâ, fulgidâ, evittatâ; spirâ conoideâ, mucronatâ, ad apicem carinatâ; suturis linearibus; anfractibus octonis, planulatis, varicosis; aperturâ submagnâ, rhomboideâ, intus albidâ; labro acuto, vix sinuoso; columellâ subinflectâ, paulisper incrassatâ, infernè subrectâ.

*Hab.*—Cahawba River, Alabama, E. R. Showalter, M. D.

*GONIOBASIS OHIENSIS*.—Testâ lævi, conicâ, subtenui, evittatâ; spirâ obtusè conicâ, mucronatâ, ad apicem carinatâ; suturis valdè impressis; anfractibus instar novenis, convexis; aperturâ parvâ, subrotundâ, intus albâ; labro acuto, vix sinuoso; columellâ inflectâ, valdè incrassatâ.

*Hab.*—Yellow Springs, Ohio.

*GONIOBASIS CINEREA*.—Testâ lævi, conoideâ, tenui, cinereâ, fulgidâ; spirâ obtusè conicâ, mucronatâ, ad apicem carinatâ; suturis valdè impressis; anfractibus octonis, convexiusculis; aperturâ submagnâ, subrhomboideâ, intus cæruleo-albâ; labro acuto, paulisper sinuoso; columellâ incurvâ; paulisper incrassatâ et purpurecente.

*Hab.*—South Carolina, Professor L. Vauxem.

*GONIOBASIS VANHEMII*.—Testâ lævi, fusiformi, subcrassâ, tenebroso-corneâ; spirâ obtusè conoideâ; suturis impressis; anfractibus septenis, subconvexis; aperturâ magnâ, subrhomboideâ, intus albidâ vel purpureâ; labro acuto, paulisper sinuoso; columellâ incurvâ, supernè et infernè incrassatâ.

*Hab.*—North Fork of the Holston River, Virginia, Prof. L. Vauxem.

*GONIOBASIS SPARTENBURGENSIS*.—Testâ lævi, fusiformi, subtenui, virido-corneâ, fulgidâ, vittatâ vel evittatâ; spirâ acutè conicâ, ad apicem carinatâ; suturis impressis; anfractibus octonis, planulatis; aperturâ submagnâ, elongato-rhomboidèâ, intus albidâ; labro acuto, vix sinuoso; columellâ paulisper incurvâ, infernè incrassatâ.

*Hab.*—Spartenburg District, S. Carolina. Prof. L. Vauxem. Marietta, Ohio. Dr. Hildreth. Wabash River, Indiana, H. C. Grosvenor.

*GONIOBASIS AURICOMA*.—Testâ lævi, fusiformi, subtenui, melleâ, vittatâ; spirâ valdè obtusâ; suturis linearibus; anfractibus quinis, vix convexis; aperturâ pergrandi, subrhomboideâ, intus flavescente; labro acuto, vix sinuoso; columellâ incurvâ, paulisper incrassatâ.

*Hab.*—Tennessee River, W. Spillman, M. D.

*GONIOBASIS GEORGIANA*.—Testâ lævi, fusiformi, inflatâ, subcrassâ, luteâ, fulgidâ, vittatâ; spirâ valdè obtusâ; suturis impressis; anfractibus quinis, convexis; aperturâ grandi, subrhomboideâ, intus albidâ et vittatâ; labro acuto, recto; columellâ incurvâ, incrassatâ, parum contortâ.

*Hab.*—North Georgia.

*GONIOBASIS VAUXIANA*.—Testâ lævi, fusiformi, subtenui, viridi; spirâ valdè obtusâ; suturis parum impressis; anfractibus quinis, supernè planulatis et

carinatis; aperturâ pergrandi, lato-rhomboidêâ; labro acuto, recto; columellâ parum incurvâ.

*Hab.*—Coosa River, Alabama, Prof. Brumby.

**GONIOBASIS WHITEI.**—Testâ lævi, fusiformi, crassâ, valdè inflatâ, luteo-fuscâ, fulgidâ trivittatâ; spirâ valdè obtusâ; suturis parum impressis; anfractibus quinis, supernè planulatis, ultimo ventricosos; aperturâ pergrandi, lato-rhomboidêâ; labro acuto, recto; columellâ incurvâ, incrassatâ et contortâ.

*Hab.*—Georgia, Rev. G. White.

**GONIOBASIS BINNEYIANA.**—Testâ lævi, obtuso-fusiformi, subtenui, valdè inflatâ, tenebroso-olivâ, obsolete vittatâ; spirâ depressâ; suturis impressis; anfractibus quinis, supernè planulatis, ultimo ventricosos; aperturâ pergrandi, subovatâ, intus tenebrosâ; labro acuto, parum sinuoso; columellâ incrassatâ, ad basim maculatâ.

*Hab.*—Coosa River, Alabama, W. Spillman, M. D.

**GONIOBASIS TUOMEYI.**—Testâ lævi, fusiformi, crassiusculâ, luteo-olivâ, vittatâ vel evittatâ; spirâ obtuso-conicâ, ad apicem minutè plicatâ; suturis impressis; anfractibus instar senis, supernè planulatis, ultimo subventricosos; aperturâ grandi, rhomboidêâ, intus albidâ; labro acuto, parum sinuoso; columellâ incrassatâ, incurvâ et contortâ.

*Hab.*—North Alabama, Prof. M. Tuomey.

**GONIOBASIS FABALIS.**—Testâ lævi, ellipticâ, crassâ, luteâ, quadro-vittatâ; spirâ valdè obtusâ; suturis irregulariter impressis; anfractibus quaternis, supernè convexiusculis, ultimo pergrandi; aperturâ magnâ, subrhomboidêâ, intus albidâ et vittatâ; labro acuto, vix sinuoso; columellâ infernè et supernè incrassatâ.

*Hab.*—Tennessee River, W. Spillman, M. D.

**GONIOBASIS GIBBEROSA.**—Testâ lævi, subfusiformi, crassâ, pallido-castaneâ vel rufo-castaneâ, vittatâ vel evittatâ; spirâ obtusâ; suturis irregulariter impressis; anfractibus gibberos, supernè convexiusculis, ultimo pergrandi, aperturâ pergrandi, rhomboidêâ, intus albâ; labro acuto, sinuoso; columellâ incurvâ, supernè et infernè incrassatâ.

*Hab.*—Alabama River, E. R. Showalter, M. D.

**GONIOBASIS LYONII.**—Testâ plicatâ, supernè striatâ et ad apicem carinatâ, luteolâ, subtenui, valdè exertâ; spirâ attenuatâ, mucronatâ; suturis irregulariter impressis; anfractibus novenis, convexiusculis; aperturâ parviusculâ, subrhomboidêâ, intus albidâ; labro acuto, sinuoso; columellâ incurvâ, incrassatâ, parum contortâ.

*Hab.*—Grayson County, Kentucky, S. S. Lyon.

**GONIOBASIS PYBASII.**—Testâ plicatâ, valdè exertâ, luteolâ, tenui, vittatâ; spirâ attenuatâ, mucronatâ; suturis impressis; anfractibus septenis, planulatis; aperturâ ovato-rhomboidêâ, intus albidâ et vittatâ; labro acuto, sinuoso; columellâ paulisper incurvâ, parum incrassatâ et contortâ.

*Hab.*—Tusculum, Alabama, B. Pybas.

**GONIOBASIS DUTTONII.**—Testâ plicatâ, conoideâ, dilutè rufo-luteâ, crassâ, bivittatâ; spirâ conoideâ; suturis irregulariter impressis; anfractibus instar septenis, subconvexis; aperturâ ovato-rhomboidêâ, intus albâ et lato-vittatâ; labro acuto, sinuoso; columellâ incurvâ, incrassatâ et valdè contortâ.

*Hab.*—Maurey County, Tennessee, T. R. Dutton. Grayson County, Kentucky, S. S. Lyon.

**GONIOBASIS DOOLYENSIS.**—Testâ plicatâ, subcylindrâ, tenebroso-corneâ vel subsinereâ, tenui, evittatâ; spirâ attenuatâ; suturis irregulariter impressis; anfractibus instar novenis, convexiusculis, aperturâ parvâ, ovato-rhomboidêâ,

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intus albidâ; labro acuto, sinuoso; columellâ valdè incurvâ, in medio impressâ et valdè contortâ.

*Hab.*—Tennessee, Prof. Troost. Near Vienna, Dooly County, Georgia, in a small stream tributary to Flint River, Rev. G. White.

*GONIOBASIS VIENNAENSIS.*—Testâ plicatâ, subfusiformi, olivaceâ, subtenui, evittatâ; spirâ regulariter conicâ; suturis irregulariter impressis; anfractibus septenis, planulatis; aperturâ subgrandi, rhomboideâ, intus cæruleo-albâ; labro acuto, sinuoso; columellâ incurvâ, infernè incrassatâ, parum contortâ.

*Hab.*—Near Vienna, Dooly County, Georgia, in a small stream tributary to Flint River, Rev. G. White.

*GONIOBASIS STRENUA.*—Testâ plicatâ, subfusiformi, fusco-olivaceâ, subtenui, evittatâ; spirâ subelevatâ; suturis valdè impressis; anfractibus instar septenis, planulatis; aperturâ subgrandi, ovato-rhomboideâ, intus albidâ; labro acuto, subsinuoso; columellâ incurvâ et contortâ.

*Hab.*—Benton County? Northwest Alabama, G. Hallenbeck.

*GONIOBASIS SPARUS.*—Testâ plicatâ, subattenuatâ, pallido-flavescente, subcrassâ, evittatâ; spirâ attenuatâ, mucronatâ; suturis irregulariter impressis; anfractibus octonis, convexiusculis; aperturâ submagnâ, ovato-rhomboideâ, intus albâ; labro acuto, sinuoso; columellâ parum incurvâ, supernè luteâ, infernè albâ, contortâ.

*Hab.*—Tennessee, Dr. Currey and Prof. Lindsley.

*GONIOBASIS DIFFICILIS.*—Testâ plicatâ, subattenuatâ, tenebroso-olivâ vel fuscescente, subtenui, evittatâ; spirâ attenuatâ, mucronatâ; suturis regulariter impressis; anfractibus instar octonis, convexiusculis; aperturâ parviusculâ, ovato-rhomboideâ, intus albidâ; labro acuto, subsinuoso; columellâ incurvâ, incrassatâ et contortâ.

*Hab.*—Tennessee, Dr. Edgar.

*GONIOBASIS BAIRDIANA.*—Testâ plicatâ, subattenuatâ, tenebroso-fuscâ, subcrassâ, unovittatâ; spirâ subattenuatâ, mucronatâ; suturis impressis; anfractibus octonis, convexiusculis; aperturâ parviusculâ, ovato-rhomboideâ, intus albidâ et unovittatâ; labro acuto, vix sinuoso; columellâ incurvâ, parum incrassatâ et valdè contortâ.

*Hab.*—Columbia River, at Fort George, Oregon, J. Drayton.

*GONIOBASIS INCLINANS.*—Testâ valdè plicatâ, subattenuatâ, tenebroso-fuscâ, subtenui, obsoletè vittatâ; spirâ subattenuatâ, mucronatâ; suturis sulcatis; anfractibus octonis, planulatis, plicis inclinatibus indutis; aperturâ parvâ, rhomboideâ, intus dilutè fuscescente; labro acuto, sinuoso; columellâ valdè incurvâ, fusco-rufescente et valdè contortâ.

*Hab.*—Near Albany, Georgia, Rev. G. White. Etowah, J. Postell. Tusculumbia, Alabama, B. Pybas.

*GONIOBASIS INDUTA.*—Testâ valdè plicatâ, conicâ, subtenui, politâ, tenebro-sâ, quadrivittatâ; spirâ conoideâ, mucronatâ; suturis valdè impressis; anfractibus octonis, planulatis, plicis erectis indutis; aperturâ parvâ, rhomboideâ, intus albidâ et quadrivittatâ; labro acuto, subsinuoso; columellâ incurvâ et contortâ.

*Hab.*—Near Vienna, Dooly County, Georgia, Rev. G. White.

*GONIOBASIS LINDSLEYI.*—Testâ plicatâ, cylindraceo-conicâ, subtenui, luteo-corneâ, evittatâ; spirâ conoideâ; suturis irregulariter et valdè impressis; anfractibus planulatis, plicis erectis undutis; aperturâ parviusculâ, rhomboideâ, intus cæruleo-albâ; labro acuto, sinuoso; columellâ incurvâ et contortâ.

*Hab.*—Tennessee, Prof. Lindsley and Dr. Edgar.

**GONIOBASIS THORNTONII.**—Testâ rugoso-plicatâ, conoideâ, subtenui, corneâ, evittatâ; spirâ conoideâ; suturis irregulariter et valdè impressis; anfractibus convexiusculis, plicis flexis distantibus indutis; aperturâ submagnâ, rhomboideâ, intus albâ; labro acuto, sinuoso; columellâ subincurvâ, incrassatâ et contortâ.

*Hab.*—Tuscumbia, L. B. Thornton, Esq. Florence, Alabama, Rev. G. White.

**GONIOBASIS INTERVENIENS.**—Testâ plicatâ, conoideâ, subtenui, tenebroso-corneâ, vel fuscâ, vel bivittatâ vel evittatâ; spirâ obtusè conoideâ; suturis irregulariter et valdè impressis; anfractibus instar senis, planulatis, plicis paulisper flexis; aperturâ subgrandi, rhomboideâ, intus albâ vel vittatâ vel fuscâ; labro acuto, sinuoso; columellâ incurvâ et parum contortâ.

*Hab.*—North Alabama, Prof. Tuomey.

**GONIOBASIS CONTINENS.**—Testâ plicatâ, conoideâ, subtenui, luteo-corneâ, evittatâ; spirâ regulariter conicâ; suturis impressis; anfractibus instar septenis, convexiusculis, plicis paulisper flexis; aperturâ parviusculâ, ovato-rhomboideâ, intus cæruleo-albâ; labro acuto, vix sinuoso; columellâ parum incurvâ et contortâ.

*Hab.*—North Alabama, Prof. Tuomey.

**GONIOBASIS CEREÆ.**—Testâ plicatâ, conoideâ, subtenui, cereâ, evittatâ; spirâ conoideâ; suturis impressis; anfractibus senis, subconvexis, plicis minutis; aperturâ grandiusculâ, elongato-rhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ incurvâ et contortâ.

*Hab.*—Tennessee, Prof. Troost; and Duck Creek, Tennessee, J. Clark.

**GONIOBASIS VIRIDICATA.**—Testâ plicatâ, subattenuatâ, tenui, viridescente, evittatâ; spirâ conoideâ, subattenuatâ; suturis impressis; anfractibus instar septenis, planulatis, plicis subcrebris; aperturâ parvissimâ, rhomboideâ, intus cæruleo-albâ; labro acuto, parum sinuoso; columellâ incurvâ, supernè flavescente, infernè albidâ, contortâ.

*Hab.*—Graysen County, Kentucky, S. S. Lyon.

**GONIOBASIS LEIDYANA.**—Testâ plicatâ, fusiformi, subtenui, luteo-corneâ, evittatâ; spirâ obtuso-conicâ; suturis linearibus; anfractibus senis, planulatis; aperturâ pergrandi, ovato-rhomboideâ, intus albidâ; labro acuto, tenui; columellâ incurvâ, ad basim contortâ.

*Hab.*—Benton County, Northwest Alabama, G. Hallenbeck, Esq.

**GONIOBASIS ABBEVILLENSIS.**—Testâ plicatâ, conoideâ, subcrassâ, castaneâ, fulgidâ, evittatâ; spirâ conicâ; suturis linearibus; anfractibus septenis, convexiusculis, ferè planulatis, ad apicem carinatis et striatis; aperturâ grandiusculâ, ovato-rhomboideâ, intus subochraceâ; labro acuto, vix sinuoso; columellâ incrassatâ et contortâ.

*Hab.*—Abbeville District, S. Carolina, J. P. Barratt, M. D.

**GONIOBASIS AMÆNA.**—Testâ plicatâ, subfusiformi, crassâ, dilutè castaneâ, evittatâ; spirâ obtusè conoideâ; suturis irregulariter impressis; anfractibus instar senis, subconvexis, ad apicem striatis; aperturâ grandi, ovato-rhomboideâ, intus albidâ; labro acuto, parum sinuoso, columellâ incrassatâ, incurvâ et contortâ.

*Hab.*—North Alabama, Prof. Tuomey.

**GONIOBASIS PAUPERCUA.**—Testâ plicatâ, subcylindraceâ, subtenui, castaneâ vel tenebroso-olivâ, evittatâ; spirâ curtiusculâ; suturis impressis; anfractibus convexiusculis, supernè plicatis, ad apicem striatis; aperturâ parvâ, ovato-rhomboideâ, intus albidâ; labro acuto, parum sinuoso; columellâ incurvâ et paulisper contortâ.

*Hab.*—North Alabama, Prof. Tuomey.

**GONIOBASIS PROLETARIA.**—Testâ plicatâ, obtusè conoideâ, subtenui, corneâ,

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evittatâ; spirâ obtusè conicâ; suturis impressis; anfractibus instar senis, convexiusculis, supernè plicatis; aperturâ grandiusculâ, subrhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ incurvâ, incrassatâ et contortâ.

*Hab.*—Florence, Alabama, Rev. G. White.

**GONIOBASIS INCONSTANS.**—Testâ plicatâ, subfusiformi, subtenui, corneâ vel olivaceâ vel tenebroso-fuscâ, vittatâ vel evittatâ; spirâ obtusè conicâ; suturis impressis; anfractibus senis, convexiusculis, supernè plicatis; aperturâ grandiusculâ, subrhomboideâ, intus albidâ vel dilutè purpureâ vel vittatâ; labro acuto, parum sinuoso; columellâ incurvâ et contortâ.

*Hab.*—Etowah River, J. Postell.

**GONIOBASIS MEDIOCRIS.**—Testâ plicatâ, subfusiformi, subtenui, cinereâ, fulgidâ, vittatâ; spirâ conoideâ; suturis irregulariter impressis; anfractibus senis, planulatis; aperturâ grandiusculâ, rhomboideâ, intus albidâ et vittatâ; labro acuto, sinuoso; columellâ incurvâ, incrassatâ et contortâ.

*Hab.*—Tennessee, Dr. Edgar and President Lindsley.

**GONIOBASIS CRISPA.**—Testâ plicatâ et transversè striatâ, fusiformi, suberassâ, luteolâ, crispatâ, evittatâ; spirâ obtusâ; suturis irregulariter impressis; anfractibus instar senis, convexiusculis; aperturâ grandî, ovato-rhomboideâ, intus albidâ; labro acuto, vix sinuoso; columellâ parum incurvâ et contortâ.

*Hab.*—Florence, Alabama, Rev. G. White.

**GONIOBASIS ORNATELLA.**—Testâ plicatâ, fusiformi, crassiusculâ, luteo-corneâ, vittatâ; spirâ obtuso-conoideâ; suturis irregulariter et valdè impressis; anfractibus instar senis, convexis; aperturâ grandî, ovato-rhomboideâ, albidâ et obsolete vittatâ; labro acuto, vix sinuoso; columellâ parum incurvâ et contortâ.

*Hab.*—Tennessee, Coleman Sellers.

**GONIOBASIS OLIVELLA.**—Testâ plicatâ, fusiformi, suberassâ, olivaceâ, fulgidâ, evittatâ; spirâ obtuso-conoideâ; suturis irregulariter et valdè impressis; anfractibus instar quinis, convexiusculis; aperturâ grandî, rhomboideâ, albidâ; labro acuto, vix sinuoso; columellâ incurvâ et contortâ.

*Hab.*—Tennessee, Prof. Troost.

**GONIOBASIS PURPURELLA.**—Testâ plicatâ, conoideâ, tenui, purpurecente, fulgidâ, vittatâ vel evittatâ, spirâ conoideâ; suturis impressis; anfractibus instar septenis, planulatis; aperturâ grandiusculâ, rhomboideâ, intus tenebrosâ; labro acuto, vix sinuoso; columellâ incurvâ et contortâ.

*Hab.*—Caney-Fork River, Tennessee, J. Lewis, M. D.

**GONIOBASIS CINERELLA.**—Testâ plicatâ, subfusiformi, tenui, luteo cinereâ, evittatâ; spirâ obtusè conoideâ; suturis irregulariter impressis; anfractibus senis, convexiusculis; aperturâ grandiusculâ, ovato-rhomboideâ, intus albidâ; labro acuto, vix sinuoso; columellâ incurvâ et parum contortâ.

*Hab.*—Tennessee, Coleman Sellers.

**GONIOBASIS CHRISTYI.**—Testâ plicatâ vel striatâ vel granulâtâ, fusiformi, suberassâ, inflatâ, luteo-olivaceâ, vittatâ; spirâ obtusè conoideâ; suturis impressis; anfractibus quinis, convexiusculis; aperturâ pergrandî, ovato-rhomboideâ, intus vittatâ; labro acuto, vix sinuoso; columellâ incrassatâ, parum contortâ.

*Hab.*—Valley River, Cherokee County, N. Carolina, Prof. David Christy.

**GONIOBASIS INSTABILIS.**—Testâ plicatâ vel lævi, fusiformi, crassâ, subinflatâ, vittatâ vel evittatâ, olivaceâ; spirâ conoideâ; suturis impressis; anfractibus instar quinis, convexiusculis; aperturâ grandî, ovato-rhomboideâ, intus vittatâ; labro acuto, vix sinuoso; columellâ incrassatâ, parum incurvâ et contortâ.

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*Hab.*—Twenty-one miles north of Murphy and other places in Cherokee County, Georgia, Prof. David Christy.

**GONIOBASIS GERHARDTI.**—Testâ carinatâ, fusiformi, tenui, fulgidâ, luteo-virente, quadrivittatâ; spirâ regulariter conicâ; suturis impressis; anfractibus senis, planulatis, ultimo grandi; aperturâ magnâ, rhomboideâ, intus albidâ et vittatâ; labro acuto, parum sinuoso; columellâ incurvâ, infernè paulisper incrassatâ.

*Hab.*—Chattanooga River, Georgia, Alexander Gerhardt. Coosa River, Alabama, Dr. Spillman.

**GONIOBASIS INFUSCATA.**—Testâ carinatâ, fusiformi, subtenui, fulgidâ, tenebrosâ, nigricante, trivittatâ; spirâ conoideâ; suturis impressis; anfractibus instar senis, supernè planulatis, ultimo grandi; aperturâ submagnâ, rhomboideâ; intus albidâ vel fuscâ, trivittatâ; labro acuto, parum sinuoso; columellâ incurvâ, infernè paulisper incrassatâ.

*Hab.*—Georgia, Rev. G. White. Coosa River, Alabama, Dr. Spillman.

**GONIOBASIS MUTABILIS.**—Testâ carinatâ vel plicatâ vel striatâ, subfusiformi, subcrassâ, luteo-virente, quadrivittatâ vel evittatâ; spirâ obtusè conoideâ; anfractibus senis, planiusculis; aperturâ subgrandi, rhomboideâ, intus albidâ; labro acuto, vix sinuoso; columellâ incurvâ, incrassatâ, parum contortâ.

*Hab.*—Butts County, Ga., Rev. G. White.

**GONIOBASIS CRUDA.**—Testâ carinatâ, subfusiformi, subtenui, fulgidâ, tenebroso-fuscâ, obsoletè vittatâ; spirâ obtusâ; suturis paulisper impressis; anfractibus supernè planulatis, ultimo grandi; aperturâ submagnâ, rhomboideâ, intus tenebrosâ; labro acuto, vix sinuoso; columellâ paulisper incurvâ, vix incrassatâ.

*Hab.*—Tennessee River, Dr. Spillman.

**GONIOBASIS RUBELLA.**—Testâ carinatâ, subulatâ, subtenui, rubicundâ, evittatâ; spirâ attenuatâ; suturis valdè impressis; anfractibus octonis, vix convexis; aperturâ parvissimâ, subrhomboideâ, intus vel albidâ vel rubidâ; labro acuto, sinuoso; columellâ parum incurvâ et contortâ.

*Hab.*—Near Murphy, Cherokee County, N. Carolina, Prof. Christy.

**GONIOBASIS MACELLA.**—Testâ carinatâ, subulatâ, tenui, olivaceâ, evittatâ; spirâ subattenuatâ; suturis valdè impressis; anfractibus septenis, convexiusculis; aperturâ parvissimâ, subrhomboideâ, intus albidâ, ad basim maculatâ; labro acuto, parum sinuoso; columellâ incurvâ et paulisper contortâ.

*Hab.*—Coosa River, Alabama, Prof. Brumby.

**GONIOBASIS RUBIGINOSA.**—Testâ carinatâ, subsubulatâ, subtenui, fulgidâ, rubiginosâ, obsoletè vittatâ; spirâ subattenuatâ; suturis valdè impressis; anfractibus instar senis, convexis; aperturâ parvissimâ, subrhomboideâ, intus dilutè rubiginosâ; obsoletè bivittatâ; labro acuto, sinuoso; columellâ parum incurvâ et contortâ.

*Hab.*—Oregon, W. Newcomb, M. D.

**GONIOBASIS UCHEËNSIS.**—Testâ carinatâ, obtusè conoideâ, subtenui, corneâ, evittatâ; spirâ obtusâ; suturis impressis; anfractibus instar senis, planulatis; aperturâ submagnâ, ovato-rhomboideâ, intus albidâ; labro acuto, parum sinuoso; columellâ incurvâ, paulisper contortâ.

*Hab.*—Little Uchee River, below Columbus, Georgia, G. Hallenbeck, Esq.

**GONIOBASIS INOSCULATA.**—Testâ carinatâ, conoideâ, subtenui, luteo-corneâ, evittatâ; spirâ subelevatâ; suturis impressis; anfractibus instar septenis, convexiusculis; aperturâ submagnâ, rhomboideâ, intus albidâ; labro acuto, sinuoso; columellâ incurvâ, infernè incrassatâ.

*Hab.*—Little Uchee River, below Columbus, Georgia, G. Hallenbeck, Esq.

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**GONIOBASIS BARRATTII.**—Testâ carinatâ, subfusiformi, subtenui, virido-corneâ vel rufo-corneâ, obsoletè vittatâ vel evittatâ; spirâ obtuso-conoideâ; suturis valdè impressis; anfractibus septenis, convexiusculis, ad apicem plicatis; aperturâ submagnâ, subrhomboideâ, intus albidâ vel obsoletè vittatâ; labro acuto, vix sinuoso; columellâ parum contortâ.

*Hab.*—Abbeville District, S. Carolina, J. P. Barratt, M. D.

**GONIOBASIS RUBRICATA.**—Testâ carinatâ, conoideâ, subtenui, rufo-fuscâ, politâ, evittatâ; spirâ subelevatâ; suturis valdè impressis; anfractibus instar septenis, convexis; aperturâ submagnâ, rhomboideâ, intus dilutè rubidâ, labro acuto, vix sinuoso; columellâ incurvâ, parum incrassatâ.

*Hab.*—Tennessee, Prof. Troost.

**GONIOBASIS BENTONIENSIS.**—Testâ carinatâ, plicatâ, striatâ, conoideâ, subtenui, virido-corneâ, evittatâ; spirâ elevatâ, conoideâ; suturis valdè impressis; anfractibus septenis, convexiusculis; aperturâ parviusculâ, ovato-rhomboideâ, intus albidâ; labro acuto, vix sinuoso; columellâ incurvâ, parum contortâ.

*Hab.*—Benton County? North Alabama, G. Hallenbeck, Esq.

**GONIOBASIS NEGATA.**—Testâ striatâ, ellipticâ, subconicâ, crassâ, luteolâ, quadrivittatâ; spirâ obtusè conicâ; suturis valdè et irregulariter impressis; anfractibus senis, convexiusculis, ultimo grandi; aperturâ parviusculâ, ovatâ, intus albidâ et quadrivittatâ; labro acuto, spissato; columellâ inflectâ, incrassatâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Alabama, E. R. Showalter, M. D.

**GONIOBASIS ELLIOTTII.**—Testâ obsoletè striatâ, subobtusè conoideâ, subcrassâ, vel flavescente vel fuscè, evittatâ; spirâ subobtusâ; suturis valdè impressis; anfractibus instar senis, convexiusculis; aperturâ magnâ, ovato-rhomboideâ, intus vel albidâ vel fuscâ; labro acuto, parum sinuoso; columellâ paulisper incurvâ, incrassatâ et parum contortâ.

*Hab.*—Fannin County, Georgia, Bishop Elliott. Uchee and Little Uchee Rivers, Alabama, G. Hallenbeck and Dr. Gesner.

**GONIOBASIS FLAVESCENS.**—Testâ striatâ, interdum granulatâ et plicatâ, subcylindraceâ, flavescente, crassâ; spirâ obtusè conoideâ; suturis irregulariter impressis; anfractibus convexiusculis, ultimo pergrandi; aperturâ grandi, subrhomboideâ, intus vittatâ vel albâ; labro acuto, vix sinuoso, columellâ incurvâ, supernè valdè incrassatâ et contortâ.

*Hab.*—Oconee and Tennessee Rivers, Tennessee, Rev. G. White.

**GONIOBASIS HALLENBECKII.**—Testâ tuberculatâ, infernè transversè striatâ, turritâ, subtenui, luteo corneâ vel olivaceâ, vittatâ vel evittatâ; spirâ elevato-turritâ; suturis valdè impressis; anfractibus octonis, carinatis, ad peripheriam compresso-tuberculatis; aperturâ magnâ, ovato-rhomboideâ, intus albidâ; labro crenulato, sinuoso; columellâ incurvâ, parum incrassatâ et valdè contortâ.

*Hab.*—Randall's Creek, near Columbus, Georgia, G. Hallenbeck, Esq.

**GONIOBASIS CANBYI.**—Testâ tuberculatâ, plicatâ, infernè transversè striatâ, turritâ, tenui, vel fuscâ vel dilutè fuscâ, maculatâ; spirâ turritâ; suturis irregulariter impressis; anfractibus septenis, carinatis, ad peripheriam compresso-tuberculatis; aperturâ parvâ, rhomboideâ, intus maculatâ; labro crenulato, sinuoso; columellâ incurvâ et valdè contortâ.

*Hab.*—Lake Monroe, Florida, Wm. Canby, and Etowah and Tennessee Rivers, Georgia, J. Postell.

**GONIOBASIS COUPERII.**—Testâ tuberculatâ, plicatâ, infernè et supernè striatâ, turritâ, tenui, tenebroso-fuscâ, ad basim vittatâ; spirâ turritâ; suturis valdè impressis; anfractibus septenis, subcarinatis, ad peripheriam et supra compresso-tuberculatis; aperturâ parvissimâ, subrhomboideâ, intus tenebroso et

uno-vittatâ; labro crenulato, valdè sinuoso; columellâ incurvâ, contortâ et purpurecente.

*Hab.*—Etowah River, Mr. Couper, by J. Postell.

**GONIOBASIS DOWNIEANA.**—Testâ tuberculatâ, subturritâ, supernè clathratâ et subcarinatâ, infernè transversè striatâ, tenui, dilutè fuscâ; spirâ conoideâ, clathratâ; suturis irregulariter impressis; anfractibus septenis, subcarinatis, ad peripheriam et supra compresso-tuberculatis; aperturâ submagnâ, ovato-rhomboidê, intus albidâ; labro crenulato, sinuoso; columellâ incurvâ et contortâ.

*Hab.*—Etowah River, J. Postell.

**GONIOBASIS TRYONIANA.**—Testâ granulosâ vel striatâ, subfusiformi, luteo-fuscâ vel tenebroso-fuscâ, crassâ, robustâ, vittatâ, rarè evittatâ, spirâ obtusè conoideâ; suturis irregulariter impressis; anfractibus instar senis, ultimo pergrandi; aperturâ pergrandi, ovato-rhomboidê, intus valdè vittatâ; labro subcrenulato, vix sinuoso; columellâ paulisper incurvâ et vix contortâ.

*Hab.*—Oostenaula, near Rome, Bishop Elliott. Etowah River, Georgia, J. Postell, and Ocoee River and Tennessee River, Rev. G. White.

**GONIOBASIS GRANATA.**—Testâ granulosâ, infernè striatâ, fusiformi, vittatâ, subcrassâ, fulgidâ, inflatâ, olivaceâ vel rubiginosâ; spirâ depressâ; suturis irregulariter impressis; anfractibus instar quinis, planiusculis, ultimo pergrandi; aperturâ grandi, ovato-rhomboidê, intus valdè vittatâ; labro parum crenulato, vix sinuoso; columellâ incurvâ et contortâ.

*Hab.*—Etowah River, near Canton, Georgia, Bishop Elliott and Rev. G. White.

**GONIOBASIS STEWARDSONIANA.**—Testâ granulatâ, transversè striatâ, subfusiformi, crassâ, fulgidâ, inflatâ, viridi vel fuscâ, evittatâ; spirâ perobtusâ; suturis impressis; anfractibus convexiusculis; aperturâ pergrandi, ovato-rhomboidê, intus albâ; labro acuto, subsinuoso; columellâ incurvâ, supernè et infernè incrassatâ et contortâ.

*Hab.*—Knoxville, Kentûcky, B. W. Badd, M. D.

**GONIOBASIS CADUS.**—Testâ cancellatâ, fusiformi, subcrassâ, inflatâ, flavescente, evittatâ; spirâ subobtusâ; suturis irregulariter impressis; anfractibus quinis, convexiusculis, supernè cancellatis; aperturâ pergrandi, ovato-rhomboidê, intus albâ; labro acuto, parum sinuoso; columellâ incurvâ, incrassatâ et contortâ.

*Hab.*—Georgia, Major J. Le Conte.

### Descriptions of Eleven New Species of MELANIDÆ of the United States.

BY ISAAC LEA.

**TRYPANOSTOMA HENRYANUM.**—Testâ carinatâ, attenuatâ, mucronatâ, tenui, diaphanâ, pallido-corneâ, evittatâ; spirâ regulariter attenuato conicâ; suturis regulariter impressis; anfractibus denis, planulatis, infernè medio regulariter carinatis et striatis; aperturâ parvâ, subrhomboidê, intus albidâ; labro valdè acuto, sinuoso; columellâ incurvâ et valdè contortâ.

*Hab.*—Tennessee? Smithsonian Institution.

**TRYPANOSTOMA ROSTELLATUM.**—Testâ striatâ, attenuatâ, subtenui, corneâ, evittatâ; spirâ elevatâ; suturis valdè impressis; anfractibus octonis, convexiusculis; aperturâ parvâ, rhomboidê, intus albidâ; labro acuto, valdè sinuoso; columellâ incurvâ et valdè contortâ.

*Hab.*—Florence, Alabama, Rev. G. White.

**TRYPANOSTOMA STRICTUM.**—Testâ carinatâ, subattenuatâ, tenui, diaphanâ, pallido-corneâ, uno-vittatâ; spirâ regulariter conicâ; suturis linearibus; anfractibus instar senis, supernè planulatis; aperturâ parviusculâ, rhomboidê,

[May,

intus albidâ et uno-vittatâ; labro acuto, paulisper sinuoso; columellâ parum incurvâ et contortâ.

*Hab.*—South Carolina, Prof. L. Vanuxem.

**TRYPANOSTOMA LATIVITTATUM.**—Testâ carinatâ, subattenuatâ, subtenui, fulgidâ, tenebrosâ, late vittatâ; spirâ conoideâ; suturis linearibus; anfractibus instar septenis, supernè planulatis, ad basim luteis; aperturâ parvâ, rhomboideâ, intus lativittatâ; labro acuto, sinuoso; columellâ incurvâ, infernè incrassatâ.

*Hab.*—Chikasaha River, Alabama, Wm. Spillman, M. D.

**TRYPANOSTOMA CAROLINENSE.**—Testâ lævi, conoideâ, subcrassâ, corneâ; spirâ obtuso-conicâ; suturis impressis; anfractibus septenis, convexiusculis; aperturâ parviusculâ, rhomboideâ, intus albidâ vel fuscescente; labro acuto, sinuoso; columellâ incurvâ, incrassatâ et contortâ.

*Hab.*—South Carolina, Prof. L. Vanuxem.

**TRYPANOSTOMA LUTEUM.**—Testâ lævi, obtuso-conicâ, subcrassâ, stramineâ, evittatâ, mucronatâ; spirâ obtuso-conicâ; suturis impressis; anfractibus octonis, convexiusculis; aperturâ parviusculâ, rhombicâ, intus dilutè stramineâ; labro acuto, sinuoso, ad marginem incrassato; columella inflectâ, infernè incrassatâ et contortâ.

*Hab.*—South Carolina, Prof. L. Vanuxem.

**TRYPANOSTOMA DIGNUM.**—Paulisper nodosâ, subfusiformi, subcrassâ, melleâ, unifasciatâ; spirâ elevatâ, regulariter conicâ; suturis impressis; anfractibus instar octonis, planulatis, ultimo subgrandi; aperturâ ovato-rhombicâ, intus albidâ vel salmoniâ, univittatâ; labro acuto, sinuoso; columellâ inflectâ, contortâ, ad basim obtusè angulatâ.

*Hab.*—Yellow 'af Creek, Shelby Co., Alabama, E. R. Showalter, M. D.

**STREPHOBASIS CARINATA.**—Testâ carinatâ, subfusiformi, inflatâ, subtenui, vi-rente, quadrivittatâ; spirâ obtusâ; suturis valdè impressis; anfractibus senis, planulatis, ad apicem carinatis, ultimo inflato; aperturâ submag-nâ, rhomboideâ, intus albidâ et vittatâ; labro acuto, parum sinuoso; columellâ incrassatâ, retrorsâ et valdè contortâ.

*Hab.*—Tennessee River, Wm. Spillman, M. D.

**STREPHOBASIS OLIVARIA.**—Testâ lævi, ellipticâ, crassâ, vittatâ, tenebroso-olivâ; spirâ obtuso-conicâ; suturis valdè impressis; anfractibus instar septenis, convexis, ultimo pergrandi; aperturâ subgrandi, rhomboideâ, intus albâ et vittatâ; labro acuto, paulisper sinuoso; columellâ infernè incrassatâ et retrorsum contortâ.

*Hab.*—Knoxville, Tennessee, J. Clark.

**LITHASIA VITTATA.**—Testâ lævi, cylindraceâ, subtenui, tenebroso corneâ, quadrivittatâ; spirâ brevi, decollatâ; suturis irregulariter impressis; anfractibus planulatis, ultimo pergrandi; aperturâ grandi, subrhomboideâ, intus albidâ et valdè vittatâ; labro acuto; columellâ incrassatâ, albâ, incurvâ.

*Hab.*—Coosa and Cahawba Rivers, Alabama, E. R. Showalter, M. D.

**LITHASIA DOWNIEI.**—Testâ parum nodulosâ, subcylindraceâ, castaneâ, spirâ obtusè conoideâ, subelevatâ; suturis irregulariter impressis; anfractibus septenis, planulatis, ultimo subgrandi; aperturâ subgrandi, rhomboideâ, intus vel albidâ vel vittatâ; labro acuto, sinuoso; columellâ albâ et incurvâ.

*Hab.*—Cumberland River, T. C. Downie.

*June 3d.*

Mr. LEA, President, in the Chair.

Twenty-two members present.

The following papers were presented for publication :

New Melanidæ of the United States. By Isaac Lea.

New Unionidæ of the United States. By Isaac Lea.

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*June 10th.*

Mr. JEANES in the Chair.

Sixteen members present.

The following paper was presented for publication :

Descriptions of new Genera, Subgenera and Species of Tertiary and Recent Shells. By T. A. Conrad.

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*June 17th.*

Vice-President BRIDGES in the Chair.

Seventeen members present.

The following papers were presented for publication :

Notice of a Collection of the Fishes of California, &c. By Theo. Gill.

Synopsis of the Lophobranchiate Fishes of Western North America. By Theo. Gill.

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*June 24th.*

Vice-President BRIDGES in the Chair.

Eighteen members present.

On report of the respective Committees, the papers of Mr. Lea, read June 3d, were ordered to be published in the Journal, and the following in the Proceedings.

Notice of a Collection of the FISHES of California presented to the Smithsonian Institution by Mr. Samuel Hubbard.

BY THEODORE GILL.

The collection of Fishes noticed in the present article was formed by Mr. Samuel Hubbard, of the Pacific Mail Steamship Company, during the past two years. Although small, it contains several species of considerable rarity and not less than five new ones, two species represent entirely "new" genera. The species will hereafter be more fully described.

Family *EMBIOTOCOIDÆ*\* Agassiz.

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\* The family of Embiotocoids appears to be represented by two subfamilies and thirteen genera.—I. *EMBIOTOCINÆ*, with the genera *Hypsurus* A. Ag., *Phanerodon* Grd. (incl. *Embiotoca argyrosoma* Grd.), *Ditrema* T. S., *Embiotoca* Ag., *Damalichthys* Grd.

[June,

## Subfamily EMBIOTOCINÆ Gill.

This subfamily embraces all the Embiotocoid fishes, with the exception of *Hysterochampus*, which is the type of a second one (*Hysterochampinae* Gill.) The group is thus limited to embrace those fishes whose dorsal fin has a longer soft than spinous portion. In *Hysterochampus*, on the contrary, the spinous portion is considerably longer than soft, and has 16 to 18 spines; that genus is composed of a single fluviatile species.

## DAMALICHTHYS LATERALIS Gill.

Five specimens are in the collection, all young and representing the stage named by Girard *Embiotoca ornata*.

## EMBIOTOCA JACKSONI Agassiz.

Several fine specimens.

## AMPHISTICHUS ARGENTUS Agassiz.

Two specimens.

## HYPERPROSOPON ARCUATUS Gibbons, (nec A. Ag.)

This species is very closely related to the *Hyperprosopon argenteus* of Gibbons; the description of the latter being essentially applicable, with the following exceptions:

1st. The forehead is higher in the middle and the frontal outline little incurved.

2d. The snout is at the horizon of the centre of the pupil, or even lower, and not as elevated as its upper border.

3d. D. 27. A. III. 32—33.

8 5  
4th. Scales 72 —, —.  
21 6

In almost other respects it resembles *Hyperprosopon argenteus*, and has the same terminal blackish ventral band.

Two specimens, a male and female, equal in size to those of *Hyperprosopon argenteus*, are in the collection of Mr. Hubbard.

## HYPOCRITICHTHYS ANALIS Gill.

HYPERPROSOPON ANALIS A. Agassiz.—I refer to this species, which has

(incl. *Embiotoca lateralis* Ag.), *Rhacochilus* Ag., *Amphistichus* Ag., *Holconotus* Ag., (nec Grd.), *Cymatogaster* Gib. (*aggregatus*), *Hypocritichthys* Gill, *Hyperprosopon* Gib., *Brachyistius* Gill, (*B. frenatus*, new sp. with small mouth, uniserial acute teeth.

5  
D. VIII. 13—15. A. III. 21, 22. Scales 38, 39 ———. Purplish, with a longitudinal band on head interrupted by eye. Abeona Grd. (*minima*).

II. HYSTEROCHAMPINÆ, with one genus,—*Hysterochampus* Gib. These thirteen genera contain at least eighteen species, *Hyperprosopon* having three, and *Damalichthys*, *Phanerodon* and *Holconotus* each two.

I have adopted the name of *Cymatogaster* instead of *Micrometrus*, because the former was first applied in publication to the species here retained under it, and its application to another type and the substitution, for the present, of the name of *Micrometrus*, as exhibited in publication, was an after thought. As it is generally acknowledged that an author has no more right to modify the nomenclature introduced by himself than another, such a change cannot be accepted.

The genus *Micrometrus* of Gibbons included two types; the first was considered by Girard, from the slight description of Agassiz, to be identical with the *Holconotus* of the latter. The second was regarded as a distinct generic type, and named *Abeona*. The correctness of this differentiation being admitted, the name of *Abeona* must be retained, and *Metrogaster* of Agassiz be regarded as a synonym of *Micrometrus*, itself as above considered, a synonym of *Cymatogaster*.

1862.]

not yet been described, two specimens in Mr. Hubbard's collection, the possession of an authenticated specimen, received by the Institution, from M. Agassiz enabling me to do so with perfect certainty.

*Hyperprosopon analis* has been truly affirmed by A. Agassiz to have "the general appearance and about the size of *Metrogaster aggregatus* Agass., but the teeth and the shape of the dorsal fin show that it is a true *Hyperprosopon*," and, notwithstanding the superficial resemblance to another type, it may be added, that the physiognomy is also essentially more like that of *Hyperprosopon* than *Cymatogaster* (or *Metrogaster Ag.*) The difference between it and the typical species of *Hyperprosopon* is, however, so great as to authorize its generic separation.

The body is oblong, the height little exceeding three-tenths of the extreme length, of which latter the head forms less than a fourth. The head itself is oblong conic; the diameter of the eye about equal to a quarter of its length, and not much longer than the snout; the latter is as high or higher than the upper border of the pupil; the forehead less depressed than in *H. argenteus*.

D. IX. 22. A. III. 24. Scales 65  $\frac{6}{16+2}$ .

The color is silvery, slightly tinged with brassy on the sides and light purplish on the back; the margin of the elevated spinous portion of the dorsal is blackish, and the anal has a very distinct ink-like spot between its fourth and eleventh rays.

The species referred to *Hyperprosopon* may be thus distinguished:

- I. Body convex and high, the height more than a third of the length, and the back behind nape convex. Head rhombic, about as high as long. Eyes very large. Snout short.

D. IX. 26—27. A. III. 32—34. .... *Hyperprosopon*.

a. Ventrals with a broad terminal black band.

8  
Scales 85  $\frac{8}{20-21}$  ..... *H. argenteus*.

8  
Scales 72  $\frac{8}{21}$  ..... *H. arcuatus*.

b. Ventrals uniformly colorless ..... *H. agassizii*.\*

- II. Body oblong, subfusiform, with the back before the dorsal scarcely convex. Head oblong-conic. Eyes moderate.

D. IX. 22. A. III. 24 ..... *Hypocritichthys*.

6  
Scales 65  $\frac{6}{16}$  ..... *H. analis*.

\* *Hyperprosopon agassizii* Gill.

This species is closely related to *H. arcuatus* Gibbons, but the occipital region is more elevated and obliquely convex; the caudal fin less emarginated, its margin dark and the ventral fins are colorless.

D. IX. 27. A. III. 33. P. 25. Scales 65  $\frac{8}{19-20}$ .

This species is the one to which the name of *H. arcuatum* Gibbons refers in the "Notes on the described Holconoti," by A. Agassiz. Gibbons' species is, however, quite different, and rather allied to *H. argenteus* than to the present one.

The following table shows the relative proportion of the several species:

	arg.	arc.	Ag.
Extreme length (=100).	74	81	61
Height, . . . . .	36	36	37
Head—Length of head, . . . . .	24	23	23
Eye—Diameter, . . . . .	7½	7½	7
Snout—Length, . . . . .	5½	5	5

[June,

## SCIÆNOIDS (Cuv.) Gthr.

## ISOPISTHINÆ Gill.

## SERIPHUS POLITUS Ayres.

*Seriphus politus* Ayres, Proc. Cal. Acad. Nat. Sc., pt. ii. p. 80.

I refer to this species a fish sent by Mr. Hubbard. It, however, disagrees in many important respects with Dr. Ayres' description, but, as the differences which the diagnosis of that gentleman offer in comparison with the present species are equally at variance with the attributes of all Sciænoid fishes, I am compelled to believe that Ayres has quite seriously erred in his description.

The present fish agrees with other Sciænoids in having seven branchiostegal rays, scales on the head and not more than two anal spines and five branched ventral rays. The second dorsal, anal and caudal fins are naked, and do not appear to have been scaly, except the interval between the median rays of the latter through which the lateral line runs as usual. The outer teeth of the upper jaw are erect and the interior bent back. The pectoral is more than half as long as the head, equalling the space between the orbit and its axilla, while the ventrals are rather less than half as long as the head.

D. VII. II. 1. 18. A. II. 1. 20. C. 4. 1. 8, 7. 1. 3. P. 2. 1. 4. V. I. 5.

9

Scales 65 —.

Pseudobranchiæ are developed.

## Family CHIROIDÆ (Sw.) Gill.

## Subfamily CHIRINÆ Gill.

## CHIRUS GUTTATUS Girard.

Two specimens.

Scales (1) ; lat. line 105 ; transverse line from dorsal to ventral fin. 1 | 4 | 8 | 35 = 51.

## CHIRUS CONSTELLATUS Girard.

One specimen was forwarded.

The two species here enumerated are excessively nearly allied, but appear to constantly differ in the color of the pectoral fin, *Chirus guttatus* having them plain, while *Chirus constellatus* has white dotted pectorals. The former species has the same form as *Chirus constellatus*, and I am quite unable to appreciate the justness of Girard's remark that "the body in its general outline is intermediate in form between *C. constellatus* and *C. pictus*, though more like the latter in its general bearing, the dorsal and ventral outlines being more arched." Girard has confined his comparisons to the *C. pictus*, from which it is totally different in proportions, squamation, color, &c., but has not assigned the characters which really distinguish it from *C. constellatus*. The color of neither species is accurately described.

## Subfamily OXYLEBINÆ.

## Genus OXYLEBIUS Gill.

This genus is allied to *Zaniolepis* (Girard), but the form is shorter and compressed, the ctenoid scales are similar to those of *Chirus* (Steller), the profile from the depressed nape rectilinear and the snout pointed, the first dorsal fin convex, increasing rapidly from the first to the fifth spines, and with the membrane behind the anterior as well as others not notched. The anal fin is shorter, coterminous with the second dorsal, and with the anal spines stronger, the second being longest as in *Zaniolepis*. The lower rays of the pectorals are 1862.]

simple and nearly entire, and the ventral fins perhaps inserted farther behind, its second soft ray slightly produced and the membrane between it and the first acutely notched. The caudal fin is truncated. The teeth are present on the jaws, vomer and palatine bones as in *Zaniolepis*, those of the former being larger in the outer row, and, as in that genus, there are six branchiostegal rays.

OXYLEBIUS PICTUS Gill.

D. XV. + I. 14. A. III 12<sup>1</sup>-. C. 1. I. 6. 5. I. 1. P. 10 + 6. V. I. 5.

The color is brownish, or dark tawny yellow, with indistinct lighter spots and with six undulating, vertical, dark purple bands ascending on the dorsal and anal fins, as wide as the intervals between them on the back and narrower below. The first band is under the three anterior dorsal spines and descends to the scapular bone; the second from the sixth to eighth spines, ceases behind the bases of the ventral fins; the third extends over the last five spines and descends on the spinous portion of the anal; the fourth covers the dorsal between the fifth and ninth soft rays and descends on the anal between and across the fourth to sixth rays; the fifth is close before the end of the vertical fins; and the sixth partly on the end of the caudal peduncle and partly on the fin. The head has an arched band from the snout to the margin of the operculum, interrupted by the lower half of the eye; beneath that band and on the branchiostegal membrane are numerous rather large spots. An arched band from the nape runs toward each eye below the posterior angle. The four small tufts, one over each eye and one on each side of the nape, are scarlet. The upper part of the spinous dorsal is light, and the margin of the soft mostly blackish. The anal is saffron yellow, and between the broad bands continued on it from the body are linear ones, parallel with them, the last crossing near the ends of the last four rays. The caudal has two or three bands; the pectoral four, and the ventral two.

Subfamily HOPLOPOMATINÆ Gill.

OPIHODON ELONGATUS Girard.

Two fine but small specimens of this species are in the collection.

Family SCORPÆNOIDÆ (Sw.) Gill.

Subfamily SCORPÆNINÆ (Sw.) Gill.

Genus SEBASTODES Gill.

This genus is readily distinguished by the characters assigned to it in the Proceedings of the Academy for 1861; the head above is quite unarmed. The other species of California referred to the genus *Sebastes* belong to another one distinguished by a form nearly similar to that of the true *Sebastes*, but with a dorsal fin armed with only twelve or thirteen (XI.—XII. + I.) spines, and having, as far as known, only ten abdominal and fourteen caudal vertebrae. With regard to the *Sebastes elongatus* of Ayres there is some doubt, but it appears, from the only description and figure published of it, to be, if not congeneric with the other Californian species, to be at least more nearly allied to them than to *Sebastes*. The genus comprising *S. nigrocinctus* Ayres, *S. nebulosus* Ayres, *S. auriculatus* Girard, *S. ocellatus* Cuv. (= *S. helvomaculatus* Ayres), *S. melanops* Girard and *S. rosaceus* Ayres may be called *Sebasticthys*.\* Not having had the opportunity to examine all of the foregoing species, I cannot be certain that all are valid.

\* The species of *Sebastes* without palatine teeth, of which the *S. polylepis* of Bleeker and Gunther is one, may be considered as representing another generic type (*Sebasticthys* Gill)



## SEBASTODES PAUCISPINIS Gill.

One specimen is in the collection.

## Family COTTOIDÆ Girard.

## Subfamily COTTINÆ.

## ASPIDOCOTTUS BISON Girard.

Three small specimens.

## ARTEDIUS NOTOSPILOTUS Girard.

Three small specimens of this species are also in the collection. The species undergoes so considerable a change with age, especially in the armature of the head, that it might readily be the cause of a multiplication of nominal species.

## Family GOBIOIDÆ.

## Subfamily GOBINÆ.

## LEPIDOGOBIOUS GRACILIS Gill.

Two specimens in the collection.

The *Gobius newberryi* of Girard is the type of another genus, to which the name of *Eucyclogobius* may be given; it is distinguished from *Lepidogobius* by the naked head, the oblong and equal second dorsal and anal fins, &c.

## Family BLENNIOIDÆ.

## Subfamily CEBEDICHTHYINÆ Gill.

## CEBEDICHTHYS VIOLACEUS Girard.

A fine specimen is in the collection.

## Subfamily CENTRONOTINÆ Gill.

## APODICHTHYS VIRESCENS Ayres.

Three specimens.

The *Apodichthys flavidus* of Girard, as originally based, may possibly be distinct from *A. virescens* Ayres, but there can be no doubt that one of the specimens sent to the Smithsonian Institution by Ayres under the name of *A. virescens* and referred by Girard to *A. flavidus*, truly belongs to the former species.

## APODICHTHYS SANGUINEUS Gill.\*

This species resembles *Apodichthys virescens*, but is of a beautiful intense red color, minutely punctulated with darker; the dorsal and anal fins have the margins rather darker and with a yellow dot generally in front of the tip of each fourth to sixth ray, and more distinct on the anal. A dark purple line under the eye is behind the upper jaw, but there is none above.

D. XCIII.—XCV. A. I.—40.

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\* A specimen of *Apodichthys* which appears to represent another species of the genus was obtained by the naturalist of the Northwestern Boundary Commission. It is thirteen inches long and rather discolored, but does not exhibit any trace whatever of the characteristic line behind the upper jaw and below the eye. The anal spine is much shorter and transversely cleft at the tip; the latter is probably abnormal. I have deferred a description, hoping to have the validity of the species confirmed by other specimens, and am very reluctant to name it from the single one in the collection, but as this notice may call attention to it, I have finally resolved to publish. The species may be called *A. inornatus*. The radial formula is D. XC. A. I.—33. C. 23. P. 2. 11. 1. In proportions it does not essentially differ from *A. virescens* or *A. flavidus*. The eye is, perhaps, smaller and the body higher. The color is brownish, with a dark spot or blotch on the back at the base of every fourth or fifth spine.

A single adult specimen was sent to the Institution by Mr. Hubbard, and a smaller one is in the collection formed by the Northwestern Boundary Commission.

Family *BATRACHOIDÆ*.

*PORICHTHYS POROSISSIMUS* Girard.

After an autoptical examination of adult specimens, Dr. Günther was unable to distinguish between the Pacific and Atlantic representatives of *Porichthys*. I am therefore compelled to follow him. The only specimens of the Atlantic fish that I have seen were young.

Family *ATHERINOIDÆ*.

*CHIROSTOMA CALIFORNIENSE* Gill.

*Atherinopsis californiensis* Girard, Ayres.

Two fine specimens in the collection.

I fully concur with Messrs. Günther and Ayres in uniting *Atherinopsis*, *Basilichthys* and *Heterognathus* of Girard in one genus, but am compelled to retain for that genus the name of *Chirostoma* given by Swainson, he having first truly limited it. The *A. affinis* and *A. tenuis* of Ayres must consequently be named *Chirostoma affine* and *C. tenue*.

The *Atherina nigrans* of Richardson is scarcely a species of *Chirostoma*, but apparently the type of another genus, which may be named *Melanotænia*, distinguished by a more robust body, black lateral band, &c.

Family *GADOIDÆ*.

Subfamily *GADINÆ*.

*GADUS PROXIMUS* Girard.

Six fine specimens are in the collection.

This species is a true *Gadus*. The *Gadus æglifinus* L. and *G. minutus* Yarrell, of our Eastern America and Northern Europe, belong to different genera. The former distinguished by its black lateral line, pointed first dorsal and emarginated caudal, may be called *Melanogrammus æglifinus* and the *Gadus minutus*, with its abbreviated head, short abdomen, emarginated caudal, &c., is the type of a genus which may be called *Brachygadus*.

Subfamily *BROSMOPHYCINÆ*.

*BROSMOPHYCIS MARGINATUS* Gill.

A fine specimen in the collection.

The name of *Brosomphycis* was published a short time before Ayres' name of *Halias*. The latter name has been also preoccupied.

Family *PLEURONECTOIDÆ*.

Subfamily *PLEURONECTINÆ*.

*PLATICHTHYS STELLATUS* Girard.

I have not been happy enough to distinguish any differences between the *Platichthys rugosus* of Girard and *Pleuronectes stellatus* Pallas. Girard has acknowledged that "the latter species is closely allied to *P. rugosus*, from which it may even not differ. An actual comparison between the specimens is, however, demanded, before a settlement of the question can be arrived at." As Richardson's elaborate description and figure are entirely applicable to the Californian species, it appears to be much more appropriate to consider the two identical until "an actual comparison" shall enable us to ascertain any differences, which is quite improbable.

[June.

## Genus PAROPHRYS Girard.

Body fusiform in profile, covered with cycloid scales. Lateral line scarcely convex in front, recurrent backwards near the back. Head large and conic. Snout conic. Eyes entirely in the anterior half, contiguous and nearly even. Nostrils on the horizon of the superior margins of each orbit; the anterior sub tubular; the posterior with an anterior flap. Mouth unequal, little oblique, the maxillary bones of the colored side extending little beyond the anterior margin of the orbit, and much shorter than that of the white side. Lips rather thin and simple. Teeth on the white side uniserial, contiguous, short and wide, presenting an incisorial edge as in *Pleuronectes planus*, &c. A recumbent anal spine. Caudal fin truncated or little emarginated.

This genus is most closely related to *Pleuronectes*.

## PAROPHRYS HUBBARDII Gill.

This species is very slender, the height being considerably less than a third of the total length and not much greater than the head. The eyes are situated in the middle of the anterior half of the head; a diameter enters four times and a half in the length of the head. The caudal fin is slightly emarginated and forms a seventh of the total length. The pectoral bent forwards, extends little beyond the interior preopercular ridge.

D. 83. A. 62. C. 3. 6. 6. 3. P. 12. V. 6. Scales of lateral line 96.

The color is a uniform brownish.

This very fine species is distinguished especially from *Parophrys vetulus* Girard by its more elongated body and head as well as the other proportions.

I have given myself the pleasure of dedicating the species to the gentleman who has formed the collection of which the present article is descriptive. The judgment with which that collection was made is evident from the number of new species described; and the excellent condition of the specimens, all of which are in alcohol, and have even, in several cases, preserved their original colors, is worthy of all praise.

## Family CLUPEOIDÆ.

## Subfamily CLUPEINÆ.

## ALAUZA CALIFORNICA Gill.

The form is that of a herring (*Clupea*), the back is thick and rounded, and the height little exceeds a seventh of the extreme length. The head forms little more than a fifth of the length. The opercular margin behind is vertical. The diameter of the eye is rather less than a fourth of the head's length, while the snout equals a third of the same. The lower jaw, when closed, is even with the upper, which latter has no emargination. The ventrals are under the posterior third of the dorsal.

D. 2. 1. 15. A. 2. 1. 16. P. 1. 17. V. 1. 8. Scales 57 + 6; longitudinal rows 12.

The color is silvery on the sides and beneath and blue above.

This species belongs to the genus *Alauza* of Valenciennes, but not of Nature. The genera of Clupeoids need a careful revision, altogether too much importance having been attached to the dentition. As I am not certain to what other genus the present species should be eventually referred, it is deemed advisable to retain it in that one where most naturalists would place it. It is, however, more nearly allied to the type of *Clupea* than that of *Alauza*.

Four specimens, between eight and ten inches long, are in the collection.

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Family *CYPRINOIDEÆ*.Subfamily *CYPRININÆ*.*CARASSIAS AURATUS* Heckel.

Two abnormal varieties of this species,—the common and well-known "Gold-fish,"—are in the collection. One of them has the tail double, but connected at the superior margin.

Family *GALEORHINOIDEÆ*.Subfamily *GALEORHININÆ*.*TRIACIS SEMIFASCIATUS* Girard.

A young specimen was sent.

*ISOPLAGIODON*, sp.

A new species of this family is in Mr. Hubbard's collection. As the single specimen is a young one, its positive determination is deferred for the present.

Family *RAIOIDEÆ*.Subfamily *RAININÆ*.*URAPTERA BINOCULATA* Girard.

One specimen.

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Synopsis of the species of **LOPHOBRANCHIATE** Fishes of Western North America.

BY THEODORE GILL.

The present brief article is preliminary to a more extended paper on the Lophobranchiate fishes inhabiting the Western coast of the North American continent. Six species have been attributed by Dr. Girard to that coast. Subtracting from that number one which appears to have been founded on a smaller individual of the common species described by Girard as *Syngnathus californiensis*, we have still the number assigned by Girard; the *S. californiensis* of that author being distinct from the homonymous species of Storer, as shown by Ayres. All the species noticed are in the collection of the Smithsonian Institution.

Family *SYNGNATHOIDEÆ* Bleeker.Subfamily *HIPPOCAMPINÆ* (Kaup.) Gill.Genus *HIPPOCAMPUS* Cuv.

1. *HIPPOCAMPUS GIGAS* Girard.
2. *HIPPOCAMPUS GRACILIS* Gill.

The body is very slender, the height being contained four times and a half in the length of the tail, or equal to the distance of the snout from the hinder border of the orbit. The tube forms about half the length of the head, which forms rather more than a sixth of the length. The spines at the angles of the frontal triangle are nearly equal and blunt. The coronet is rather elevated; the temporal spines rather large and blunt. The angles, especially the dorsal, of every third or fourth plate are tuberculous.

D. 19. Plates  $\frac{10(3)}{10(1) 38}$ .

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The color is a very dark purple, indistinctly and sparsely dotted with lighter. The fins are colorless.

A single female specimen was obtained by Mr. Xantus at Cape St. Lucas. It differs from any of the previously described species by the combination of characters indicated in the diagnosis, and is remarkable for its slender form, which rivals that of *Acentronura*.

Subfamily SYNGNATHINÆ Kaup.

Genus DERMATOSTETHUS Gill.

This genus is, perhaps, most closely related to Syngnathus, although in some respects tending to Trachyrhamphus (Kaup), &c. It is readily distinguished from Syngnathus by the following characters:

1st. The trunk and tail especially are considerably more robust.

2d. The breast-shields are covered by the adipose skin.

3d. The occiput is elevated and carinated.

4th. The lower jaw is received within the upper.

In all other respects it resembles Syngnathus.

3. DERMATOSTHUS PUNCTIPINNIS Gill.

The height and width of the trunk nearly equal the head behind the eyes. The head forms about an eighth of the total length; the snout equals the distance of the base of the pectoral fin from the eye, while the height at the occiput is equal to the length of the operculum. The tail (exclusive of the fin) is twice as long as the trunk.

$$(2 + *) 18 \mid 9 \text{ (or } 9\frac{1}{2}\text{)}$$

D. 40—42. Plates

$$(1 + \dagger) 19 \text{ (1) } 39$$

The color is a uniform chestnut, while the dorsal fin has its rays dotted with chestnut.

Four specimens, all of which were males, of about twelve inches long, were found at San Diego, California, by Mr. Trowbridge.

Genus SYNGNATHUS (Linn.) Kaup.

This genus, as restricted by Dr. Kaup, is represented in California by five species, which may be briefly distinguished by the characters assigned in the following synopsis:

Dorsal with 38—42 rays.

Postanal plates 46—47..... S. californiensis.

Postanal plates 40—43..... S. griseolineatus.

Dorsal with 30—34 rays.

Snout forming more than half the length of head.

Snout equal to interval between eye and base of

pectoral. Nuchal plates scarcely keeled..... S. arundinaceus.

Snout equal to interval between eye and end of pec-

toral fin. Nuchal plates sharply keeled..... S. leptorhynchus.

Snout scarcely forming half the length of head..... S. dimidiatus.

4. SYNGNATHUS CALIFORIENSIS Storer.

Nec S. californiensis Girard.

$$19\frac{1}{2} \mid \frac{1}{2} 9\frac{1}{2}$$

D. 42. Plates

$$19-20 \text{ (1) } 46-47$$

California (1), W. Hutton.

\* Occipital and nuchal plates; in the formula for the other species they are omitted.

† First or gular plate; in the formula for the others it is omitted.

## 5. SYNGNATHUS GRISEOLINEATUS Ayres.

*Syngnathus californiensis* Girard (nec Storer.)*Syngnathus abbotti* Girard.

18 | 9

D. 38—41. Plates  $\frac{\quad}{18(1) 39-43}$ .

San Francisco (1), Dr. Ayres; (1) Dr. Newberry. Tomales Bay (4), Mr. Samuels. Fort Umpqua, Oregon (3), Dr. Vollum.

## 6. SYNGNATHUS ARUNDINACEUS Girard.

17 | 9

D. 34. Plates  $\frac{\quad}{17(1) 43}$ .

Coast of California (1), Dr. Suckley.

## 7. SYNGNATHUS LEPTORHYNCHUS Girard.

17 | 8

D. 32. Plates  $\frac{\quad}{17(1) 41}$ .

San Diego, California (1).

## 8. SYNGNATHUS DIMIDIATUS Gill.

*Syngnathus brevirostris* Girard (nec Hemp. et Ehr., nec Tem. et Schlegel.)

17 | 7

D. 30—32. Plates  $\frac{\quad}{17(1) 37-39}$ .

San Diego, California (3).

## Subfamily DORYRHAMPHINÆ Kaup.

## Genus DORYRHAMPHUS Kaup.

## 9. DORYRHAMPHUS CALIFORNIENSIS Gill.

The snout forms half the length of the head; its crest is composed of about ten irregular teeth, and farther back are two others. The double frontal crest is well dentated. The superior orbital border has five or six teeth. The ridge under the orbit is unarmed, but on the side of the snout is well serrated. The chin is prominent but unarmed, and some distance behind, in the middle is a slight swelling. The longest superior pectoral rays are about equal to the length of the operculum. The caudal is as long as the snout.

(2 +) 15 | 7

D. 25. A. 3. C. 44. P. 20. Plates  $\frac{\quad}{(1 +) 18(1) 16}$ .

(1 +) 18 (1) 16

The color is an almost uniform yellowish brown, but with a black streak from the snout to the upper axilla of the pectoral fin.

A single female specimen of this species was discovered by Mr. Xantus at Cape St. Lucas.

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Descriptions of New Genera, Subgenera and Species of Tertiary and Recent Shells.

BY T. A. CONRAD.

## Family PLEUROTOMIDÆ.

## TURRIS, Rumphius. PLEUROTOMA, Lam.

The species of this genus are inhabitants of the Indian Ocean, coasts of Madagascar and China; and, as they are unknown on the American coasts,

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it is probable that all of this family, recent and fossil, in America belong to distinct genera, usually classed as subgenera by authors. The predominant forms in the Miocene of the United States are *Drillia* and *Surcula*, the latter containing some species much larger than any of the former genus. The true *Turris* group is also absent from the Eocene, where species of the two Miocene genera above mentioned and others abound. It is also unknown in a recent state on the American coasts.

### SURCULA, Gray.

1. *Surcula engonata*.—Fusiform; whorls 8, turritid, nodulous on the angle, very minute revolving lines above the angle, distinct below it; one line more prominent near and below the suture; labrum margin rounded; body whorl with obsolete revolving lines.

*Locality.* Virginia.

2. *Surcula nodulifera*.—Subfusiform, turriculate; whorls 8, carinated below the suture by a subtuberculous line, and furnished with tubercles shaped like inverted commas, distant; a revolving line between the tubercles and suture; body whorl with prominent revolving lines and a minute intermediate one.

*Locality.* Virginia.

3. *Surcula rugata*.—Fusiform, turriculate; whorls 10, lower half obtusely ribbed; upper half concave, subangular, with much curved, rugose lines of growth; beneath the suture whorls obtusely subcarinated, distinct revolving lines over the ribbed portion, minute and obsolete above it; suture profound; body whorl and beak striated; beak slightly curved.

*Locality.* Calvert Cliffs, Md.

### DRILLIA, Gray.

1. *Drillia impressa*.—Elevated, scalariform or turriculate, with short, obtuse ribs; contractions of whorls striated, and having a carinated line near the suture, revolving lines impressed, double, alternated, rugose volutions 8; base subumbilicated.

*Locality.* James River, Virginia.

2. *Drillia distans*, n. s.—Turriculate, whorls 6, scalariform, with distant obtuse ribs on the lower half; suture waved, with an impressed line above it; body whorl with an impressed revolving line above and four raised revolving lines inferiorly; upper sinus of labrum deep and rounded, lower obsolete.

*Locality.* Virginia.

3. *Drillia arata*.—Turriculate, whorls 9; spire elevated, acute; subscalariform, the contracted portion of the whorls flattened and with perpendicular sides, below this space costate, ribs somewhat oblique and crossed by minute, close lines, which on the body whorl reach the base, obsolete above, distinct inferiorly.

*Locality.* Virginia.

4. *Drillia bella*.—Turriculate; whorls 7, scalariform, costate nearly to the suture; ribs distant, obtuse; whole surface with minute revolving raised lines, very minute and close on the contracted space below the suture, reflected labrum callous at the upper end.

*Locality.* Virginia.

5. *Drillia burnea*.—Turritid; upper part of whorl without ribs and with an impressed revolving line; lower part ribbed, ribs oblique, rounded; surface striated with close impressed revolving lines, finer and obsolete on the upper part of the whorls.

1862.]

## MANGELIA, Leach.

*Mangelia Virginiana*.—Short-fusiform; whorls 5, subscalariform, or medially angular; ribs prominent, two whorls from the apex smooth; minute revolving lines on the lower half of the penultimate whorl; one or two obsolete revolving lines on the body whorl.

*Locality.* Yorktown, Virginia.

## PETRICOLIDÆ.

## PLEIORYTIS, Conrad.

Equivalve, ovate or oval, with radiating striæ, gaping posteriorly; hinge of right valve with two widely diverging teeth; left valve with one direct thick triangular, bifid tooth under the apex, and an oblique compressed tooth posteriorly; sinus of pallial impression extending beyond the middle of the valves; muscular impressions large. (Miocene.)

*P. ovata*.—Ovate, compressed, very inequilateral, thin, radiately striate, striæ numerous, undulate or irregular, crossed by wrinkled fine lines; cardinal teeth prominent.

Proportionally longer, more compressed and inequilateral than *P. centennaria*, and with narrower hinge teeth.

*Locality.* Day's Point, James River, Virginia.

## FASCIOLARIIDÆ.

## BUSYCON, Bolten.

1. *B. carinatum*.—Fusiform; whorls 6; spire elevated; whorls angular, angle situated below the middle of the whorls, carinated, carina tuberculated, sides of volutions above the angle straight and very oblique, surface transversely striated; lines rugose, unequal, obsolete on the middle of last whorl; columella and canal sinuous.

*Locality.* Virginia.

2. *B. filiosum*.—Pyriform, thick, lineated, lines revolving, close, fine, unequal, rugose; spire short, scalariform, spinose on the angle, spines foliated; columella twisted, sinuous; last whorl obliquely ridged; canal long, sinuous.

*Locality.* Yorktown, Virginia.

Resembles *B. gibbosum*, C., (Kiener, Conch. pl. 9, fig. 2.) but has shorter spines, finer striæ and more scalariform spire. That is a recent reversed species, but the fossil has been found dextral only. Rather common at Yorktown. The spire in some specimens is short and hardly scalariform, but the revolving ridge on the lower part of the body whorl distinguishes this from the other Miocene species.

## FASCIOLARIA, Lam.

## Subgenus LIROSOMA, Conrad. 1862.

Subpyriform; ribbed, beak narrow and produced, slightly recurved; one long, very oblique plait at the angle of the columella.

*Fasciolaria (Fusus) sulcosa*, Conrad, Foss. Med. Tert.

## Subgenus TEREBRASPIRA, Conrad. 1862.

Spire elongated, whorls angular; plaits concealed or not reaching the outer edge of columella.

*Fasciolaria elegans*, Emmons, Geol. N. C.

## BUCCINIDÆ.

## TRITIA, Risso.

*T. scalaris*.—Ovate-acute; spire elevated, turritid; whorls 7, longi-  
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tudinally ribbed; ribs rounded, prominent, curved on the last whorl; revolving lines close and distinct; right lip striated within; fold at base of columella distinct.

*Locality.*

BULLIA, Gray.

Subgenus BULLIOPSIS, Conrad.

1. *B. ovata*.—Smooth; last whorl subquadrate; ovate or oblong-ovate, entire; whorls 5 or 6, slightly convex; spire conical, about half the length of the shell; aperture elliptical.

*Locality.* St. Mary's Co., Md.

Shorter and broader than the other two species of Maryland, the callus not prominent nor extending beyond the upper extremity of aperture.

2. *B. Marylandica*.—Oblong-ovate, entire; whorls 6, slightly convex or subtruncated laterally; suture impressed; aperture about half the length of the shell; columella profoundly callous above, the callus extending beyond the lip.

*Locality.* St. Mary's Co., Md.

Proportionally longer than the preceding, and the spire subscalariform. The shell is variable in outline, the spire being much longer in some specimens than others of equal breadth.

3. *B. quadrata*, C., Journ. A. N. S. vi. 226.

There are no known living representatives of this subgenus.

#### COLUMBELLINÆ.

AMYCLA, H. and A. Adams.

Subgenus ASTYRIS, H. and A. Adams.

1. *Amycla communis*.—Ovate, whorls 6 or 7, smooth and polished; spire rather elevated; body whorl abruptly rounded in the middle or subangular; submargin of labrum minutely dentate.

*Locality.* St. Mary's River, Md.

A common species in the blue clay of Maryland and Virginia.

2. *A. avara*, var. *granulifera*.—Narrow-acuminate; longitudinally ribbed; ribs numerous, angular; spire subturriculate; whorls 8, crossed by impressed lines, four in number, on 4 whorls of the spire, and covering the body whorl to the base; where the lines cross the ribs there is a small tubercle; labrum 7-dentate within; columella subplicated from base to submedial angle.

*Locality.* Occurs with the preceding.

3. *A. reticulata*.—Subturritid; volutions 6—7, slightly convex; lines prominent, revolving and transverse lines equal in size, transverse lines most remote, lines smaller and closer below the middle of last whorl; right lip toothed within.

*Locality.* Virginia.

#### OLIVINÆ.

DACTYLUS, Klein.

Subgenus STREPHONA, Browne.

*Dactylus eboreus*.—Slightly tumid on the upper part of body whorl; whorls 6 in number, the penultimate contracted below the suture; columella slightly tumid, with numerous acute plaits, and five oblique plaits at base, four of them elongated.

*Locality.* Virginia.

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*DENTALIDÆ.*

## DENTALIUM.

*D. Carolinense*.—Regularly curved, ribs 9 to 11, narrow and laterally flattened.

*Locality.* North Carolina.

Larger, less tapering, and having fewer ribs than *D. attenuatum*, Say. Longer and tapering more than *D. —*, Emmons, Geol. N. C., fig. 188.

*VERMETIDÆ.*

## VERMETUS, Adams.

Subquadrate, ribs 3, longitudinal, distant, the lowest one most prominent; longitudinal lines minute, close, rugose, becoming obsolete near the spire, which is regular, each whorl having two carinated lines revolving in the middle and one joining the suture at base; longitudinal lines none.

*Locality.* Neuse River, below Newbern, N. C.

*TROCHIDÆ.*

## LEIOTROCHUS, Conrad.

*L. distans*.—Trochiform; volutions 4; suture subcanaliculate near the apex; revolving lines, a few distant, distinct, impressed, the others very fine; periphery rounded; base convex-depressed, with six distant impressed revolving lines and very fine intermediate lines; umbilicus narrow, profound; subcarinated at base.

*Locality.* Calvert Co., Md.?

## CARINORBIS, Conrad.

Suborbicular; spire small, depressed, or but little prominent; shell costate, ribs revolving, distant, prominent; last whorl flattened above; umbilicus small, and the space beneath it channelled; peritome continuous.

*C. (Delphinula) lyra*, Conrad. *C. (Delph.) quadricostata*, Emmons. (Miocene.)

*SCROBICULARIDÆ.*

## ABRA, Leach.

*A. ovalis*.—Oval, convex, inequilateral, with five close laminar concentric lines; posterior side short, with a distinct obtuse fold; end margins rounded; within highly polished; cardinal and lateral teeth prominent.

*Locality.* Yorktown, Virginia. (Miocene.)

*ASTARTIDÆ.*

## ASTARTE, Sowerby.

*Astarte distans*.—Triangular, convex-depressed, with four broad concentric undulations; concentric lines unequal; umbo flattened with small prominent concentric ribs, inner margin minutely crenulated.

*Locality.* Cumberland Co., N. J., near Shiloh. (Miocene.)

Very distinct from the nearest allied species, *A. undulata* Say.

## PARASTARTE, C.

Elevated, triangular, equilateral, ventricose; epidermis pale and shining; hinge of right valve with one thick nearly direct tooth, and deep and rather long channel in the hinge plate anterior to the tooth; left valve with two equally diverging teeth; posterior submargin of both valves channelled above.

*Estarte triquetra*, C., Tampa Bay, is the type of this new genus,  
[June,

which differs essentially from *Erycinelli*, whilst the exterior is very much like the latter. (Recent.)

#### CRASSATELLA, Lam.

*C. producta*.—Trapezoidal, elongated, inequilateral, concentrically ribbed; ribs or ridges subacute, prominent as far as the umbonal slope which is obtusely subcarinated, and curved inwards; posterior slope depressed and medially subangular, concentric lines not prominent except behind the umbo, where they are more distinct; posterior extremity obliquely truncated; inner margin minutely crenulated.

*Locality*. Enterprise, Clark Co., Miss. (Eocene.)

This elegant species may be distinguished from *C. protexta* by the furrows or ridges extending over the whole disk. It belongs to a group of fossils quite distinct from those of Claiborne, Jackson or Vicksburg.

#### TRIGONIIDÆ.

#### VERTICORDIA, Wood.

*V. Emmonsii*, C., Emmons, Geol. N. C., 286 206.

This is the only species yet known in an American formation.

#### ARCIDÆ.

#### CUCULLEA, Lam.

The typical form of hinge teeth in this genus is not represented in the Eocene or Cretaceous *Arcidæ*. The oldest form which could be referred to *Cucullæa* occurs in the latter formation, represented by thick ponderous shells, with a broad hinge, and are in marked contrast to that of the recent species, whilst the character of the teeth is equally remote. I propose, therefore, to characterize the cretaceous subgenus as follows:

#### IDONEARCA, Conrad.

Triangular, thick, delicately lined; hinge thick, medial cardinal plates transverse, laminar, laterally striated; anterior and posterior plaits elongated, oblique, curved downwards at the ends towards the umbo, and laterally striated; interior plate curved, very prominent.

*Cucullæa Tippana*, C., and *T. capax*, C. (Cretaceous.)

The following European species will come under this section:

*Arca tumida*, d'Orbig., *A. Marceana*, d'Orbig., *A. fibrosa*, d'Orbig.

#### TRIGONARCA, Conrad.

Equivalve, trigonal, angular on the umbonal slope; hinge area narrow; series of cardinal plates curved and placed transversely or nearly at right angles to the hinge line.

*T. (Cucullæa) Maconensis*, C., Journ. A. N. S.

Viewed exteriorly, this shell has the habit of *Cucullæa*, but the hinge of *Axinæa*. It probably has the internal elevated plate, but the specimens are filled with stone too hard to be removed, (Cretaceous.)

#### Subgenus LATIARCA, Conrad.

Triangular, thick, capacious; hinge line narrow medially, broad and thick on the sides; cardinal plates granular and laterally striated, towards the ends in short oblique series; cardinal area wide with obliquely diverging grooves.

*L. (Cucullæa) gigantea*, C., *L. idonea*, C., *C. pnonchela*, Rogers, *C. transversa*, Rogers. (Eocene.)

#### ANOMOLOCARDIA, Klein.

*A. trigintinaria*.—Elongated, rhomboidal, very unequilateral, ven-  
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tricose; ribs about 31; square, not very prominent, on the posterior side divided by an impressed line and posterior to the umbo with an intermediate raised line; posterior end emarginate; cardinal area transversely striated; hinge line long, and the plates numerous; disk medially contracted or flattened; intersices of the ribs transversely striated.

*Locality.* South Carolina. (Miocene.)

#### NOETIA Gray.

*N. ponderosa*, Say, var. *N. carolinensis*.—Ovato-cuneate, ventricose; disks flattened submedially, ribs about 35 in number; narrow, flattened, divided by an impressed line, except on the anterior side, where they are distinctly lined only near the base, transverse wrinkles between the ribs close and prominent; these intercostal spaces have each an acute radiating line about the umbonal slope and posteriorly; basal margin slightly contracted medially.

*Locality.* Dauphin Co., North Carolina. (Miocene.)

Compared to the typical *ponderosa* it is less ventricose, proportionally longer, and has 35 ribs, whilst the latter has only 26.

*N. ponderosa*, Say, is abundant in a fossil state in some localities, and Mr. Tryon has obtained specimens from Cape May, in company with *Turritella plebeia*, Say, but I have not seen a recent specimen, and suppose it to be an extinct species.

#### STRIARCA, Conrad.

Equivalve, radiately striate, closed; hinge area transversely striated, and also the epidermis above it; hinge line dilated and curved at the ends; teeth divided into oblique hollow cross plaits.

*S. (Arca) centenaria*, Say. (Miocene.)

The remarkable teeth of this genus distinguish it from all other genera of *Arcidae*; the plaits are hollow with parallel laminar sides.

#### BARBATIA, Gray.

##### Subgenus GRANOARCA, Conrad.

Equivalve, gaping anteriorly; hinges are rather wide and very oblique, with longitudinal grooves angulated under the back; tooth more or less divided into granular plates, posteriorly widely expanded and broken into irregular granules.

*A. propatula*, C. Miocene Foss., 61, 32, 1.

#### CARDITIDÆ.

##### Subgenus PTEROMERIS, Conrad.

Triangular, not oblique, with radiating ribs; beaks medial: hinge of left valve, anterior tooth direct or directed slightly towards the anterior margin; posterior tooth double or bifid.

*Cardita perplana*, C. —A fossil of the North American Miocene is the type of this genus, which embraces two fossil and one recent species, all small shells. The other fossil species is *Cardita abbreviata*, C., and the recent *P. (Astarte) flabella*, C., of Florida.

#### Family MYTILIDÆ.

##### MYTILOCONCHA, Conrad.

Subfalcate, thick; perlaceous, laminated; hinge thick, elongated; pointed at the apex; an oblique tooth or ridge and parallel furrow throughout the entire length of hinge area.

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1. *M. (Myoconcha) incurva*, C., Miocene, Foss. 52, 28, 1.

2. *M. (Mytilus) incrassata*, C., ib., 74, 42, 4.

### PECTENIDÆ.

#### PECTEN, Lin.

*P. fraternus*.—Ovate, upper valve slightly ventricose, lower convex depressed; ribs 15 or 16, prominent; convex, laterally flattened, narrower than the interstices, trilineate, squamose; interstices with fine, unequal, delicately squamose radiating lines; lower valve, ribs broader, and more numerous lined; ears moderate, with radiating numerous rugose lines.

*Locality.* Virginia. (Miocene.)

Differs from *P. Jeffersonius* in being comparatively more elevated or ovate; in having smaller ears, and more numerous and narrower ribs, &c.

*P. Edgemonensis*.—Suborbicular; height not quite equal to the length; lower valve-ribs 16 to 17, prominent, but not elevated, square or convex-depressed, not quite as wide as the intervening spaces, radiately lined with finely squamose striæ, most conspicuous towards the margins, interstices of ribs carinated, in the middle squamose and finely striated; ears with fine close unequal squamose radiating lines, the larger ones most prominent on the posterior side; margins of ligament pit carinated.

*Locality.* Edgewood Co., North Carolina. Cab. Smithsonian Institution.

Allied to *P. boreus*; the carina between the ribs distinguish it from that species. (Miocene.)

#### LYROPECTEN, Conrad.

Inequivalve, radiately costate; hinge with a triangular pit as in *Pecten* and diverging prominent teeth on each side the ligament cavity.

*Lyropectin (Pallium) estrellanus*, C., Pacific R. R. Reports, 1855, vi. pl. 3, f. 15.

This genus is peculiar to the Miocene of the Pacific slope, and appears in three large species, the second of which has been figured and described as *Pallium estrellanum*, in Pacific Railroad Reports, vol. vii. 191, but is very distinct from that species. I propose to name it *Volæformis*.

*L. crassicardio*.—Suborbicular; ribs 15; larger valve ventricose; ribs rounded, not quite as wide as intervening spaces; whole surface radiately striate with equal lines, about 11 on the ribs and 5 on the interstices; opposite valve convex, ribs prominent, narrower and more abrupt than in the large valve, disposed to be concentrically nodulous or undulated by broad concentric furrows, and sometimes an abrupt concentric truncation.

*Locality.* California.

### OSTRIADÆ.

#### OSTREA, Lin.

*O. falciformis*.—Falcate, radiately ribbed; ribs numerous, regular, close, rounded, crossed by squamous lines; ribs small on the anterior depression; margins plicated, not crenulated; ligament cavity oblique.

*Locality.* Enterprise, Clark Co., Miss. Dr. Spillman. (Eocene.)

Revision of the GULLS of North America; based upon specimens in the Museum of the Smithsonian Institution.

BY ELLIOTT COUES.

The present paper is an abstract of a more extended Monograph on the Gulls of North America, prepared for publication in a Government Report. 1862.]

As some time, however, may elapse before the appearance of the Report, it has been thought advisable to issue in advance this brief sketch of the subject. Except in the cases of one or two species, everything not absolutely necessary to the proper understanding of the subject has been omitted. In the Monograph alluded to will be found references to the pages of the works of the authors cited; descriptions of the various changes and stages of plumage; together with a discussion of doubtful points of synonymy, and the arguments for the views entertained. It is also illustrated by figures of the bills of all the species, and colored drawings of the primary quills, showing the outlines and extent of their markings. The gulls of North America are worked up to the fullest extent that the specimens at my command allow; but, in the apparent hopelessness of arriving at ultimate truth with regard to these birds, I am prepared to relinquish any of the views now entertained which future investigation may prove to be erroneous.

#### Family *LARIDÆ*.

The family Laridæ, embracing the Jägers, Gulls, Terns and Skimmers is divisible into four subfamilies, which may be distinguished by the following brief diagnosis:

**LESTRIDINÆ.**—Covering of upper mandible not continuous, the basal half with a somewhat horny overlapping plate, differing in character from the terminal portion; the nostrils opening beneath it, but slightly above the cutting edge, and beyond the middle of the bill. Tail cuneate, the central feathers projecting, usually tapering and much elongated, the lateral stiff and acuminate. Interdigital webs more or less rounded. Body full, stout; size usually moderate.

**LARINÆ.**—Covering of bill continuous. Bill more or less robust, the culmen about straight to the nostrils, abruptly decurved to the tip, which overhangs the tip of the lower mandible. An angular projection at the symphysis of the lower jaw more or less prominent. Nostrils at the end of the basal half of the bill. Tail generally even, the feathers being all of the same character. Webs more or less indented. Inner lateral toe moderate. Body robust; size very large or moderate.

**STERNINÆ.**—Covering of bill continuous. Bill slender and tapering to a very acute point, the tip not abruptly decurved, nor overhanging the lower mandible. Curve of culmen and commissure regular and gradual from base to tip. Angle of lower mandible scarcely apparent. Nostrils on the basal third of the bill. First primary greatly longer than the second. Tail generally forked. Inner lateral toes very short. Webs indented. Body rather slender and graceful; size moderate or very small.

**RHYNCHOPSINÆ.**—Bill excessively compressed, like the blade of a knife. Upper mandible abruptly shorter than the lower. Otherwise generally as in *Sterninæ*.

We have at present only to do with the second of these groups, the

#### Subfamily *LARINÆ*.

Of the many genera into which the Gulls have been divided by systematic writers, North America contains representatives of eight, which seem to differ in well marked characters. They may be arranged in two sections and very briefly defined as follows:

#### *A.*—*LARÆ*.

Size very large, large, or moderate. Body robust, general organization more or less powerful. Bill stout and deep, the angle prominent, the tip obtuse, seldom attenuated or much decurved. Tail never cuneate or decidedly

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forked. Legs rather stout; hind toe sometimes rudimental. Head never with a hood; in winter with the neck streaked with dusky. Under parts white without a decided roseate tint.

1. *Larus*.—Size large or moderate. Bill stout, robust, obtuse, the tip not attenuated, the angle usually very prominent. Convexity of culmen great at the ends. Color white, nearly always with a darker mantle. Tail even.

2. *Blasipus*.—Size moderate. Bill rather slender, its tip somewhat attenuated. General color dusky. Tail even, or very slightly emarginate.

3. *Rissa*.—Size rather small. Bill stout at base, but more attenuated and decurved at the tip. Angle acute, but not very prominent. Hind toe rudimental. Tail even; somewhat emarginate in the young.

4. *Pagophila*.—Size rather small. Bill short, stout, obtuse. Tarsus very short, stout, arm rough. Tibiæ partially feathered. Webs excised. Color entirely pure white.

#### B.—XEMEE.

Size moderate, small, or very small. Body more slender, general organization more delicate. Bill generally slenderer and more acute, the angle not very prominent, but acute, the tip decurved and attenuated. Tail variable,—even, forked, or cuneate. Legs rather slender. Hind toe always present. Head usually with a hood, or with a black ring round the neck. Under parts white, with a decided roseate tint.

5. *Chroicocephalus*.—Size moderate and very small. Bill slender, the tip more or less decurved. Tail even.

6. *Rhodostethia*.—Size small. Bill short and very slender. Neck with a black ring, but head without a hood. Tail cuneate.

7. *Xema*.—Size small. Bill short, rather slender, the angle acute. Head with a hood and neck with a ring. Tail moderately forked.

8. *Creagrus*.—"Of medium size; bill very strong and much curved; mantle grayish white; tail deeply forked."—Lawr.

The above brief characters define the genera sufficiently for our present purposes; the aim being rather the determination of species than rigid systematic classification.

#### Genus 1. *LARUS*, Linnaeus.

*Larus*, Linn. 1744; nec 1735; (typus *L. canus*, fide Gray.)

*Gavia*, Moehring, 1752; nec auct.

*Leucus*, Kaup, 1829.

*Laroides*, Brehm, 1830; t. *L. argentatus*, Brünn. Bp. 1856; (typus idem.)

*Plantus*, Reichenbach, 1853.

*Glaucus*, Bruch, 1853; (t. *L. glaucus*, Brünn.)

*Dominicanus*, Bruch, 1853; (t. *L. marinus*, Linn.)

*Gavina*, Bp. 1854, fide G. R. Gray; nec Bp. 1856.

*Laroides*, Bruch, 1855; (t. *L. glaucus*, Brünn. = *Glaucus*, Bruch, 1853.)

*Leucus*, Bp. 1856; (t. *L. glaucus*, Brünn. Emend. *Leuc.* Kaup, 1829 = *Laroides* Bruch, 1855, vel *Glaucus*, Bruch, 1853.)

The eleven species of the genus found in North America may be very naturally arranged under the following sections or subgenera:

Section A.—*LEUCUS* Bp. (*Plantus*, Reich. *Glaucus*, p. Bruch, 1853, *Laroides* p. Bruch, 1855.) Large and powerful; primaries without any black; upper parts very light.

a. Color above entirely white.

1862.]

1. *LARUS HUTCHINSII* Richardson.

?*L. glacialis*, Benicken (nec Macgill. qui *L. glaucus*, Brünn.) *Glaucus glac.* Bruch, 1853. *Laroides glac.* Bruch, 1855. *Leucus arcticus*, "Macg." Bp. 1856, excl. synonym. (nec Macg.) *Larus Hutchinsii*, Richardson, F. B. A. 1831, ii. 419.

*Sp. char.*—Adult: Bill flesh-colored at base, blackish on terminal third. Entire plumage pure white, the shafts of the feathers straw yellow. Feet light flesh-color. Young: Head, neck and upper parts mottled with light reddish brown, appearing on the latter as irregular patches, and on the rump as more or less obsolete transverse bars. Under parts a nearly uniform very light reddish brown, the under tail coverts transversely barred with white. Wings and tail pure white. Length  $27\frac{1}{2}$  inches; extent 60; wing  $17\frac{3}{4}$ ; bill above 2.40; along gape 3.20. Tarsus 3.40; middle toe and claw 3.50.

*Hab.*—Arctic America; North Pacific; New York State!

The name "*Arcticus* Macgill." is usually applied to this bird. Bonaparte adopts the name in his *Conspectus*, moreover, considering it identical with *L. argentatus* of Sabine's *Memoir* on the Birds of Greenland. But both these authors speak of a notable amount of blue on the back,—("back pure pearl gray, with a good deal of blue"—"*cærulescente-perlaceo*.") Moreover, Macgillivray himself subsequently says that his *arcticus* is the *leucopterus* Faber. I have not been able to find the original description of *glacialis* of Benicken; but Bruch, who adopts that name, speaks of the "gull-blue" of the upper parts. In the *Fauna Boreali-Americana*, ii. p. 419, there is given a brief description of a Gull, which is certainly, I think, the present species. The names "*arcticus*" and "*glacialis*" being in my opinion untenable, I adopt that of *Hutchinsii*, proposed by Richardson. I have no doubt of the validity of the species.

This species is now introduced into the Fauna of the United States through a specimen killed in Washington co., New York, and presented to the Smithsonian Institution by Mr. Peter Reid. It was killed in midwinter, while feeding on a dead sheep. Other specimens were collected by Mr. Stimpson in Behring's Straits, while connected with the North Pacific Expedition under Capt. Rodgers, U. S. N.

b. Color above very light pearl blue. Primaries like the back, fading insensibly into white at some distance from the tips.

2. *LARUS GLAUCUS* Brünnich.

*Larus glaucus*, Brünn. 1764 et auct. *Laroides glauc.* Bruch, 1855. *Leucus glauc.* Bp. 1856. *Plantus glauc.* Reich. 1853. *Larus consul*, Boil. 1822. *Glaucus cons.* Bruch, 1853. *Larus islandicus*, Edmonston, 1822, nec Edm. 1823. *Larus glacialis*, Macgill. 1824; (nec Benick.) *Larus leuceretes*, Schlep. *L. leucopterus*, Vieill. *L. giganteus*, Benick. fide Bp.

*Sp. char.*—Length 29 inches; extent 62; wing 18.5. Bill above 2.75, along gape 3.75; height at nostril .80, at angle .85. Tarsus 3.00; middle toe and claw 2.75. (Dimensions sufficient to separate it from *leucopterus*, the only other N. A. species in this group, (b).)

*Hab.*—Arctic seas, coming southward in winter. Labrador in summer.

3. *LARUS LEUCOPTERUS* Faber.

*L. argentatus*, Sub. 1818; nec Brünn., nec auct. *L. argentatus*, var. Temm. *L. arcticus*, Macgill.; (nec *Leucus arct.* "Macg." Bp. 1856.) *Larus leucopterus*, Faber; (nec Vieill., qui *L. glaucus*, Brünn.) *Laroides leucop.* Bruch, 1855. *Glaucus leucop.* Bruch, 1853. *Leucus leucop.* Bp. 1856. *Plantus leucop.* Reich. *Larus islandicus*, Edmonst. 1823, nec 1822. *Larus glaucoides*, Temm. 1840. *Laroides glaucoides et leucopterus*, Brehm, fide Bp.

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*Sp. char.*—Length 24 inches, wing 16·75. Bill above 1·80, rectus 2·80, depth at angle ·65. Tarsus and middle toe and claw 2·26.

*Hab.*—"Arctic seas; Baffin's Bay; Labrador." (Lawr.)

c. Color above pearl blue. Primaries about the color of the back to the very tips, which have well-defined, rounded, white apical spots.

4. *LARUS GLAUDESCENS* Lichtenstein.

*Larus glaucescens*, Licht. *Laroides glauc.* Bruch, 1855; (nec *Glaucus glaucescens*, Bruch, 1853, qui *Larus chalconotus*.) *Leucus glaucescens*, Bp. 1856. *Larus glaucopterus*, Kittlitz, fide Bruch. *Glaucus glaucopterus*, Bruch, 1853.

*Sp. char.*—Bill long and rather weak, the upper mandible projecting considerably beyond the lower, the convexity of the culmen comparatively slight. Angle pretty well defined, the outline between it and the tip about straight. Adult: Mantle pearl blue, much the same shade as in *argentatus*. Primaries slightly deeper than the back, all with rounded, well-defined apical spots of white. First, Base not appreciably lighter than the body of the feather, with a well-defined white spot on both webs, near the end, separated from the white apex by a transverse band of the color of the body of the feathers; second, third and fourth, basal portions notably lighter than the terminal, fading into pure white at their junction with the latter, without spots except the apical ones; fifth, sixth, basal portions the color of the back, fading into white near the end, separated from the white apices by a band (narrowest on the sixth) of the color of the outer primaries.

*Young of the year.*—Bill black. Everywhere deep grayish, somewhat mottled with whitish, the feathers of the back, wings and upper tail coverts edged, tipped and crossed by more or less regular transverse bars of grayish white. Length about 27 inches, wing 16·75. Bill above 2·25, gape 3·25, height at angle ·70; tarsus 2·60, middle toe and claw 2·50.

*Habitat.*—Pacific coast of North America.

One of the later discoveries, and a very distinct and well-marked species.

5. *LARUS CHALCOPTERUS* Licht.

*Glaucus glaucescens*, ("Licht."), Bruch, 1853; (nec *Laroides glaucescens*, (Licht.) Bruch, 1855. *Laroides chalconotus*, Bruch, 1855. *Leucus chalconotus*, Bp. 1856. *Larus chalconotus*, Lawr. 1858.

*Sp. char.*—Adult: "Entirely similar to *leucopterus*, except in the primaries, which are ashy gray, with rounded white apical spots." Young: "Dark gray, as in *glaucopterus*," (of Kittlitz = *glaucescens*, Licht.)

*Habitat.*—"American coast of Behring's Straits, and Greenland."

A species I have never seen. The diagnosis is copied from Bruch's Monograph. This author, in saying that the primaries of the bird are "ashy gray, with rounded white apical spots," reduces the characters in this respect precisely to those of *glaucescens*, Licht. Then, the bird being "like *leucopterus*, except on the primaries," must be separated from *glaucescens*—throwing out of consideration the primaries, acknowledged to be identical—by those points in which *leucopterus* differs,—viz.: smaller size, somewhat differently shaped bill, and lighter mantle. In a word, *chalconotus* is a *leucopterus* with the wings of *glaucescens*.

If the characters given are constant, the species is doubtless a valid one. If so, it is the smaller analogue of *glaucescens*, and bears the same relation to that species that *leucopterus* does to *glaucescens*.

Section B.—*DOMINICANUS* Bruch. Very large and powerful; color above dark blackish slate; primaries crossed with black near the end.

6. *LARUS MARINUS* Linnæus.

*Larus marinus*, Linn. 1776. *Dominicanus marinus*, Bruch, 1853 et 1855. 1862.]

*Larus naevius*, Gmel. 1788 (juv.) *Larus maculatus*, Bodd. fide Bp.; (nec Brünn.) *Larus maximus*, Müller, et *Fabricii*, Brehm, secundum Bp.

*Sp. char.*—First primary with a large white space at the tip,  $2\frac{1}{2}$  inches long. Young: Fully as large as the adult; the bill as large, but the angle less developed, entirely black. Upper parts dusky chocolate brown, everywhere mottled with whitish and light rufous, (the latter on the back and wings,) the feathers being tipped and the wing coverts deeply indented with this color. Under parts mottled with white, or rufous white and dusky, the throat mostly immaculate. Primaries and tail deep brownish black, the former at the extreme apex tipped, and the latter tipped, subterminally barred, and with the outer feather mottled with whitish. Length 30 inches, extent .65, wing 18.50.

*Habitat.*—North Atlantic, coming south in winter. Florida (Aud.)

A full description of the adult appeared unnecessary. That of the young was drawn up from a specimen taken from its nest while in the downy state, and reared by the writer until full grown.

Section C.—*LAROIDES* Brehm. (*Larus*, Kaup; *Glaucus*, p. Bruch, 1853.)

Mantle lighter than in B, darker than in A. Primaries crossed with black near the ends.

a. Large; bill robust; angle prominent. "Herring-gulls."

I. A rounded, white subapical spot on the first primary. Legs flesh-colored

7. *LARUS OCCIDENTALIS* Audubon.

*Larus occidentalis*, Aud. *Glaucus occid.* Bruch, 1853. *Laroides occid.* Bruch, 1855.

*Sp. char.*—Bill large, robust, very stout and deep, the culmen very convex at the end, the angle strongly developed, making the under outline doubly concave. Adult: Mantle dark bluish ash, almost slate color, the tips of the secondaries and tertiaries white, the line of demarcation distinct. Primaries: first three black throughout their exposed portions, the outer white for some distance at the tip (1.75 inches), crossed near the end with an irregular black bar; the shafts entirely black; the second without a white spot but its tip and the tips of all the others white. The young of the year: Bill entirely black, rather shorter than in the adult, but at the same time with great comparative depth at the angle. Everywhere a deep blackish brown, mottled with grayish white, the feathers of the upper parts edged and tipped with that color. Rump and upper tail coverts barred with whitish and dusky. Primaries and tail uniform deep blackish brown, with scarcely lighter tips, the former without tips. Length 24 inches, extent 55, wing 15.5. Bill above 2.30, along gape 3.10; height at nostril .75, width .40, height at angle .85. Tarsus 2.75.

*Habitat.*—Pacific coast of North America.

A very strongly-marked species.

8. *LARUS SMITHSONIANUS* Coues.

*Larus argentatus*, auctorum americ. *L. argentatus ex Americâ.*

*Sp. char.*—Adult: Mantle typical "gull-blue;" much lighter than in *occidentalis*, lighter than in *brachyrhynchus*, much as in *Delawarensis* and *glaucescens*, darker than in *glauca* or *leucopterus*. Bases of primaries a but slightly lighter shade of the blue of the back, not so light nor extending so far, (especially on the first primary,) nor so broad at the end as in *Californicus*; on the first the light portion is very short, falling five or six inches short of the white spot, is not lighter at its juncture with the black, nor does it extend further on the central portion than on the edge of the feather; on the second, third and fourth the light bluish extends about the same distance (about four

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inches from the tip of the second), and runs further up along the centres of the feathers than on the edge; on the seventh the black is a mere spot on one or both webs; the bluish fades into pure white at its juncture with the black on all the feathers except the first. First primary with a subapical spot near the tip, small, rounded, not much more than an inch long, not longer on the outer vane than on the inner, sometimes wanting on the former. Second primary without a white spot, or, if present, it is a mere point. Extreme tips of all the primaries white. Young of the year: Entirely a deep sooty brown, the throat slightly streaked and the rump transversely barred with whitish, and the feathers of the upper parts edged with grayish or yellowish. Wings and tail entirely black; bill black. Length 25 inches; extent 58; wing 17.75; tarsus 2.50 to 2.60.

*Habitat*.—Eastern and Western coasts of North America.

Although it may seem a hazardous undertaking to separate the Herring-gulls of America and Europe, after they have been judged identical by so many authors of repute, I am compelled to do so from a conviction that the differences constantly observable in them are of specific value. Further on it will be attempted to show why they have been confounded.

The comparison of the extensive series of the North American bird has been made with four perfect specimens of *Larus argentatus* from Europe, which, I have every reason to believe, represent typically the characters of that species.

In both birds, the color of the mantle, the color of the bill, the relative proportions of the tarsus and toes, the black on the primaries, the small white apical spots, and their bluish bases do not differ appreciably. The tangible differences are the following:

1st. The whole bird is larger. The difference in the wing in some specimens amounts to nearly two inches, and in none is it less than half an inch.

2d. The bill is larger, longer and more robust. It is especially stouter at the base. The angle is larger, more prominent and bulging; but at the same time it has not so pointed and well defined an apex.

3d. The legs and feet are longer and stouter, perhaps even more so than is proportional to the greater size of the bird. The entire difference in the length of the tarsus and middle toe amounts to but little less than half an inch.

The preceding differences, though marked, I should not consider, in the absence of other distinctive features, as of specific value. The following discrepancies I find it impossible not to regard as conclusive.

4th. In the European bird, when adult, the first primary has a white terminal space just about two inches long. (This is precisely as in *californicus*, the similarity being further heightened by the fact that in young birds there is a narrow transverse bar, which gradually resolves itself into two small spots or scollops, and finally disappears.) The second primary has a rounded white spot about three-fourths of an inch in diameter, invading both vanes, but divided into two by the black shaft. In the American bird the first primary has a rounded white spot (of much the same size and character as that on the second primary of the European bird) entirely distinct and separated from the white apex, which is very small. The second primary has no white sub-terminal spot; or if one is present (which is rarely the case in very old birds) it is exceedingly small.

Now it may be urged, that these differences have been noted, but disregarded as of no value, the nature of the terminal markings on the wings of gulls being considered "notoriously inconstant." There is in the Smithsonian collection perhaps the most extensive series of American Herring gulls ever brought together. In no single specimen of the series have I ever observed the slightest approach to the large white apical space on the first primary which exists in the European bird;—constantly, so far as I have observed. 1862.]

portunities for judging. While the bird is undergoing the changes incident to its arriving at maturity, there are great and indeed endless variations in the precise character of the primaries. All, however, uniformly tend towards the same result; and in fully adult birds *these characters are constant*.

I find no material differences in the character of the extent of the bluish markings of the bases of the primaries.

The above points would seem to be sufficient to establish the position assumed, but there is another argument of a different character which, in connection with the preceding, seems quite conclusive. The Herring Gulls of both continents differ from the *Larus glaucus, leucopterus*, etc., in being essentially southern birds. They go north to breed only, returning again as soon as the duties of incubation are concluded, and moreover, do not proceed very far north. The American bird, at least, is found but sparingly, if at all, north of Cape Chidleigh, on the coast of Labrador, and is more numerous somewhat farther south. The *Larus glaucus, leucopterus, Pagophila eburnea*, etc., are entirely boreal birds, inhabiting the regions about the arctic circle, coming south only when forced to do so by the severity of winter. In view of this fact, it would be improper to presume upon the specific distinction of the two birds, unless very strongly marked and constant characters were found. Reasoning by analogy, it would be natural to suppose that two birds, separated by the breadth of the ocean, might very probably be distinct; and discrepancies which in the case of truly boreal birds would be of little importance, might under other circumstances be of specific value.\*

In view of the above facts, I have not hesitated to separate the two birds. If the position assumed should be hereafter substantiated by more extended investigation, it will be interesting as bearing upon the law which regulates the identity or non-identity of birds of the two continents, which does not appear to be as yet thoroughly understood.

With regard to the previous comparisons which have been instituted between the two birds, in which no differences have been discovered. It seems that this might have arisen in two ways. In the first place, authors who were impressed with the differences of the markings of the primary in the same species at different ages, might have considered these differences in the two species as equally accidental, and consequently entirely overlooked them, considering them as of no value whatever. The birds in other respects are so generally similar, that they might readily be thought identical. Again, when we are informed that absolutely no differences could be discovered, is it not very probable that the European bird was compared with Northern white-tipped-primaryed stype, the color of the legs not being apparent in dried skins? For example:—this is certainly the case in the comparison made by Wm. Thompson, Esq. (See "Natural History of Ireland, Birds, vol. iii. page 367, copied from the Proceedings of the Zoological Society of London, for 1835, page 83.) The comparison is here made of "six mature specimens of the Herring-Gull of the north of Ireland" with the description given in the Fauna Boreali-Americana. As Richardson does not particularly mention the character of the bluish markings on the bases of the primaries, and gives the legs as flesh colored, there was no difficulty in referring the European specimens to the description. On account of the difference of size of the subterminal spot on the second primary of the two wings of the same individual, the author infers that "this marking is so inconstant that it should not be relied on as a character." Both spots, however, were present; and I have noticed the same difference in the two wings of *californicus*, and even the presence of a minute white dot on the second primary of one wing of *L. Smithsonianus*, and its absence from that of the other, without considering it as in the least invalidat-

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\* It is due to Prof. Baird to acknowledge that the theory is not original with myself.

ing the claims of these markings to be considered as of value. The radical difference still exists.

But if then the terminal marking of the primaries of *californicus* are like those of the European *argentatus*, and the two species are nearly identical in size and general robustness, what are the differences between these two species? Briefly as follows: The European *argentatus*, though less robust than the *apicalis*, does not exhibit that decided approach to the "new gull" type indicated in the *californicus* by its greenish legs. Though the terminal markings of the primaries are quite identical, the character of the bluish bases differ decidedly. In *californicus* this color is very light, so much so as to be almost white. It runs up further on the primaries (especially on the first), and with a different pattern, its edge being nearly parallel with the shaft for the greater part of its length, and then turning off suddenly at an angle to the edge. It runs up nearly as far on the edge of the feather as in the middle. Now in the European *argentatus* (and also in *Smithsonianus*,) this color is but little lighter than the mantle; runs an oblique course to the edge of the feather; and goes further up centrally than at the edge of the inner vane, where the terminal blackish descends for a little distance as a narrow margin. Moreover, in *californicus* the line of demarcation of the two colors is very distinct and decided, while in *argentatus*, they are more blended at their union. In discussing this point, the habitat of the *californicus* should not be lost sight of.

With regard to the name by which this species is to be designated:—

So far as I have been able to ascertain, the species has never been designated by any other name than that of *L. argentatus* by American authors, it having been always considered by them as identical with the European species of Brünnich.

The *Laroides americanus*, Brehm, might perhaps be considered to refer to this species. It is, however, evidently quite a different bird. The brief diagnosis of Brehm is as follows: "Unterscheidet sich von *Laroides argentatoides* Brehm durch den etwas kleinern Schnabel und der noch weiter hirsten erhöhten scheitel." Now the *Laroides argentatoides* of Brehm is said by that author, "vor allen vorhergehenden"—*L. major*, *argentatus* and *argenteus*—"an ihrem kleinen Schnabel und äusserst hohen scheitel zu erkennen." Thus, the *L. americanus* of Brehm is a bird with a much smaller bill even than *L. argentatoides* of that author, and therefore cannot possibly be the species now under consideration, which has a larger bill than *argentatus*, Brünnich. I regard it as not at all impossible that Brehm should have based his species (*americanus*) on a small specimen of *L. californicus*, but his diagnosis is so brief and unsatisfactory that I do not see how the identity of the two names is to be proved positively.

The *Laroides argentatoides*, Brehm, is given by Bonaparte and some other authors as the "*Larus argentatus ex Americâ*," which would make it the bird now under consideration. Brehm's description, however, gives no tangible points of difference, and the measurements indicate a bird rather smaller instead of larger than the *argentatus*, Brünn. The distinctive characters from *argentatus* are summed up as lying in the smaller size, smaller bill and higher forehead;—features quite at variance with those presented by the species now under consideration. Moreover, the expression "sie ist nördlichere unter allen silbermöven," proves decisively the non-identity of the two. I have been unable to find any other name which could by any possibility be referred to this species.

There is, in the collection of the United States Exploring Expedition, (Vincennes and Peacock,) a Gull labelled as having been obtained in Oregon. The specimen presents the characters of the present species typically, agreeing perfectly with eastern skins. This locality I was at first disposed to consider as erroneous, but very recently specimens received from J. Hepburn, Esq., of 1862.]

San Francisco, collected in that immediate vicinity, would seem to demonstrate the existence of the species on the Pacific as well as on the Atlantic coast. The specimens I have compared critically with an eastern series, and have been unable to detect the slightest difference. They appear to be absolutely identical. A circumstance that would seem to confirm the belief that the present species does extend quite across the continent is the fact that there are undoubted specimens in the collections of Messrs. Kennicott and Ross from localities whose general avi-fauna is rather of a western than of an eastern type. Should the existence of this bird on the Pacific slope be satisfactorily demonstrated, its *habitat* may properly be given as the "Continent of North America."

I beg leave to dedicate this species to that Institution whose material for the illustration of North American ornithology, unequalled in richness and extent, has so greatly increased our knowledge in this department of Natural History. And the name seems not inappropriate, for, as there is scarcely a lake or river in North America which does not furnish sustenance to this Gull at some period of its extensive migrations, so there is hardly a locality, however remote or inaccessible, which has not yielded its varied productions to the Smithsonian Institution, until its collections afford every facility for the study of the Natural History of our Continent.

II. A large white apical space on first primary in adult birds. Legs dusky olivaceous, the webs bright chrome.

9. *LARUS CALIFORNICUS* Lawrence.

*L. argentatoides*, Bp. 1828 et Richardson, 1831; nec Brehm. *L. Californicus*, Lawr. 1854 et 1858. *Laroides Calif.* Bp. 1856.

*Sp. char.*—Bill moderately stout and strong, the angle well developed; varying considerably in size, larger than in *Delawarensis*, sometimes nearly equalling *argentatus*. Tarsus equal to or slightly longer than the middle toe and claw. Adult: Bill chrome yellow, tinge with greenish, a vermilion spot on the lower mandible at angle; a black spot just above it, forming with another small black spot, sometimes present on the upper mandible, an imperfect band. Legs olivaceous greenish or yellowish, the webs chrome. Mantle pearl blue, much as in *brachyrhynchus*, lighter than in *canus* (Linn.), perhaps a little darker than in *argentatus*. Primaries: bases of all light bluish white, almost white internally, especially on the outer; and of great extent on all the primaries; first with a white space at the end about two inches long, the shaft white along the white portion of the feather; second with a white spot near the end on the whole of the inner and most of the outer web, divided by the black shaft; tips of all white; black forming merely a narrow subterminal band on the sixth. Tips of inner primaries, of the secondaries and tertiaries, white. Dimensions, (average, for they vary greatly) wing 15.50; bill nearly 2.00; tarsus 2.30. Female smaller.

*Habitat.*—California; Pacific coast; Arctic America, internally; breeds about Great Slave Lake.

The following is the argument in favor of the synonymy adduced:

In the first place, *argentatoides* of Bonaparte's Synopsis (1828), and of Richardson (1831), are the same bird, since the latter quotes the former as authority for the name, and the diagnosis and descriptions of the two agree perfectly. Now, in the collection there are numerous specimens of the fully adult bird from Arctic America, from localities not far distant from those where Richardson's specimens were procured. These specimens agree precisely with Richardson's descriptions of *argentatoides*,\* and correspond very

\* If it be objected that the expression "six outer quills crossed by a brownish black bar, which takes in nearly the whole of the first one" is not correct, I refer to several other descriptions of Richardson, (his *canus* and others,) where it is evident that he does

nearly with the measurements.\* I think, then, that there can be no reasonable doubt of the propriety of referring the large northern specimens to the *argentatoides* of Richardson and Bonaparte. These same specimens were, immediately upon their reception, referred unhesitatingly to *Californicus* of Lawrence, by both Prof. Baird and myself. We have critically examined them, and find it impossible to distinguish them from undoubted specimens of *Californicus*.

The size is somewhat greater; but not more so than would be expected from the much more northern habitat of the specimens examined; and, moreover, the numerous specimens differ among themselves to a remarkable degree, the smallest of the northern ones not exceeding the largest of the southern. Thus, though a large northern bird and a small southern differ so much that it would seem quite reasonable to separate them, there are found intermediates of every grade of dimensions. The upper parts of the northern bird are, perhaps, a shade lighter than are California specimens; but otherwise, we cannot appreciate the slightest distinctive characters. Now, it is not improbable that there should be in America two species of white-tipped primaries Gulls, the one from Arctic (and Eastern?) America and the other from the Pacific, differing from each other, on an average, in size; but in the absence of tangible characters, I do not venture to separate the two. I therefore, at present, quote "*Larus argentatoides*, Bp. et Rich. nec Brehm" as synonymous with "*Californicus*, Lawr.," leaving it to future investigation to settle the point definitely.

The only discrepancy to be reconciled in the description of Richardson, is the statement "legs flesh-colored." The legs of *Californicus* are of a dusky olivaceous greenish or yellowish, their interdigital membranes bright chrome yellow, with a slight tinge of green. In this respect, as well as in a general less powerful and robust organization, weaker bill, &c., it shows an evident approach to the "Mew-Gulls" (*Delawarensis*, *canus*, &c.), and apparently forms the connecting-link between the powerful Herring-Gulls, with their robust bills and flesh-colored legs, and the group of which *canus* is the type.† But Mr. Lawrence himself, in his description given in the General Report, says also "legs flesh-colored," though the color is given correctly in the Ann. N. Y. Lyc. N. H. The descriptions of both these authors were most probably drawn up from the dried skins, in which, as attested by a large series before me, the legs appear of a dingy undefinable color, which might readily be supposed to be the change produced in drying of the flesh color. My authority for the statement as to the color of the legs, is the labels attached to the specimens, containing the color of bills, eyes, legs, &c., taken from the recent bird before skinning.

The type of *Californicus* has been kindly furnished by Mr. Lawrence for examination. It is moulting, and some of the primaries are not fully grown out. The white apical space on the first primary is interrupted by a narrow transverse bar of black. Another specimen before me is in precisely the same condition. In other skins of the series the black bar is resolved into

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not take into special consideration the character of the extent of the bluish white bases of the quills; and since the black nearly occupies the whole of the outer web of the first, he would not have particularly noticed the extent to which the bluish white runs up on the inner vane.

\* I am inclined to think that Richardson drew up his measurements and descriptions from the largest as well as the most perfect specimens, since, in several instances, the measurements seem above the average, though not exceeding the dimensions of large individuals.

† Bonaparte (Syn., 1828, 360) says his *argentatoides* is "common near New York and Philadelphia."

‡ This fact is also an argument for the impropriety of separating the two groups generically, as has been done by some authors.

1862.]

two little spots, then into a slight indentation at the edge of the feather, which finally disappears altogether, leaving the apex of the first primary purely and uninterruptedly white for nearly two inches.

Independently of the difference in size, character of bill and color of legs, the present species may readily be distinguished from the American Herring-Gull by the different markings of the primaries, (compare descriptions.)

If it be an error to refer the *argentatoides* of Richardson to the *Californicus*, or, in other words, if there be a true Herring-Gull in the north with flesh-colored legs, I do not know by what characters it could be separated from the true European *argentatus*. (See comparison of *Californicus* and *argentatus*, under head of *L. Smithsonianus*.)

The name *argentatoides* of Bonaparte and Richardson is of course of prior date to *Californicus* of Lawrence. The latter name, however, obtains, of Brehm's having first applied the name *argentatoides* to a variety, perhaps only accidental, of the European *argentatus*, of which it necessarily becomes a synonym.

Brehm's description of his *argentatoides* applies pretty well to *Californicus*, but it is evident that it cannot refer to the latter, for he says of it, that "brutet an der scheve dischen, Norwegischen und Danischen kaste,"—a statement entirely at variance with all that is at present known of the geographical distribution of *Californicus*.

Bonaparte, in his *conspectus* (1856), under head of *L. argentatoides*, (referring to his *Synopsis* of 1828,) gives, among other characters, the smaller size, the tarsus only two inches, "*remigibus nigris, apice, primæ latissimo, albis*." This is precisely the character of *Californicus*. The tarsus of *L. Smithsonianus* is nearly or quite two and a half inches long; that of *L. argentatus* about two and a quarter; while that of *Californicus* is just about two inches.

- b. Smaller; bill less robust; angle less prominent; legs dusky bluish green. "Mew Gulls." (Including *L. canus*, the type of Linnæus' *Larus*.)

#### 10. *LARUS DELAWARENSIS* Ord.

*Larus Delawarensis*, Ord, 1815; Lawr. 1858, (excl. synonym. aliq.) *L. canus*, Bonap. Syn. 1828; (nec Linn.; nec Richards.; nec Nutt.) *L. zonorhynchus*, Richardson, 1831; Aud. 1842 (excl. synonym.), Bp. 1856 (excl. synonym.) *Glaucus zonorh.* Bruch, 1853. *Gavina zonorh.* 1855.

*Sp. char.*—Bill encircled with black near the end. Tarsus a fourth longer than the middle toe. Mantle light pearl blue. Spot on the outer primaries small, not larger on the outer than on the inner web. In winter the head and neck spotted (not streaked nor nebulated) with dusky. Length 19·75 inches; extent 48·50; wing 14·75. Bill above 1·70; gape 2·30; tarsus 2·05; toe 1·80.

*Habitat.*—North America, generally. Puget's Sound. All along the Atlantic coast. Texas and interior.

It is necessary to exclude the synonyms of many of the authors adduced, since most of them quote *canus* and *brachyrhynchus* of Richardson as the young. (See next species.)

#### 11. *LARUS BRACHYRHYNCHUS* Richardson.

?*Larus niveus*, Pall. 1811. *Larus canus*, Richardson, 1831, ad (nec Bp. Syn. 1828; nec Linn. et auct.), Nuttall, 1834. *Larus brachyrhynchus*, Richardson, 1831, juv. *Larus Suckleyi*, Lawrence, 1858. *Rissa* (?) *septentrionalis*, Lawrence, 1858.

*Sp. char.*—Bill small, somewhat stout for its length, much shorter than the head or tarsus. Upper mandible straight to the end of the nostrils, moderately convex to the tip, rather more so than in *canus*. Angle comparatively more developed than in *canus*, the lower outline considerably concave posterior to

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it, somewhat so before it. Commissure about straight to near the tip. Tarsus about equal to middle toe and claw. Adult: Bill bluish green, its terminal third bright yellow. Legs and feet dusky bluish green, the webs yellowish. Mantle light grayish blue, or dark pearl blue; a shade lighter than in *canus*, much darker than in *Delawarensis*. Primaries: The bluish gray bases rather lighter than in *canus*, much darker than in *Delawarensis*, but fading into nearly pure white on all but the first, at its juncture with the black portion. These bluish gray bases extend towards the end much further than in *canus*, as far as in *Delawarensis*; and, as in that species, extend on the second, third and fourth feather further along the centre of the feather than on the edges, so that they are bordered for some distance with the black of the terminal portions. The black takes in the outer web of the first primary, and nearly the whole of the inner, but rapidly becomes narrower, till on the sixth it is merely a subterminal transverse bar; the seventh has frequently a spot of black on one or both webs; first, with a large white spot near the end, two inches long, longer on the outer than on the inner web, not divided by the black shaft; the tip of the feather black; second, with a similar spot, but smaller, not longer on the outer than on the inner web, and divided by the black shaft; the extreme tip white, as are the apices of all the others except the first. Dimensions: Length 17.50; extent 40.00; wing 13.75. Bill above 1.40; along gape 2.00; height at nostril and at angle .35; tarsus and middle toe and claw 1.80.

*Habitat*.—Interior of Arctic America. North Pacific Coast.

I have before me the type specimen of Richardson's *Larus brachyrhynchus*, the original of this description in the Fauna Boreali-Americana, "a female, killed on the 23d of May, 1826, at Great Bear Lake." "Some brown markings on the tertiaries, primary coverts, and bastard wing, with an imperfect subterminal bar on the tail, point it out as a young bird, most probably just commencing its second spring. The rest of its plumage corresponds with that of *L. zonorhynchus*, except that it wants the extreme white tips of the quill feathers." The specimen is labelled "♀, May 23, 1826, Great Bear Lake," and corresponds minutely with the above description. Richardson, however, in drawing up the description from the young bird, fell into the error of giving "*remigibus apice concoloribus*," whereas, in the adults, the primaries are as broadly tipped with white as in *Delawarensis* or *canus*. In the type the bill is very short, perhaps less than in the average of even young birds; but there are specimens before me in which it is quite as short.

A very careful comparison of the types of *Larus Suckleyi* and *Rissa septentrionalis* with the above specimen, and with the very extensive series of all ages in the collection, shows them to be absolutely identical, and proves that the three names refer to one and the same species.

The rather intricate discussion of the relationships of *Larus niveus*, Pallas, is presented elsewhere. The amount of the other synonyms may be stated in a word. There are in North America two species of "Mew-Gulls." One is the *Delawarensis*, Ord., *zonorhynchus*, Richd. The other is a bird, the adult of which Richardson mistook for the European *canus*, Linn. and so named it, the young of which he characterized as *L. brachyrhynchus*. The error of authors is in not recognizing two species, but considering *canus*, Rich., and *brachyrhynchus*, Rich., as intermediate ages, or varieties of *zonorhynchus*, Rich. As the name of *canus* is pre-occupied, *brachyrhynchus*, though based upon the young bird, must stand for the North American species.

*Comparison of L. canus*, Linn., of Europe, and *L. brachyrhynchus*, Rich., of America.—Common characters: Small weak bills, without strongly developed angle, or black band; color of back nearly the same, subterminal and apical spots of primaries identical. Distinctive characters: *brachyrhynchus* has the bill shorter and smaller, culmen more convex at the end, the angle perhaps comparatively more developed. Size is less, gull blue, a little 1862.]

lighter. Bases of primaries very different, the blue is much lighter, fades into nearly white at its juncture with the black; extends for a greater distance, and runs up further in the centre than along the edges of the inner vane; tarsus about equal to the middle toe and claw, while in *canus* the tarsus is a fourth longer, as in *Delawarensis*. The collections of Messrs. Kennicott and Ross would seem to indicate that this gull is extremely abundant in the interior of Arctic America.

#### Genus II. *BLASIPUS* Bonaparte.

*Blasipus*, Bp., 1852, fide Lawr. Bp., 1856, type *Larus Heermanni*, Cass.  
*Adelarus*, Bruch, 1853. Id., 1855, p.

#### 12. *BLASIPUS HEERMANI*, Bon. ex Cass.

? *Larus Belcheri*, Vig., 1829. ? *Lencophacus Belcheri*, Bp., 1856; (nec "*Adelarus Belcheri*, Vig.; *fuliginosus* Gould" Bruch, 1853 et 1855).  
*Larus Heermanni*, Cass., 1852. *Blasipus Heerm.*, Bp., 1856; Lawr., 1858.  
*Adelarus Heerm.* Bruch, 1853, et 1855, excl. synonym.

*Sp. Char.*—Bill bright vermillion, black from angle to tip. Head all round white, gradually merging on the neck to a plumbeous ash, which extends over the whole under parts (considerably lighter on the abdomen and under tail coverts,) and also on the rump, but which on the back and wings deepens into a plumbeous slate color. Tips of secondaries and tertials broadly white. Primaries black, the tips of all but the three outer ones white. Tail black, narrowly tipped with white. "Length about 17.50 inches; wings 13.50; tail 5.50."

*Habitat.*—Pacific Coast of North America; Puget's Sound; California; Mazatlan, Mex.

#### Genus III. *RISSA* Leach.

*Larus*, Linnæus, 1758, (nec 1744, nec 1735, fide Gray.)

*Gavia*, Boie, 1822, (nec Moehr. 1752.)

*Rissa*, Leach, 1825, (typus *Larus rissa*, Brünn.)

*Cheimonea*, Kaup, 1829, (typus idem.)

*Pulocondora* Reichenbach, fide Bp.

#### 13. *RISSA TRIDACTYLA* Bon. ex Linn.

*Larus rissa* Brünn, 1764. *L. tridactylus* et *rissa*, Linn. 1766. *L. torquatus*,

*L. gavia*, et *L. canus*, Pall., 1811. *Rissa Brünnichii*, Leach, 1825.

*R. cinerea*, Eyton. *R. tridactyla*, Bon., 1838, et auct. *Gavia tridactyla*, Boie, 1822. *Cheimonea tridactyla*, Kaup, 1829.

*Sp. Char.*—Bill rather longer than the tarsus, nearly equal to the middle toe without the claw, stout at the base, tapering somewhat towards the tip, which is rather acute and attenuated. Convexity of culmen regular and gradual. Angle at symphysis very moderately developed. Color of bill light yellow, clouded with olivaceous. Head and neck all round, under parts and tail pure white. Mantle rather dark bluish or cinereous gray, the tertiaries and secondaries of the same color nearly to their tips, which are white. Primaries: the first very light bluish white, without white apex, its outer web and its inner web for about two inches from the tip black; second like the first, but without the black outer web, its tip being black for nearly the same distance as the first, its apex with a minute white spot; on the third and fourth the black tips grow shorter, while the apices are more broadly white; this lessening of the black on each feather is exactly proportional to the shortening of the successive quills, causing the bases of all the black tips to be in the same straight line. A subapical black spot is usually present on one or both webs, but is sometimes absent. Legs and feet dusky olive. Young: Bill black. An anteocular lunula, and a postocular spot, dusky

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slate. A broad transverse bar across the neck behind, the whole of the lesser and median wing coverts, the bastard quills, the tertiaries, except at their edges, and a terminal bar on the tail, black. The four outer primaries with their outer webs, outer half of inner webs, and tips for some distance black, the rest of the feather pearly white. Tips only of the fifth and sixth black, their extreme apices with a white speck. Dimensions: Wing 12.25. Bill above 1.40 to 1.50, height at base .59, at angle .40; tarsus 1.30 middle toe, and claw 1.80.

*Habitat*.—Arctic regions of both hemispheres, coming south in winter.

A specimen has the circumrostral space as far back as the eyes a light brownish ashy, in marked contrast to the adjoining white. The bill is stouter than usual, and of a bright chrome.

A comparison of this species with the succeeding will be found under the head of the latter.

14. *RISSA KOTZEBUI* Bon.

?*R. brachyrhyncha*, Bruch, 1853, nec *Larus brachyrh.* Gould. *R. nivea* Bruch, 1855, excl. synon. *R. Kotzebui*, Bp., 1856. *R. brevirostris*, "Brandt," Lawrence, partim, sed nec Brandt, quæ potius species sequens.

*Sp. Char.*—Nearly adult. Bill rather long, and somewhat tapering towards the tip, which is attenuated and decurved; stout at the base, where it is much deeper than at the angle; culmen about straight to the nostrils, the convexity beyond them to the tip very gradual and rather slight; gonys doubly slightly concave, the angle but little developed, so as to hardly touch a chord drawn from the tip of the lower mandible to the base; but its apex acute. Bill light yellow, slightly tinged with olivaceous, its tip somewhat clouded with dusky. The specimen described, as being not fully mature, has a post-ocular spot, and the nape plumbeous gray, which color on the back of the neck fades into the pure white which intervenes between it and the mantle. Mantle gray-blue, with a leaden tinge, but several shades lighter than in *brachyrhynchos*. This color extends nearly to the tips of the tertiaries, but hardly at all invades the secondaries, which are pearly white for nearly the whole length. Primaries: The shafts of all black, deepest on the outer ones; the first blackish-brown, its inner web dull white at the base, this white narrowing as it ascends till it is lost an inch or two from the tip of the feather; there is no distinct line of demarcation between the two colors; second the color of the first, but the white broader, better defined, and ending abruptly one and a half inches from the tip; third and fourth with the white still wider defined, and running up rather further on the feather; fifth bluish white, with a brownish black tip, half an inch long and a central field of dusky along the shaft; other primaries a lighter shade of the color of the back, fading into white on the edges, without any black. An imperfect subterminal bar on the tail, and dusky tips along the median wing coverts, show the specimen to be immature. Tarsus shorter than the middle toe without the claw; the hind toe better formed than in *R. tridactyla*. Legs and feet dusky-olivaceous. (No. 21,287, S. I. Coll., from Semiarine Straits.)

Another specimen (No. 15,695, from the N. W. coast of America) differs in the following particulars:

The bill, though stout at the base, is more tapering and attenuated at the tip, which is more decurved; and the convexity of the culmen is more gradual, giving a somewhat different shape. The back is a rather darker shade of leaden gray, approximating to *R. brachyrhyncha*. The white of the inner vanes of the outer primaries is broader, purer and more sharply defined. It agrees precisely in other particulars, the hind toe having the same developement. Dimensions (of No. 21,287): Bill along culmen 1.50 inches; from apex of angle to

tip of lower mandible .48; from nostrils to tip of upper mandible .72; depth at base .55, at angle .42; width at base .33. Wing just 12 inches; tarsus 1.35; toe and claw 1.90. Of No. 15,695, the same parts measure respectively, 1.68, .56, .90, .54, .40, .40; wing, tarsus and toe about the same.

*Habitat*.—Northwest coast of America.

This species differs from the *R. tridactyla* chiefly in the shape of the bill and in the greater development of the hind toe. Its habitat is also quite different, and I have not the slightest doubt of the propriety of separating that species. From the *R. brachyrhyncha*, Gould, of which I have before me typical specimens, fully mature and in excellent preservation, it is totally distinct, the characters differing in almost every respect. The size, shape and color of the bill, the color of the mantle, the color of the feet and the markings of the primaries are widely diverse in the two birds. It is unnecessary here to specify these differences, as they may be seen by comparing the descriptions given.

While the characters of the species are thus so very distinct and well marked, its synonymy is in a state of confusion only equalled, perhaps, by that of the succeeding species; and the proper name to be applied to it is a matter of great uncertainty. The history of its synonyms is so intimately blended with that of *Rissa brachyrhyncha*, that the two may be most conveniently discussed together. The reasons for the adoption of the name which I chose for this species may, however, be given here. The essential character of Bonaparte's *R. Kotzebui* is "simillima præcedenti;" *R. tridactyla*, "sed halluc magis ex plicato." The character of the hind toe is precisely the distinctive feature of the specimen now under consideration. Still there are some discrepancies in Bonaparte's description. The wings of the young birds before me are not "black internally;" the bill is not "very black," nor is the back "remarkably variegated with black and white." Still, in a more immature state of plumage than that exhibited by the specimens before me, these characters may exist; and therefore, in spite of these discrepancies, I think it advisable to adopt the name, especially as the imposition of a new one, otherwise unavoidable, is thereby obviated. It is well known that at certain ages the *R. tridactyla* assumes exactly the state of plumage described by Bonaparte; and reasoning by analogy, in view of the close relationship of the two, it might be expected that the same should occur in the present species.

#### 15. *RISSA BRACHYRHYNCHA* (Gould.)

*Larus brachyrhynchus*, Gould, P. Z. S. 1843. *Rissa nivea*, Gr. secundum Bp.; (nec *L. niveus*, Pall. *Rissa brevirostris*, Brandt, secundum Bp. *Rissa nivea*, "Bruch," Lawrence, (1858,) Gen. Rep. 855; sed nec Bruchii, quæ species præcedens. Descriptio Gouldii ipsius transcripta est.

*Sp. char.*—Adult: Bill a uniform clear light straw yellow, without any olivaceous tinge; very short, stout, wide at the base, upper mandible much curved, though not acute nor attenuated; the convexity of the culmen very great, especially towards the tip, it being, from the nostrils to the tip, almost the arc of a circle, whose centre is the apex of the angle at the symphysis; gonys but very slightly doubly concave, its angle but little developed. Tarsus not much more than two-thirds the middle toe and claw. Wings exceedingly long, reaching much beyond the tail. Head and neck all round, under parts and tail pure white. Mantle deep leaden gray, much darker than in the preceding; and this color extending to within half an inch of the tips of the secondaries and tertials, which are white. Primaries: First primary with its shaft and outer vane black, its inner vane with a space of dull gray (not white), which, at the base, takes in nearly all the vane, but gradually narrows, and, at about two and a half inches from the tip, ends by a well-defined rounded termination about half as broad as the vane itself; second, the outer vane is of the same leaden gray to within four inches of the tip; the inner

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vane wholly of a lighter shade of the same color to within three inches; this gray ends very abruptly, being almost truncated, as it were; third, like the second, but the gray extends further (nearly as far on the outer as on the inner web), to within about two inches of the tip, which has a minute gray apical spot; fourth, wholly leaden gray to within one and a half inches of the tip, which has a larger apical spot than the second; fifth, the leaden gray body of the feathers is separated from the well-defined and now white apex by a band of black, less than an inch long; and the gray begins to be edged internally with white; sixth, gray, fading into white at the tip and internal border, with a small subapical spot of black on one or both webs; other primaries like the sixth, without any black. This "gray" of the primaries is precisely the color of the mantle. Legs and feet in the dried specimen light straw yellow; probably tinged with coral red in life. Claws black. Dimensions: Bill along culmen 1.19 inches; depth at base .50; width .42; depth at angle same; nostril to tip .60. Wing 13.00; tarsus 1.25; middle toe and claw 1.95. (No. 24,296, S. I. Coll. from Kamtschatka.)

*Habitat.*—Kamtschatka.

This is a very strongly-marked species, and one which it is impossible to confound with any other. The fine specimens before me agree in the minutest particulars with Gould's description. Its peculiar characters of the shape of the bill, its color and that of the feet, with the dark mantle and the peculiar style of the markings of the primaries, separate it widely from any other Gull with which I am acquainted. Having never seen the young bird, I am totally unacquainted with the changes of plumage which the species undergoes.

Having thus characterized the two species of *Rissa* from the Northwest coast, I proceed to the difficult task of discussing their intricate synonyms. While it is believed that the characters of the species are accurately given, the hope is scarcely indulged that the synonyms are more correctly assigned than they have hitherto been by previous authors.

Concerning the proper location of no name has there been a greater difference of opinion among authors than of *Larus niveus* of Pallas? Many writers consider it a *Rissa*, and refer it to the *R. brachyrhynchos* of Gould. Bonaparte considers it a true *Larus*, and makes it a distinct species. I am decidedly of opinion that it is a true *Larus*, and very closely allied to, if, indeed, not identical with, the *Larus brachyrhynchos*, Richardson, of this paper. Let us examine the characters given by Pallas. "Rostrum virescente-flavum." There is no trace of greenish in the bill of *Rissa brachyrhynchos*, which is a clear straw yellow. "Pedes fusi." The feet of *Rissa brachyrhynchos* are yellow, with a tinge of coral red. With his known accuracy of description, Pallas could hardly have made such a mistake as this; and hence, I do not see why Bruch has identified the bird with *Rissa brachyrhynchos*. In Pallas' description thus far, there is nothing absolutely inconsistent with the characters of *C. Kotzebui* of this paper. The description continues, however, "apice alarum nigro præcedenti similis." The preceding species is *L. cachinnans*, Pall., the description of the primaries of which is, "remiges 1 ad 6 extremitate nigre, extimæ sensim ulterius; duæ extimæ macula transversa alba et apice, 3 ad 6 tantum apice albæ." This is the usual pattern of coloration of the primaries of Herring-Gulls, and very different from that which obtains throughout the genus *Rissa*, being equally inapplicable to either species of the genus. It is true that the plate gives no indication of these subapical spots on the primaries; but in the case of conflict, the text should certainly have precedence. Is the bird, then, a *Rissa*? If we examine Pallas' descriptions of his *Larus rissa*, *L. torquatus*, or *L. gavia*, we find that he is very careful to use the expressions "tridactylus" and "subtridactylus," and it seems hardly probable that the rudimental character of the hind toe would have passed unnoticed. The plate shows the hind toe and claw as fully formed as many species of *Larus*, and there is no expression in the text contradicting it. While I am thus of opinion that the

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bird is a *Larus*. I by no means insist upon its reference to *L. brachyrhynchus*, Rich, although I have placed it as a synonym of that species, with a query, in consequence of my inability to discover any material discrepancies. The question appears really to hinge upon the identity or non-identity of *Larus brachyrhynchus* with the Siberian type of *L. canus*, which is given by Midden-dorff as a variety (*major*) of *canus*, in view of its larger bill and some other peculiarities. I have little doubt of the propriety of referring *L. niveus* to this Siberian Mew-Gull.

But, while I thus exclude *Larus niveus* of Pallas from the *Rissa*, the *Rissa nivea* of Bruch and other authors is to be examined. Bruch says of his *R. nivea* of 1855, that it has the hind toe better developed; and it is of another species that he says "feet coral-red." While, therefore, he is in error in adducing *R. brachyrhyncha*, Gould, as a synonym, his species is to be referred (from its description) to the preceding species,—*R. Kotzebui*.

I quote *Rissa nivea*, Gr. and *Rissa brevirostris*, Brandt, as synonyms of the species, on the authority of Bonaparte.

In the General Report on Birds, Mr. Lawrence gives, under the head of *Rissa brevirostris*, Brandt, a description taken from Bruch, which applies to the preceding species in most particulars, but the expression, "feet coral-red," is only applicable to the present. Again, under head of *Rissa nivea*, Bruch, which has been shown above to be the *Kotzebui*, he copies Gould's description of *R. brachyrhyncha*. In other words, in his first species he has the synonymy of the present and mostly the description of the preceding species; and his second, the description of the present species and mostly the synonymy of the preceding. *Rissa septentrionalis* of Lawrence has been already adverted to.

I am entirely ignorant of the characters and relationships of *Larus citrirostris*, Schimper. By Bonaparte it is placed as a synonym of *Rissa brachyrhyncha*; this author, perhaps, having overlooked the fact that he had already assigned it, a few pages previously, to *L. niveus*, Pallas. Judging, however, from Bruch's description and plate, it must be quite distinct from the present species, as the bills differ widely in shape. Bruch says that Bonaparte's *L. kamtschatchensis* is an "undoubted synonym" of *Larus citrirostris*. Bonaparte himself places *L. kamtschatchensis* as a partial synonym of *L. niveus*, Pall. It is not impossible, after all, that *L. niveus* should be distinct from the Mew-Gulls (*Larus canus major*, Midd. and *L. brachyrhynchus*, Rich.) both of Siberia and America, and yet be no *Rissa*, but form a good species, with *Larus kamtschatchensis*, Bp. and *L. citrirostris*, Schimper, as synonyms. This is the opinion maintained by Bonaparte.

In the preceding remarks I have endeavored to state the opinions of various writers and my own, as fairly as possible; considering that in this manner truth is most likely to be attained. I do not profess to have settled so knotty a point satisfactorily, even to myself; and, accordingly, am prepared to adopt any modifications of the views here expressed which future investigations may require.

#### Genus IV. PAGOPHILA Kaup.

*Gavia*, Boie, 1822; (nec Moehr. 1752.)

*Pagophila*, Kaup, 1829, (typus *Larus eburneus*.)

*Cetosparactes*, Macgill. 1842, (typus idem.)

#### 16. PAGOPHILA EBURNEA Kaup ex Gmel.

*Larus eburneus*, Gmel. 1788. *Gavia eburnea*, Boie, 1822. *Pagophila eburnea*, Kaup, 1829; Lawr. 1858. *Cetosparactes eburnea*, Macgill. 1842. *Larus candidus*, Fabricius, 1780. *Larus niveus*, Mart. fide Bp.; (nec Pall. 1811.)

*Sp. char.*—Culmen straight to the nostrils, then regularly convex; commissure gently curved to the tip, where it is greatly decurved; gonys straight to

[June,

near the angle, which is well developed, the outline from angle to tip perfectly straight. Feathers extending between the rami nearly to the angle. Wings long and pointed, reaching beyond the tail; primaries gradually attenuated to the tip. Adult: Entirely pure white, the shafts of the primaries straw yellow. Bill dusky greenish yellow at tip, and along the cutting edges. Legs and feet black. Length 19.50 inches; wing 13.25; bill above 1.40, along gape 2.10, height at nostrils .45; tarsus about 1.45 (varying); middle toe and claw 1.75.

*Habitat*.—Northern coasts of both continents.

17. *PAGOPHILA BRACHYTARSUS* Bruch ex Hölb.

*Larus brachytarsus*, Hölb. 1846. *Pagophila brach.* Bruch, 1855. *P. brachytarsi*, Lawr. 1858. *Larus niveus*, Brehm, fide Bp.; (nec Pall. 1811.) *Pagophila niveus*, Bp. 1856.

*Sp. char.*—"Bill yellow, with a darker tip. The long wings, which when folded reach two and a half inches beyond the tail, are distinguished from those of all other Gulls by the extraordinary breadth of the four first primaries. Color snow-white, with or without dark brown spots. Feet and webs black, the latter very deeply excised. Length 17 inches; extent 40; tail 5; tarsus one inch; middle toe 1.75. Breadth of outer primary four inches from tip 1.23."

*Habitat*.—"Greenland."

Never having seen a specimen of this supposed species, I have nothing to offer with regard to its relationships to the *P. eburnea*. The description is compiled from Holböll's original account.

Genus V. *CHROICOCEPHALUS* Eyton.

*Xema*, Boie, 1822; (nec Leach, 1818.)

*Gavia*, Kaup, 1829; (typus *L. ridibundus*; nec Moehr. 1752.)

*Ichthyaetus*, Kaup, 1829; (t. *L. ichthyaetus*, Pall.)

*Hydrocoleus*, Kaup, 1829; (t. *L. minutus*, Pall.)

*Chroicocephalus*, Eyton, 1836; (t. *L. capistratus*, Temm. fide Gray.)

*Gavia*, Macgill. 1842, p. (Nec Moehr. 1752.)

*Atricilla*, Bonap. 1854; (t. *Atricilla Catesbyi*, Bp.)

*Cirrhocephalus*, Bruch, 1855; (t. *L. cirrhocephalus*, Vieill.)

A.—Large; bill rather stout, tip much decurved; middle toe and claw three-fourths the tarsus.

18. *CHROICOCEPHALUS ATRICILLA* Lawr. ex Linn.

*Larus atricilla*, Linn. 1766. *L. ridibundus*, Wils.; (nec Linn.) *L. major*, Catesb. *Atricilla Catesbyi*, Bonap. (fide Bruch.) *Chroico. atricilla*, Lawr. 1858.

*Sp. char.*—Bill deep carmine. Hood deep plumbeous, grayish black, extending further on the throat than on the nape. Eyelids white posteriorly. Mantle grayish plumbeous. Length 16.50 inches; wing 13; bill above 1.75; tarsus 2.00; middle toe and claw 1.50.

*Habitat*.—More southern portions of Atlantic coast of North America. Texas.

B.—Medium; tarsus equal to the middle toe and claw.

19. *CHROICOCEPHALUS CUCULLATUS* Bruch ex Licht.

*Larus pipixcan*, Wagler. *L. melanorhynchus*, Temm. fide Bruch. *Chroicocephalus cucullatus*, Bruch, 1855; Lawr. 1858.

*Sp. char.*—Bill very short, scarcely more than two-thirds the head, about three-fourths the tarsus, moderately stout, the culmen regularly curved from base to tip; angle well defined and very prominent. Adult: hood deep plumbeous black, barely encircling the head, not extending further on the throat than on the nape. Lower eyelid white, upper more broadly so, the white extending behind the eye. Mantle bluish plumbeous, as in *Franklinii*, with more blue than in *atricilla*. Primaries: Shafts of three outer black, of the inner 1862.]

light colored; first, outer web wholly black, inner a rather lighter ashy than the black to within about three inches from the tip; second, like the first, but the base of the outer web the color of the inner; on the third, fourth and fifth the black gradually decreases in extent, till on the sixth it is merely a narrow, subterminal bar; the tips of all are white, smallest on the first, increasing successively on the others. Three lateral tail-feathers white, the others light pearl blue, deepest on the central. Bill deep carmine, crossed with black near the end, the extreme tip yellowish. Legs and feet red. Wing 11.25; bill above 1.20; along gape 1.70; tarsus or middle toe and claw 1.50.

*Habitat*.—Central America; Panama, (Suckley); Louisiana, (Wurde mann.)

Closely allied to *Ch. Franklinii* and much resembling it. Easily to be distinguished by the characters of the primaries, as will be seen by comparing the descriptions given.

20. *CHROICOCEPHALUS FRANKLINII* Bruch ex Richardson.

*Larus Franklinii*, Richard. 1831. *Chroicocephalus Franklinii*, Bruch, 1855.

*Sp. Char.*—Bill comparatively longer and slenderer than in *cucullatus*, the tip more attenuated and decurved. The angle well defined and acute; but the depression of the tip makes it less prominent, gonys from angle to tip concave. Adult: Mouth and bill bright carmine, the latter crossed with black near the end. Feet dusky carmine. Edges of eyelids orange. A conspicuous white patch above and below the eye, and behind it. Hood deep plumbeous black, encircling the upper part of the neck as well as the head, and extending much further on the throat than nape. Mantle as in *cucullatus*. Primaries: Shaft of first white, of others white except along the black portions of the feathers; first, its outer web black to within an inch of the end, its inner pearly white, crossed by a black bar near the end, the tip white for almost an inch; next five crossed by a black bar near the end, two inches wide near the end, gradually narrowing to a black spot on the sixth; bases of all the color of the back fading into white along the outer edge of the inner vane and adjoining black portions; tips of all white. Tail feathers as in *cucullatus*. Length 14 inches, extent 35, wing 11.25. Bill above 1.25, gape 1.75, tarsus or middle toe and claw 1.60.

*Habitat*.—Interior of Arctic America; Nebraska; Texas; Mexico.

21. *CHROICOCEPHALUS PHILADELPHIA* Lawrence ex Ord.

*Sterna Philadelphia*, Ord, 1815. *Chroicocephalus Philada.*, Lawrence, 1858.

*Larus capistratus*, Bonap., 1828. *L. Bonapartei*, Richardson, 1831.

*Chroicocephalus Bonapartei*, Bruch, 1855.

*Sp. Char.*—Bill shorter than the head or tarsus, much compressed, slender, and sternine. Both mandibles with a slight but distinct notch near the tip. Nostrils linear, exceedingly narrow. Adult: Bill black; mouth carmine; legs and feet chrome, tinged with vermillion. Webs bright coral red. Hood plumbeous slate, not so deep as in *Franklinii*, enveloping the head and upper part of the neck, reaching further before than behind. White patches on eyelids narrow. Mantle pearl blue, much lighter than in *Franklinii* or *cucullatus*, not so light as in *minutus*. Ends of the tertials and scapulars scarcely lighter than the back. Primaries: Shafts of the first five or six white except at their extreme tips, the others dark colored; first, outer web and extreme tip black, rest white; second, white, its tips black for a greater distance than the first, and on one or both webs, for a greater or less distance (sometimes half way down the feather) narrowly bordered with black; third, fourth, fifth, sixth, black at the ends for about the same distance on each, the black bordering the inner web much further than the outer; the inner webs of the third and fourth, and both webs of the fifth and sixth, of a rather lighter shade of the color of the back. Other primaries like the back, the seventh and eighth with a touch of black on one or both webs. Length 14 inches, extent 32, wing 10.25. Bill above 1.20, gape 1.75, tarsus or middle toe and claw 1.40.

*Habitat*.—Entire continent of North America.

[June,



Does the female of this species have a brown head? I am inclined to the contrary opinion. If Audubon's assertion to the fact of having seen Gulls with brown heads be true, they were probably of a different species.

[All the preceding species of *Chroicocephalus* acquire during the breeding season, a beautiful delicate rosy blush on the white of the under parts.]

C.—Very small; bill exceedingly slender and compressed; tarsus shorter than the middle toe and claw.

22. *CHROICOCEPHALUS MINUTUS* Bruch ex Gmel.

*Larus minutus*, Gmel. 1788. *Hydrocolæus minutus*, Kaup, 1829. *Xema minutum*, Bp. 1838. *Gavia minuta*, Macgill. 1842. *Chroicocephalus minutus*, Bruch, 1855. *Larus melanotis*, Lesson, fide Bruch.

*Sp. Char.*—Smallest of the genus. Length 11.50. Bill above .90, along gape 1.40; tarsus, .90, middle toe and claw 1.10. Under surface of wings deep blackish slate.

*Habitat.*—Europe. ? Northern North America (accidental.)

Professor Baird thinks that there is no good reason to consider this bird an inhabitant of or even a visitor to North America. It has been included in our fauna on the strength of a statement of Sabine, who saw a small Gull, with black head and bill, greatly resembling the *Larus minutus*. This, however, was before *Larus Bonapartei* (*Chroicocephalus Philadelphia*) was described and made known by Richardson in the F. B. A., and a poorly preserved or immature specimen might easily be referred to *Larus minutus* by one ignorant of the existence of two species.

Genus VI. *RHODOSTETHIA* Macgill.

*Rossia*, Bp. 1838; (nec Owen.)

*Rhodostethia*, Macgill. 1842; (t. *Larus roseus* Macgill.)

23. *RHODOSTETHIA ROSEA* Bp. ex Macgill.

*Larus roseus*, Macgill. 1824; descriptio nulla. *Rhodostethia rosea*, Bp. *Rossia rosea*, Bp. 1837. *Larus Rossii*, Richardson, 1825; descriptio hujus avis prima. *Rhodostethia Rossii*, Macgill. 1824.

*Sp. Char.*—"Scapulars, inter-scapulars, and both surfaces of the wings clear pearl gray; outer web of the first quill blackish brown to its tip, which is gray; tips of the scapular and lesser quills whitish. Some small feathers near the eye, and a collar round the middle of the neck, pitch-black. Rest of plumage white, the neck above and whole under plumage deeply tinged with peach blossom red in recent specimens. Bill black, its rictus and the edges of the eyelids reddish orange. Legs and feet vermillion red; nails blackish. Length 14 inches, wing 10.5, tail 5.5. Bill above, .75, along gape 1.25, tarsus 1.—1.12." (Richardson).

*Habitat.* Arctic Regions.

We have never had the pleasure of examining a specimen of this exquisite Gull, and are therefore obliged to copy the description from Richardson. This author admits that the bird was named *Larus roseus* the year before he called it *L. Rossii*; but claims precedence for his name, on the ground that his was the first published description.

Genus VII. *XEMA* Leach.

*Xema*, Leach, 1818; (fide Gen. Rep. t. *Larus Sabini*, J. Sab.)

*Gavia* Macgill. 1842. p.

24. *XEMA SABINI* Leach ex Sab.

*Larus Sabini*, J. Sab. 1818. *Xema Sabini*, Leach, 1825. *Gavia Sabini*, Macgill. 1842.

*Sp. Char.*—Adult, breeding plumage. Bill black to the angle, abruptly bright chrome from angle to tip. Mouth bright orange; eyelids orange; legs and feet black. Hood uniform clear deep slate, bounded inferiorly by a band, narrowest 1862.]

on the nape, of deep velvety black. Lower parts of neck all round, tail and its coverts, four inner primaries, secondaries, greater part of greater coverts, tips of tertials, except the innermost, and whole under parts, pure white. Mantle slatey blue, extending quite to the tips of the inner tertials. Edge of wing, from the carpal, with the bastard wing, black. First five primaries, with their shafts, black; their extreme tips, and the outer half of the inner webs, to near the end, white. Other primaries white, the sixth with a touch of black on the outer web; web near the base, extending a little on the inner web. Emargination of tail 1.25 inches. Length 13.75; wing 10.75. Bill 1.00, along gape 1.50, height at angle .30; tarsus 1.25, middle toe and claw same.

*Habitat*.—Arctic America. Lake Winnipeg. (Kennicott.)

The preceding description was drawn up from a very beautiful and perfect specimen, collected on Lake Winnipeg by Mr. Kennicott.

#### Genus VIII. CREAGRUS Bonap.

*Creagrus* Bp. 1854. fide gen. Rep.

#### 25. CREAGRUS FURCATUS (Neboux.)

*Larus furcatus* Neboux. *Xema furcatus*. Bruch 1853. *Creagrus furcatus* Bruch 1855.

*Sp. Char.*—"Adult: Head and nearly all of the neck grayish brown; two small rounded white spots embracing symmetrically the base of the upper mandible; mantle grayish white; breast, abdomen, and under wing coverts white; wings extend beyond the tail; primaries black on their inner and outer edges; the smaller wing coverts white; the greater slate color bordered with white; tail very much forked and white, the two outer tail feathers much longer than is usual in this class of birds; bill very much bent, black at the base and white at the extremity; iris red; eyelids orange; tarsi and feet red; claws black.

"Total length 60 centimetres."

"*Habitat*.—California."

Of this rare and remarkable Gull I have never seen a specimen; but copy the description from the General Report, to complete this very cursory notice of the Gulls of North America.

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Catalogue of Birds collected by the United States North Pacific Surveying and Exploring Expedition, in command of Capt. John Rodgers, United States Navy, with notes and descriptions of new species.

BY JOHN CASSIN.

#### 1. *FALCO PEREGRINUS*, Gmelin.

From Japan.

We find in the collection one very fine adult specimen, quite identical with specimens from Asia in the Museum of the Academy, and the first ever brought to this country from Japan. Mr. Stimpson's note is, "shot by Mr. Charles Wright in the hills west of the city of Hakodadi, Island of Jesso, June, 1855."

#### 2. *MICRONISUS BADIUS*, (Gmelin).

From China. "Hong Kong, March, 1855, collected by Mr. Salvador Pelkey." (Mr. Stimpson.)

#### 3. *BUTEO VULGARIS*, Bechstein.

*Buteo vulgaris japonicus*, Temm. and Schleg., Faun. Japon. Aves, p. 16.

From China. The only specimen is in light colored plumage and not adult. "Common about the harbor of Hong Kong, March, 1855." (Mr. Stimpson.)

#### 4. *MILVUS GOVINDA*, Sykes.

*Milvus melanotis*, Temm. and Schleg., Faun. Jap. Aves, p. 14, (1850).

[June,

From Japan. "Kagosima Bay, December, 1854. Collected by Lieut. Brooke." (Mr. Stimpson).

5. *ELANUS LEUCURUS*, (Vieillot).

"San Francisco, California, January, 1856." (Mr. Stimpson).

6. *CIRCUS HUDSONIUS*, (Linnæus).

"San Francisco, California, January, 1856." (Mr. Stimpson).

7. *STRIX PRATINCOLA*, Bonaparte.

"San Francisco, California, shot by J. G. Cooper, M. D., December, 1855." (Mr. Stimpson).

8. *OTUS VULGARIS*, Fleming.

From China. "Taken at sea, off the coast of China, about lat. 30° N, December, 1854, by Mr. L. M. Squires of the Hancock." (Mr. Stimpson.)

9. *BRACHYOTUS CASSINI*, Brewer.

From California. "Mare Island, November, 1855. Shot by Capt. H. K. Stephens." (Mr. Stimpson).

10. *KETUPA FLAVIPES*, (Hodgson).

From China. "Hong Kong, presented by Dr. Harland." (Mr. Stimpson).

11. *CORVUS CORAX*, Linnæus.

From Arikamcheche or Kayne Island, Behring's Straits. So far as I can see is identical with the European Raven.

12. *PICA SERICEA*, Gould.

"Hong Kong, China, March, 1855, collected by Mr. S. Pelkey." (Mr. Stimpson).

13. *EULABES JAVANENSIS*, (Latham).

From Gaspar Island, in the Straits between the islands of Java and Sumatra. "Gaspar Island, April, 1854, collected by Mr. Squires." (Mr. Stimpson).

14. *SPREO MORIO*, (Linnæus).

"In flocks at Simon's town, Cape of Good Hope, October, 1853. Specimens in the collection were obtained by Mr. Joseph Pennington and Mr. Francis H. Storer." (Mr. Stimpson).

15. *SPREO BICOLOR*, (Gmelin).

From the Cape of Good Hope. "Iris white, lips or wattles at the base of the bill, bright yellow, inhabits the marshy plains near Constantia, Cape of Good Hope, October, 1853. Specimens in the collection were obtained by Mr. Joseph Pennington." (Mr. Stimpson).

16. *LAMPROTORNIS METALLICUS*, Temminck.

From the Island of Tombaro or New Ireland. Numerous specimens, which seem to be identical with others in the Academy Museum from New Guinea.

"Iris bright red, sexes alike; total length 9½ inches, wing 4½, extent of wings 13 inches. In flocks at Port Praslin, Tombaro Island, January 23d, 1854." (Lieut. Van Wyck).

17. *AGELAIUS GUBERNATOR*, (Wagler).

"San Francisco, California, November, 1855." (Mr. Stimpson).

18. *EUPLECTES CAPENSIS*, (Linnæus).

From the Cape of Good Hope. "On the plains and hill sides near villages, and especially numerous near Constantia, Cape of Good Hope, October, 1853." (Lieut. Van Wyck).

19. *HYPHANTORNIS AURIFRONS*, (Temminck).

"Near Simon's town, Cape of Good Hope, October, 1853." (Mr. Stimpson).  
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20. *MELOPHUS LATHAMI*, (Gray).  
From China. "Hong Kong, March, 1855, collected by Mr. Salvador Pelkey." (Mr. Stimpson).
21. *PASSER MONTANUS*, (Linnaeus).  
From the Loo Choo Islands.
22. *CITRINELLA TOTTA*, (Sparman).  
From the Cape of Good Hope.
23. *SERINUS BUTYRACEUS*, (Linnaeus).  
"Near Simon's town, Cape of Good Hope, October, 1853." (Lieut. Van Wyck).
24. *SERINUS CANICOLLIS*, (Swainson).  
From the Cape of Good Hope. "This bird had its nest in the crevice of a granite rock on the western shore of False Bay at Simon's town, Cape of Good Hope. It was about four feet from the ground and contained eggs; September, 1853." (Mr. F. H. Storer).
25. *ESTRELLA ASTRILDA*, (Linnaeus).  
From the Cape of Good Hope.
26. *LEUCOSTICTE BRUNNEINUCHA*, (Brandt).  
From Kamtschatka. One specimen in mature plumage of this little known bird, which appears to be a summer resident in North-eastern Asia, and very probably also visits Russian America.  
"Petropaulski, Kamtschatka, July, 1855." (Mr. Stimpson).
27. *FRINGILLARIA CAPENSIS*, (Linnaeus).  
"Near Simon's town, Cape of Good Hope, October, 1853." (Mr. Stimpson).
28. *MACRONYX CAPENSIS*, (Linnaeus).  
"Simon's Bay, Cape of Good Hope, September, 1853. Collected by Mr. Francis E. Storer." (Mr. Stimpson).
29. *MEGALOPHONUS APIATUS*, (Vieillot).  
"Simon's Bay, Cape of Good Hope, September, 1853." (Mr. Stimpson).
30. *LANIUS SCHACH*, Linnaeus.  
From China. "Hong Kong, February, 1855." (Mr. Stimpson).
31. *FICUS COLLARIS*, (Linnaeus).  
From the Cape of Good Hope. Numerous specimens of both sexes are in the collection of the Expedition, and are distinguishable from each other only by the rather lighter color of the females. In some specimens of the latter there is an ashy tinge in the usually clear black parts of the plumage, not to be seen in male specimens. Apparently an abundant species of Southern Africa.  
"Near Simon's town, Cape of Good Hope; common around farm houses on the hills and having nests and eggs in October, 1853." (Mr. Stimpson).
32. *LANIARIUS BACBAKIRI*, (Shaw).  
"Simon's town, Cape of Good Hope, October, 1853." (Lieut. Van Wyck).
33. *MERULA CHRYSOLAUS*, (Temminck).  
"Hong Kong, China, March, 1855." (Mr. Stimpson).
34. *MERULA CARDIS*, (Temminck).  
"Hong Kong, China, March, 1855," collected by Mr. S. Pelkey." (Mr. Stimpson).
35. *PETROCOSYPUS MANILLENSIS*, (Gmelin).  
From the Loo Choo Islands. "Abundant in the country around Nappa Harbor, Great Loo Choo Island. Generally observed in the hedges which take  
[June,

the place of fences in this island, but frequently seen on the ground. It appears to exclusively inhabit the rice and Indian corn fields or other cultivated places." (Mr. E. M. Kern).

36. *PETROCINCLA RUPESTRIS*, (Vieillot).

From the Cape of Good Hope. A very handsome and interesting bird, of which numerous specimens are in the collection of the Expedition. Female specimens are easily distinguishable by the entire head being dull brown, uniform with the back, with light touches and lines of black. In the males the head is light ashy blue and the back dark fulvous mixed with brownish black. Apparently an abundant bird of South Africa.

"Simon's town, Cape of Good Hope, October, 1853." (Lieut. Van Wyck).

37. *BESSONORNIS PHENICURUS*, (Gmelin).

"Constantia, Cape of Good Hope, October, 1853. Occasionally seen, but not common." (Lieut. Van Wyck).

38. *MYIOPHONUS NITIDUS*, Gray.

*Myiophonus nitidus*, Gray, Zool. Misc. p. 1, (1831).

From China.

Specimens of this little known but quite distinct and handsome species are from the vicinity of Hong Kong, and are in excellent plumage and preservation. It has usually been regarded as identical with *M. Temminckii*, Vigors, but quite erroneously, the two birds being no more nearly related than any other two species of this genus.

The specimens in the collection of the Expedition are the first ever brought to this country, and are a most valuable and interesting addition to the National Museum. From the frequently erroneous references to it by authors, it appears also to be little known in museums of Europe. It is a quite distinct and well marked species. The present specimens are from the same locality given in the original description by Mr. Gray, to which we refer above, and are undoubtedly the same species.

"Hong Kong, China, March, 1855. Collected and presented by Dr. Harland." (Mr. Stimpson).

39. *IXOS HÆMORRHOA*, (Gmelin).

"Hong Kong, China, February, 1855. Collected by Mr. Salvadora Pelkey." (Mr. Stimpson).

40. *IXOS CAPENSIS*, (Gmelin).

"Near Simon's town, Cape of Good Hope, October, 1853. Common in the valleys, generally frequenting the bushes." (Lieut. Van Wyck).

41. *IXOS SINENSIS*, (Gmelin).

"Hong Kong, China, February, 1855. Collected by Mr. Salvadora Pelkey." (Mr. Stimpson).

42. *IXOS*

From Hong Kong. A young bird not in good condition and brought home in spirits, but evidently a species that I have never before seen from China. and much regret that I find no other specimens in the collection.

43. *GARRULAX PERSPICILLATUS*, (Gmelin).

"Hong Kong, March, 1855. Collected by Mr. S. Pelkey." (Mr. Stimpson)

44. *MICROCELIS SQUAMICEPS*, (Kittlitz).

*Oriolus squamiceps*, Kittl., Mem. Acad. St. Petersburg, 1830, p. 241.

*Galgulus amaurotis*, Kittl., Kupfert, Vog. p. 8, (1832).

"*Turdus amaurotis*, Temm.," Kittl., as above.

Mem. Acad. St. Petersburg, 1830, pl. 16. Kittl. Kupfert, pl. 12, fig. 1.

From the Bonin Islands.

1862.]

One specimen only, I regret to say, from the locality originally designated by the describer of this curious species, the distinguished Russian naturalist above named. This specimen is not in mature plumage, and is somewhat injured from being preserved in alcohol, but I have no doubt as to the identity of the species.

So far as I can judge from the present specimen, I much doubt that this bird is identical with *Turdus amaurotis*, Temm. and Schleg., Faun. Japon. Aves, pl. 31, B., a Japanese species, of which several specimens are in the Academy Museum from the Leyden Museum, though so rated by ornithologists, and even by Professor Kittlitz himself in his late work above cited. This bird is well described and figured as above cited, and the specimen now before us is the first that we have ever had the gratification of seeing and the first ever brought to this country.

"Bonin Islands, October, 1854." (Mr. Stimpson).

45. *SPHENÆCUS AFRICANUS*, (Gmelin).

"Near Simon's town, Cape of Good Hope, October, 1853. Found in sheltered sandy valleys, frequent." (Lieut. Van Wyck).

46. *PRATICOLA SYBILLA*, (Gmelin).

"Near Constantia, Cape of Good Hope, October, 1853, frequent." (Lieut. Van Wyck).

47. *RUTICILLA AURORA*, (Pallas).

From China. Figured by Messrs. Temminck and Schlegel in Fauna Japonica as a bird of Japan, where it appears to be of more frequent occurrence, but I have now repeatedly received it from China.

"Hong Kong, February, 1855." (Mr. Stimpson).

48. *CALLIOPE CAMTSCHATKENSIS*, (Gmelin).

*Turdus camtschatkensis*, Gm., Syst. Nat. ii. p. 817, (1788).

*Motacilla calliope*, Pallas, Travels, iv. p. 668, (Paris, 1793).

*Calliope Lathamii*, Gould, B. of Europe, ii. p. (not paged, 1837).

*Accentor calliope*, Auct.

Gould, B. of Eur. ii. pl. 118.

From Kamtschatka.

A specimen of this bird in the collection of the Expedition is one of the most interesting that we have ever had an opportunity of examining. It is from the locality from which this species was originally described, and from which it derives its name, though now well known as a bird of India, occasionally occurring in Europe, and is very handsomely figured by Mr. Gould in his magnificent and standard work above cited.

The first description of this species is by Latham, under the name of "*Kamtschatka Thrush*," in General Synopsis of Birds, ii. p. 28, from specimens in the collection of Sir Ashton Lever; "*inhabits Kamtschatka*." On the faith of this description Gmelin gave the name as above. I find in the Museum of the Academy numerous specimens, of which those from Japan bear the most intimate resemblance to that now before me. All these seem to be slightly larger than others variously labelled "*Bengal*," "*India*" and "*Europe*," but in all other respects are precisely similar. I have no doubt of the identity of the species from all the localities here mentioned, the proper name for which is that above given.

"Shot at Awatska Bay, Kamtschatka, July, 1855." (Mr. Stimpson).

49. *NEMURA CYANURA*, (Pallas).

"Hong Kong, February, 1855; collected by Mr. S. Pelkey." (Mr. Stimpson).

50. *ZOSTEROPS ANNULOSA*, (Swainson).

"Simon's Bay, Cape of Good Hope, September, 1853." (Mr. Stimpson).

[June.

51. *CERCOTRICHAS CORYPHÆUS*, (Vieillot).

*Sylvia coryphæus*, Vieill., Nouv. Dict. xi. p. 177, (1817).

*Drymoica coryphæa*, G. R. Gray, Gen. Birds, i. p. 163.

Le Vaill. Ois. d'Afr. iii. pl. 120.

From the Cape of Good Hope.

This seems to be a little known species, though from the fact that there are several specimens in the present collection and also in the Museum of the Academy, we would infer that it is of frequent occurrence in Southern Africa. The only name that we find for this bird is that of the great French ornithologist, Vieillot, given above, and after careful examination we find no genus more appropriate than *Cercotrichas*, Boie, as given by Dr. Hartlaub in his very valuable volume on the Birds of Western Africa, p. 69. It is a long-tailed form of *Luscinæ*, as restricted by Mr. G. R. Gray, to which belong such genera as *Cercotrichas*, *Sphenura* and *Thamnolaca*, and represented in the Thrushes by *Copsychus* and its allies.

This bird is fairly represented in Le Vaillant's plate above cited. "Constantia, Cape of Good Hope, October, 1853. Collected by Lieut. Van Wyck." (Mr. Stimpson).

52. *DRYMOICA MACULOSA*, (Boddart).

"Simon's town, Cape of Good Hope, September, 1853. Collected by Mr. Francis E. Storer." (Mr. Stimpson).

53. *DRYMOICA SUBRUFICAPILLA*, Smith.

*Drymoica subruficapilla*, Smith, Ill. S. Afr. Zool. Birds, (1849).

"*Malurus phragmitoides*," label in Acad. Mus. Phila.

Smith, Ill. S. Afr. Zool. Birds, pl. 76, fig. 2.

From the Cape of Good Hope. This species is represented in the plate above cited with but moderate success, and for its identification in the present collection we rely on specimens in the Academy Museum labelled by that very excellent ornithologist Mr. Jules P. Verreaux, of Paris. The name *Malurus phragmitoides* is attached to specimens formerly in the Rivoli collection, and which we have not succeeded in finding in any publication to which we have access, except the catalogue of the Rivoli collection.

"Simon's Bay, Cape of Good Hope, September, 1853." (Mr. Stimpson).

54. *REGULOIDES PROREGULUS*, (Pallas).

*Motacilla proregulus*, Pallas, Zoog. Ross. Asiat. i. p. 499, (1811).

*Regulus modestus*, Gould, B. of Eur. ii. (not paged, 1837).

Gould B. of Eur. ii. pl. 149.

"Hong Kong, February, 1855." (Mr. Stimpson).

55. *MOTACILLA CAPENSIS*, Linnæus.

"Simon's town, Cape of Good Hope, September, 1853. Collected by Lieut. Van Wyck and Dr. Alexander." (Mr. Stimpson).

56. *MOTACILLA DUKHUNENSIS*, Sykes.

"In a meadow at Hong Kong, China, March, 1855. Collected by Mr. Salvador Pelkey." (Mr. Stimpson).

57. *MOTACILLA LUZONIENSIS*, Scopoli.

"Hong Kong, February, 1855." (Mr. Stimpson).

58. *MOTACILLA LUGUBRIS*, Temminck.

*Motacilla lugubris*, Temm., Man. d'Orn. iii. p. 175, (1835).

*Motacilla albeola*, var. *kamtschatica*, Pallas, Bonap. Cons. Av. i. p. 251.

Gould. B. of Eur. ii. pl. 142. Temm. and Schleg., Faun. Jap. Birds, pl. 25. From Kamtschatka.

One specimen, not in good condition, appears to be this species in summer 1862.]

plumage, but has the white space on the shoulders not so large as appears to be usual. The throat is entirely black, which color extends to the breast, ending abruptly.

This is undoubtedly the bird alluded to by Pallas in Zoog. Ross. Asiat. i. p. 507, as a variety of *Motacilla albeola*, which he states is of frequent occurrence in Kamtschatka and the Curile Islands. To this variety the Prince Bonaparte gives the name as above.

"Petropaulski, July, 1855." (Mr. Stimpson).

59. *BUDYTES VIRIDES*, (Gmelin) ?

From the Island of Formosa. A young specimen preserved in spirits and which we find impossible to refer to any species—moreover, a young specimen of a *Motacilla*, greenish and yellowish colored, is not an easy subject, at best !

"Flew on board, after a storm, off the south end of the Island of Formosa, September 25th, 1854." (Mr. Stimpson).

60. *ANTHUS MALAYENSIS*, Eyton.

"Hong Kong, February, 1855." (Mr. Stimpson).

61. *HIRUNDO GUTTURALIS*, Scopoli.

"Flew on board off the Island of Formosa, September, 1855." (Mr. Stimpson).

62. *CECROPIS CUCULLATA*, (Boddart).

"Constantia, Cape of Good Hope, October, 1853. Collected by Lieut. Van Wyck." (Mr. Stimpson).

63. *CYPSELUS MELBA*, (Linnæus).

*Hirundo melba*, Linn., Syst. Nat. i. p. 345, (1766).

*Hirundo alpina*, Scopoli.

*Hirundo gularis*, Steph., Gen. Zool., x. p. 99, (1817).

*Cypselus gutturalis*, Vieill., Nouv. Dict. xix. p. 422, (1818).

Le Vaill. Ois d'Afr. v. pl. 243.

From the Cape of Good Hope.

Several specimens, very interesting on account of their locality, and tending to demonstrate that this bird, which is found in southern Europe and Asia, inhabits also the entire continent of Africa. On careful comparison with European specimens in the Museum of the Philadelphia Academy, though we find no strong nor perhaps sufficient characters distinguishing the present bird, yet the specimens now before us are somewhat larger, and appear to have a wider band in front on the neck and breast. Both of the names last given above are applicable to the South African bird, having been applied on the faith of Le Vaillant's plate and description.

"Near Simon's town, Cape of Good Hope, October, 1853. Shot by Lieut. Van Wyck." (Mr. Stimpson).

64. *ALCEDO BENGALENSIS*, Gmelin.

From the Loo Choo Islands and from China.

"Loo Choo, November, 1854, and Hong Kong, February, 1855." (Mr. Stimpson).

"Frequently seen along a creek at Tumai, Nappa Harbor, Great Loo Choo, generally sitting very quietly on dead branches projecting over the stream, or occasionally plunging into the water." (Mr. E. M. Kern).

65. *HALCYON PILEATA*, (Boddart).

"Near Hong Kong, presented by Dr. Harland." (Mr. Stimpson).

66. *HALCYON RUFIVENTRIS*, Swainson.

"In a dry valley back of Porto Praya, Cape de Verde Islands. Collected by Lieut. Van Wyck, July, 1853." (Mr. Stimpson).

[June,



67. *SELASPHORUS RUFUS*, (Gmelin).

From Sitka, Russian America.

68. *NECTARINIA FAMOSA*, (Linnæus).

From the Cape of Good Hope.

Numerous specimens of both sexes and young of various ages and stages of plumage. In the youngest the entire upper parts are dull ashy brown, the brilliant metallic green of the adult first appearing on the shoulders. Throat and under parts of the body greenish yellow mixed with dark greenish brown.

"Simon's town, Cape of Good Hope, October, 1853. Abundant, and numerous specimens collected by Lieut. Van Wyck." (Mr. Stimpson).

69. *NECTARINIA VIOLACEA*, (Linnæus).

From the Cape of Good Hope.

Adults and young birds in the collection of the Expedition. The latter are uniform dull greenish brown or yellowish brown above and nearly the same below, though lighter and with the yellow predominating on the abdomen.

"Very abundant in the gorges of the hills near Simon's town, Cape of Good Hope, September and October, 1853. Numerous specimens were collected by Lieut. Van Wyck and Mr. Joseph Pennington." (Mr. Stimpson).

70. *CINNYRIS CHALYBEA*, (Linnæus).

"Cape of Good Hope, October, 1853; abundant, and numerous specimens obtained by Lieut. Van Wyck and Mr. Joseph Pennington." (Mr. Stimpson)

71. *PROMEROPS CAFER*, (Linnæus).

From the Cape of Good Hope.

Numerous specimens of both sexes and various stages of plumage are in the collection of the Expedition. This is evidently a common bird of South Africa, and the specimens now before us show much uniformity in colors and other specific characters in both sexes. They differ, however, in some minor particulars, such as the greater or less extent of the light brown color on the breast, and no two specimens have the tail of the same length. One male, evidently a patriarch, has a magnificent outfit in this line, his tail measuring fifteen inches, and his total length about twenty-one inches.

This is one of the few birds named and described by Linnæus from a drawing only, without specimens and without reference to any author. A second description, in which he names the same species "*Upupa promerops*," (Syst. Nat. i. p. 184), is copied from Brisson.

"Abundant on the hill sides, frequenting low trees and bushes; numerous specimens obtained by Lieut. Van Wyck. Cape of Good Hope, October, 1853." (Mr. Stimpson).

72. *ECLICTUS LINNÆI*, Wagler.

From the Island of Tombaro, or New Ireland. One specimen only of this gorgeous species, which, though known as a bird of New Guinea, is now presented from a new locality.

"Port Praslin, Tombaro Island, January 23d, 1854. Extent of wings  $26\frac{1}{2}$  inches, wing from shoulder  $9\frac{3}{4}$ , total length 13 inches. Iris whitish, a delicate band of azure colored feathers around the eyes." (Lieut. Van Wyck).

73. *ECLICTUS POLYCHLORUS*, (Scopoli).

From the Island of Tombaro or New Ireland. Also from a new locality.

"Port Praslin, Tombaro Island, January 23d, 1854. Iris red; total length 15 inches, wing from shoulder  $9\frac{1}{2}$ , extent of wings 30 inches." (Lieut. Van Wyck).

74. *GEOCOLAPTES CAFER*, (Gmelin).

From the Cape of Good Hope.

75. *CENTROPUS SINENSIS*, (Stephens).

*Polophilus sinensis*, Steph., Gen. Zool. ix. p. 51, (1815).  
1862.]

From China. Specimens not in mature plumage, but of a species probably quite distinct from *C. philippinus* or other, and much as described by Stephens, as cited.

"Hong Kong, China, March, 1855, collected by Mr. S. Pelkey." (Mr. Stimpson).

76. *GEOCOCCYX MEXICANUS*, (Gmelin).

"California, November, 1855." (Mr. Stimpson).

77. *COLUMBA INTERMEDIA*, Strickland.

From the Loo Choo Islands.

"Frequently seen about the pine trees in the foreign burying ground and its vicinity, at Tumai, Nappa Harbor, Great Loo Choo Island, December, 1854. Seemed to be quite at home in the trees, and was rather wild and watchful, though occasionally shot for eating by members of the Expedition. Pairs were generally seen together and only in the trees." (Mr. E. M. Kern).

78. *CARPOPHAGA VAN WYCKII*, Cassin.

About the size of and resembling *Carpophaga ænea* and allied species, but with the head and neck lighter and a distinct ring of white around the eyes. Bill moderate, rather depressed at base; wing with the third quill longest; tail rather long; tarsi short and feathered behind, in front having about three large scales; toes much flattened beneath, claws rather strong, curved.

Frontal feathers and ring around the eye white. Head and neck above light cinereous, body above, wing coverts and tail coverts metallic golden green with violet and ferruginous shades. Throat and entire under parts of the body vinaceous, tinged with purple on the throat and breast and inclining to cinereous on the flanks and abdomen. Under tail coverts dark chestnut, quills black with a bluish lustre and a slight shade of grayish ashy, tail feathers deep metallic blue, changing to green on the edges and at their ends. Bill and feet light colored, probably yellow.

"Iris lake, upper mandible purple at base; extent of wings 27 inches." (Lieut. Van Wyck).

Total length about 17 inches, wing 9, tail 5½ inches.

*Hab.*—Tombaro Island or New Ireland. Specimen in National Museum, Washington.

This fine Pigeon is of much interest, and we regret to find only a single specimen in the collection of the Expedition, which was obtained by Lieut. Van Wyck at Port Praslin, in the island above mentioned. It is allied to *C. ænea* and its allies, but is not identical with either of them, and is from a locality not previously assigned to any species of the intricate group of which *C. ænea* is the type.

To this handsome bird we have great gratification in giving a name in honor of its discoverer, the late Lieut. Van Wyck of the United States Navy. To the enterprise and scientific taste of this lamented gentleman we are indebted for a very valuable portion of the present extensive collection, and he was deservedly esteemed as one of the most talented and promising young officers of the naval service. His early death, on the passage homeward of the U. S. Brig Porpoise, is, assuredly, to be deplored as a loss to science and to his country.

79. *CARPOPHAGA LECTUOSA*, (Temminck).

From Tombaro Island, (New Ireland).

One specimen only in young plumage, but from a locality not previously known for this species.

"Purchased from the natives at Port Praslin, Tombaro Island, or New Ireland, February, 1854." (Lieut. Van Wyck).

80. *TURTUR RUPICOLA*, (Pallas).

From the Loo Choo Islands.

[June,

"Numerous at the foreign burying ground at Tumai, Great Loo Choo Island, December, 1854. Frequently seen in the pine trees and always in pairs, the male constantly *cooing* and very sedulously engaged in attentions to his mate." (Mr. E. M. Kern).

81. *TURTUR CHINENSIS*, (Scopoli).

"Hong Kong, China, February, 1855. Collected by Mr. Salvadora Pelkey." (Mr. Stimpson).

82. *LOPHORTYX CALIFORNICUS*, (Shaw).

From California.

83. *GRUS CANADENSIS*, (Linnæus).

"San Francisco, California, November, 1855." (Mr. Stimpson).

84. *HERODIAS EGRETTA*, (Gmelin).

"San Francisco, California, November, 1855." (Mr. Stimpson).

85. *HERODIAS ALBA*, (Linnæus).

"Loo Choo, December, 1854." (Mr. Stimpson).

86. *ARDEA JUGULARIS*, Forster.

From the Loo Choo Islands. Specimens in the usual dark colored plumage, and not different from others now before me from Tahiti and New Zealand, so far as I can see. The present is an unusual locality.

"Loo Choo, December, 1854." (Mr. Stimpson.)

87. *ARDEA GREYI*, (Gray.)

"Loo Choo, December, 1854." (Mr. Stimpson.)

88. *BOTAURUS LENTIGINOSUS*, (Montagu.)

"Marc Island, California." (Mr. Stimpson.)

89. *NUMENIUS ARQUATUS*, (Linnæus.)

From the Loo Choo Islands.

"Abundant along the coral reefs at Nappa Harbor, Great Loo Choo Island." (Mr. E. M. Kern.)

90. *LIMOSA FEDOA*, (Linnæus.)

"San Francisco, California, November, 1855." (Mr. Stimpson.)

91. *CHARADRIUS FULVUS*, Gmelin.

From Loo Choo and the Bonin Islands. Several specimens apparently of the same species and identical with numerous others now before me from various localities in the Pacific Ocean.

"Loo Choo, November, 1854, Bonin Islands, October, 1854." (Mr. Stimpson.)

92. *CHARADRIUS LONGIPES*, Temminck.

From the Bonin Islands. Appears to be identical with Asiatic specimens in the Museum of the Philadelphia Academy.

93. *ÆGIALITIS NIVIFRONS*, (Lesson.)

From the Cape of Good Hope. "In low, stony places near the sea, Cape of Good Hope, October, 1853, collected by Lieut. Van Wyck." (Mr. Stimpson.)

94. *MACRORAMPHUS SCOLOPACEUS*, (Say.)

"San Francisco, California, November, 1855." (Mr. Stimpson.)

95. *SYMPHEMIA SEMIPALMATA*, (Gmelin.)

"San Francisco, California, December, 1855." (Mr. Stimpson.)

96. *TOTANUS BREVIPES*, (Vieillot.)

"Bonin Islands, October, 1854, Loo Choo, November, 1854." (Mr. Stimpson.)

97. *TOTANUS GLAREOLA*, (Linnæus.)

"Hong Kong, China, March, 1855, collected by Mr. S. Pelkey." (Mr. Stimpson.)

98. *TRINGOIDES HYPOLEUCA*, (Linnæus.)

From the Loo Choo Islands.

99. *TRINGOIDES EMPUSA*, (Gould.)

"Bonin Islands, October, 1854." (Mr. Stimpson.)

100. *TRINGA ALPINA*, Linnæus.

From the Asiatic coast of Behring's Straits. Specimens in the collection of the Expedition are identical with the European species and also with Asiatic specimens in the museum of the Philadelphia Academy.

"Straits of Semiafine, Asiatic coast of Behring's Straits, August, 1855." (Mr. Stimpson.)

101. *TRINGA MINUTA*, Leisler.

"Straits of Semiafine, Asiatic coast of Behring's Straits, August, 1855." (Mr. Stimpson.)

102. *PHALAROPUS FULICARIUS*, (Linnæus.)

From Behring's Straits. "This bird appeared in great numbers, during an easterly storm, seeking shelter under the lee of our tents at Arikamecheche Island, on the Asiatic coast of Behring's Straits, in August, 1855." (Mr. Stimpson.)

103. *RALLUS ELEGANS*, Audubon.

"San Francisco, California." (Mr. Stimpson.)

104. *RALLUS VIRGINIANUS*, Linnæus.

"San Francisco, California, January, 1856." (Mr. Stimpson.)

105. *FULICA AMERICANA*, Gmelin.

"San Francisco, California, November, 1855." (Mr. Stimpson.)

106. *FULICA ALAI*, Peale.

From the Sandwich Islands. "Found in considerable numbers tending their young at a fresh water pond near Hilo, Hawaii, March, 1856." (Mr. Stimpson.)

107. *ANAS BOSCHAS*, Linnæus.

From the Sandwich Islands.

108. *MARECA AMERICANA*, (Gmelin.)

"San Francisco, California, January, 1856." (Mr. Stimpson.)

109. *DAFILA ACUTA*, (Linnæus.)

"San Francisco, California, January, 1856." (Mr. Stimpson.)

110. *NETTION CAROLINENSIS*, (Gmelin.)

"San Francisco, California, December, 1855." (Mr. Stimpson.)

111. *NETTION CRECCA*, (Linnæus.)

"Obtained in the market at Hong Kong, China, by Capt. Rodgers, February, 1855; said to be caught in nets." (Mr. Stimpson.)

112. *SPATULA CLYPEATA*, (Linnæus.)

"San Francisco, California, January, 1856." (Mr. Stimpson.)

113. *FULIX MARILA*, (Linnæus.)

"Loo Choo Islands, December, 1854." (Mr. Stimpson.)

114. *FULIX AFFINIS*, (Eyton.)

"Petaluma Creek, California, December, 1855." (Mr. Stimpson.)

115. *ATHYA VALISNERIA*, (Wilson.)

"San Francisco, California, December, 1855." (Mr. Stimpson.)

[June,

116. *BUCEPHALA AMERICANA*, (Bonaparte.)  
 "San Francisco, California, December, 1855." (Mr. Stimpson.)
117. *HISTRIONICUS TORQUATUS*, (Brandt.)  
 From California.
118. *POLYSTICTA STELLERI*, (Pallas.)  
 "Semiavine Straits, August, 1855." (Mr. Stimpson.)
119. *ERISMATURA RUBIDA*, (Wilson.)  
 "San Francisco, California, January, 1856." (Mr. Stimpson.)
120. *MELANETIA VELVETINA*, (Cassin.)  
 "San Francisco, California, November, 1855." (Mr. Stimpson.)
121. *PELIONETTA PERSPICILLATA*, (Linnæus.)  
 "San Francisco, California, November, 1855." (Mr. Stimpson.)
122. *SOMATERIA MOLISSIMA*, (Linnæus.)  
 "Semiavine Straits, August, 1855." (Mr. Stimpson.)
123. *SOMATERIA SPECTABILIS*, (Linnæus.)  
 "Behring's Straits, August, 1855." (Mr. Stimpson.)
124. *BERNICIA LEUCOPAREIA*, (Brandt.)  
 "San Francisco, California, January, 1856." (Mr. Stimpson.)
125. *COLYMBUS SEPTENTRIONALIS*, Linnæus.  
 "San Francisco, California, November, 1855." (Mr. Stimpson.)
126. *PODICEPS CORNUTUS*, (Gmelin.)  
 "California, November, 1855." (Mr. Stimpson.)
127. *PODILYMBUS CAROLINENSIS*, (Latham.)  
 "San Francisco, California, November, 1855." (Mr. Stimpson.)
128. *URIA GRYLLE*, (Linnæus.)  
 From Herald Island, Arctic Ocean.  
 Very interesting on account of locality, which is north of Behring's Straits, though known as inhabiting the coasts of northern Asia. Exactly identical with the bird of northern Europe and north-eastern America.  
 "Herald Island, August, 1855." (Mr. Stimpson.)
129. *URIA COLUMBA*, (Pallas.)  
 From Behring's Straits. Numerous specimens of this species, now well known as inhabiting the Pacific coast of America from the present locality to San Francisco. In general form and color resembles the preceding, but is easily distinguished by the white space on the wing being partially divided by a black band, or, as expressed by Pallas, "*fascia alarum duplex alba*."  
 "Abundant in the edge of the water at the harbor of Glassnappe in the island of Arikamcheche or Kayne Island, which is on the Asiatic side of Behring's Straits, lat. 64° 40' N., long. 172° 59' W., and along the shores of the Straits of Semiavine which separate this island from the continent of Asia."  
 "This bird was always observed swimming close to the shore, apparently in search of food, and though seen in considerable numbers, was always isolated and scattered along the coast. It is quite shy and timid, and on the slightest alarm escaped by diving with great expertness and quickness, and swimming under the water quite a considerable distance. It was not heard to utter any note, but quite silently and very industriously appeared to be constantly engaged in its search for subsistence." (Mr. E. M. Kern.).  
 "Behring's Straits, August, 1855." (Mr. Stimpson.)
130. *URIA CARBO*, (Pallas.)  
 From the coast of Japan. From a new locality and a more southern latitude than usual for this interesting species.
- 1862.]

"On the coast of the Island of Nippon, Japan, north of the Bay of Sendai, June, 1855. Collected by Lieut. Brooke." (Mr. Stimpson.)

131. *URIA ARRA*, (Pallas.)

From Herald Island, Arctic Ocean. The only specimen of this species that has ever reached the naturalists or museums of the United States from a locality on the western or north-western coasts of America. In mature plumage, and showing strongly the dilated edges of the basal third part of the upper mandibles by which this species is easily distinguished.

"Herald Island, Arctic Ocean, August, 1855." (Mr. Stimpson.)

132. *FRATERCULA CIRRHATA*, (Gmelin).

From the Sea of Ochotsk. Formerly very rare in museums, but is now brought in nearly all collections from the Pacific coast of America, and is evidently of frequent occurrence.

"Ochotsk Sea, August, 1855, collected by Capt. H. K. Stevens." (Mr. Stimpson.)

133. *MORMON CORNICULATA*, Naumann.

*Mormon corniculata*, Naum., Isis 1821, p. 782.

*Mormon glacialis*, Aud. Orn. Biog. iii. p. 599. (1835.)

Gray, Gen. iii. pl. 174. Aud. B. of Am. pl. 293, Oct. ed. vii. pl. 463.

From Behring's Straits and the Sea of Ochotsk. Several specimens in mature plumage, all of which seem to be that entitled to the name here given. The species is, however, nearly related to the common *glacialis*, and may be identical.

"Behring's Straits, August, 1855; Ochotsk Sea, August, 1855." (Mr. Stimpson.)

134. *PHALERIS PUSILLA*, (Pallas.)

*Uria pusilla*, Pallas, Zoog. Ross. Asiat. ii. p. 373, (1811.)

From Behring's Straits. Specimens of this little bird are amongst the most interesting in the collection of the Expedition, and are probably the first ever obtained since this species was described by the distinguished Russian naturalist above mentioned. Usually this bird has been regarded as identical with *Phaleris microceros*, (= *P. nodirostris*), but it is entirely distinct, and also from *Alca pygmaea* of authors.

This curious little bird is probably the very smallest of the sea birds, and is easily distinguished by the clear black of its upper plumage and pure white of the under parts, with the additional character of having white scapulars. It is about an inch shorter in total length than *P. microceros*, and smaller in all other measurements. The rediscovery of this bird is an important contribution to ornithology, and the specimens are an exceedingly valuable addition to the National museum.

"In the Straits of Semiafine and along the coast of Arikamcheche Island this little bird was quite numerous in September, 1855. It was always seen in the water and was constantly diving, as though seeking food beneath the surface, but remaining submerged a short time only. It has a short chirping note, and is so very small in size and gentle in its actions and appearance that some of our party were disposed to insist that it was a very young bird, or *chicken* of a larger species. All admitted that it was the very smallest sea-bird that they had ever seen."

"Though rather shy, it was occasionally killed by a blow from the paddle of a *kiak* or native boat, and sometimes an attempt to row into the midst of a flock for that purpose was successful. Several specimens were preserved for the ornithological collection, and large numbers were eaten, and with other birds proved an agreeable addition to our limited stock of fresh provisions." (Mr. E. M. Kern.)

135. *PELECANUS FUSCUS*, Linnæus.

"San Francisco, California, November, 1855." (Mr. Stimpson.)

[June,

136. *SULA FIBER*, (Linnaeus.)

"Shot at the Bonin Islands by Mr. J. Thompson, Master's Mate of the Vincennes, October, 1854." (Mr. Stimpson.)

"Alighted on board, off the Mela-co-shimah Islands, between the Loo Choo Islands and Formosa, just after sunset, October 3d, 1854. Bill yellowish blue, inclining to greenish about the base and on the throat. Feet light lemon yellow. Two fishes of the genus *Hemiramphus* were found in its maw." (Mr. Stimpson.)

137. *SULA PISCATOR*, (Linnaeus.)

"Taken in the Coral Sea, January, 1854. No land nor shoal known to be in the vicinity." (Mr. Stimpson.)

138. *GRACULUS DILOPHUS*, (Swainson.)

"San Pablo Bay and Bay of San Francisco, California, November, 1855." (Mr. Stimpson.)

139. *GRACULUS VIOLACEUS*, (Gmelin.)

From Behring's Straits. In very fine adult plumage.

"Behring's Straits, August, 1855." (Mr. Stimpson.)

140. *GRACULUS CARBO*, (Linnaeus.)

"Shot at Fotow Bay, Island of Ousima, May, 1855, by Lieut. Brooke." (Mr. Stimpson.)

141. *LARUS HUTCHINSHI*, Richardson.

From Behring's Straits.

"Abundant on the shores of Semiavine Straits and in the fresh-water lagoons of Arikamcheche Island on the Asiatic coast of Behring's Straits, in August, 1855; not shy and easily approached within gun-shot. The native boys catch this bird with a sort of sling made of five or six strands of rope, to the ends of which small stones are attached. This sling is thrown at the bird usually when flying, and is frequently successful in entangling it so much that it cannot extricate itself before being captured. The skins of this and other birds are used by the Tehuchtechi people for clothing." (Mr. E. M. Kern.)

142. *LARUS MELANURUS*, Temminck.

"Hakodadi, Japan, June, 1855." (Mr. Stimpson.)

143. *RISSA KOTZEBUEI*, Bonaparte.

"Behring's Straits, August, 1855." (Mr. Stimpson.)

144. *CHROICOCEPHALUS PHILADELPHIA*, (Ord.)

"San Francisco, California, November, 1855." (Mr. Stimpson.)

145. *STERNA MACROURA*, Naumann.

*Sterna macroura*, Naum., Isis, 1819, p. 1847.

*Sterna arctica*, Temm., Man. d'Orn. ii. p. 742, (1820.)

From Behring's Straits. This is the first specimen that I have ever seen from the North Pacific Ocean, but it appears to be identical with the bird from the northern regions of America and Europe.

"Semiavine Straits, Asiatic coast of Behring's Straits, August, 1855." (Mr. Stimpson.)

146. *STERNA LUNATA*, Peale.

*Sterna lunata*, Peale, Zool. U. S. Ex. Exp. Vincennes, Birds, p. 277, (1st ed. 1848.)

From the Pacific Ocean, lat. 26° N., long. 135° E. This is a rather large, black-billed species of the same group, and considerably resembling the common *S. panaja*, but is much lighter colored. It is carefully described in my second edition of the volume on Quadrupeds and Birds of the U. S. Ex. Exp. (1858.)

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"Taken in the North Pacific Ocean, lat.  $26^{\circ}$  N., long.  $135^{\circ}$  E. (Mr. Stimpson.)

147. *STERNA MINUTA*, Linnæus?

From the Island of Formosa. In young plumage.

"Flew on board after a storm, off the south end of the Island of Formosa, September 25th, 1854." (Mr. Stimpson.)

148. *ANOUS STOLIDUS*, (Linnæus.)

From the Pacific Ocean. Very extensively distributed, but one specimen in the collection of the expedition is from an unusually northern locality.

"Specimen No. 181, taken near the Borodine Islands, lat  $24^{\circ}$  N. long.  $132^{\circ}$  E. in the North Pacific Ocean."

"Specimen No. 105, alighted on board at night, in lat.  $5^{\circ}$  S., long.  $166^{\circ}$  E. (Mr. Stimpson.)

149. *DIOMEDEA EXULANS*, Linnæus.

From the Cape of Good Hope and other localities in the South Atlantic and Pacific Oceans.

150. *DIOMEDEA BRACHYURA*, Temminck.

"North Pacific Ocean, lat.  $30^{\circ}$  to  $60^{\circ}$  N., long.  $140^{\circ}$  to  $150^{\circ}$  W., very common." (Mr. Stimpson.)

151. *DIOMEDEA MELANOPHRYS*, Temminck.

From the Cape of Good Hope and from the South Pacific ocean.

"Feet pearly slate color, a black stripe at the base of the bill, which nearly disappears on drying. Shot and prepared by Dr. Stuart." (Mr. Stimpson.)

152. *DIOMEDEA FULIGINOSA*, Gmelin.

From the Cape of Good Hope and various localities in the Pacific Ocean.

153. *OSSIFRAGA GIGANTEA*, (Gmelin.)

From the Pacific Ocean, south of Australia.

"Lat.  $40^{\circ} 10'$  S., long.  $132^{\circ} 49'$  E. Iris black, feet black, little changed in drying." (Lieut. Van Wyck.)

154. *FULMARUS RODGERSII*, Cassin.

About the size of *F. glacialis* of the Northern Atlantic Ocean, and in general appearance resembling that species, but with the tertiary quills, rump and under wing coverts white. Bill strong, thick, wings long, with the first quills longest, feet rather large, tarsi covered with small hexagonal scales, tail short, slightly rounded.

Bill yellow, with a tinge of green at base (in dried skin.) Head, neck, lower back, rump, tertiary quills and entire under parts snowy white. Back, scapulars and wing coverts brownish ashy, with a pearly lustre, primary and secondary quills ashy brown, with a large portion of their inner webs white, and their shafts white. Tail feathers light ashy brown, with their shafts white and their inner webs white at base. Feet light colored, probably yellow.

Total length about 18 inches, wing 12, tail 5 inches.

*Hab.*—South Indian Ocean. Specimen in Nat. Mus. Washington.

This bird belongs to the same group as the common *Procellaria glacialis* of the Northern seas and *P. Pacifica* of the Northwestern coast of America, both of which are included in the restricted group *Fulmarus*. The tertiary quills in the present species are white, which is a strong character, in addition to which it is larger and much lighter colored than either of the species mentioned. In the one character of having the tertiaries white, this bird resembles *P. antarctica*, Gray, Voy. Erebus and Terror, Birds, pl. 33, but in no other. The bill in the present bird is yellow, and precisely of the same form as in *P. glacialis*. One specimen only is in the collection of the expedition, and is stated to have been obtained in the Indian Ocean.

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This species is dedicated to Commodore John Rodgers, of the United States Navy, under whose command the voyage of the North Pacific Surveying and Exploring Expedition was performed, and through whose liberal and enlightened encouragement and assistance the naturalists of the expedition were enabled to form one of the most extensive and interesting collections in all departments of zoology ever brought to this country. In all the classes of Marine zoology the collections are especially valuable, and were made under the immediate direction of this accomplished and distinguished officer.

155. *FULMAREUS PACIFICUS*, (Audubon.)

"Kamtschatka Sea, September, 1855. North Pacific Ocean, lat. 40° N., long. 150° W." (Mr. Stimpson.)

156. *THALASSOICA GLACIALOIDES*, (A. Smith.)

"At sea, lat. 44° 48' S., long. 42° 54' E., Nov. 14th, 1853. Eyes black, bill black and flesh-colored, the latter fading to nearly white in drying." (Lieut. Van Wyck.)

157. *ÆSTRELATA LESSONII*, (Garnot.)

From the South Indian Ocean. A single specimen of this little known species, quite identical with Mr. Gould's specimens now in the Museum of the Philadelphia Academy.

"Taken in the South Indian Ocean, December, 1853, by Dr. Stuart, of the Porpoise. Eyes black, lower part of toes and webs black, upper part white." (Lieut. Van Wyck.)

158. *MAJAJEUS CONSPICILLATUS*, (Gould.)

From the Atlantic Ocean, off the coast of Africa. Quite identical with Mr. Gould's specimens in the Museum of the Philadelphia Academy, and from a new locality for this species, but probably like nearly all its relatives,—a great wanderer.

"South Atlantic Ocean, September, 1853." (Mr. Stimpson.)

159. *DAPTION CAPENSIS*, (Linnæus.)

From the Cape of Good Hope and South Pacific Ocean.

160. *PUFFINUS KUHLLI*, Bonaparte.

From the Cape of Good Hope. Specimens in excellent plumage appear to be the species designated by Prince Bonaparte as above, and differ from *P. major* as stated by that distinguished author.

"Taken with hook and line at sea, off the Cape of Good Hope, Sept. 11th, 1853. Land distant about fifty miles." (Mr. F. H. Storer.)

161. *NECTRIS TENUIROSTRIS*, (Temminck.)

From Japan. A small dark lead-colored species, very accurately described and figured in "Fauna Japonica."

"Taken off the east coast of Nippon, Japan, in lat. 36° N." (Mr. Stimpson.)

162. *THALASSIDROMA WILSONII*, (Bonaparte.)

"Gulf Stream, off the coast of Virginia, June, 1853." (Mr. Stimpson.)

163. *THALASSIDROMA MELANOGASTRA*, Gould.

From the Cape of Good Hope and the Pacific Ocean. The former seems to be a new locality for this species, and the specimen differs from others in the collection of the expedition in having the throat black. We find, however, similar specimens in Mr. Gould's collection in the Museum of the Philadelphia Academy.

"Taken in the South Indian Ocean by Lieut. Van Wyck and Dr. Stuart of the Porpoise, December, 1853." (Mr. Stimpson.)

"Eyes black, male, lat. 40° 25' S., long. 126° 12' E." (Lieut. Van Wyck.)

"Thirty miles south of the Cape of Good Hope, September, 1853." (Mr. F. H. Storer.)

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With this species we close the Catalogue of the present very interesting collection. In that part of Commodore Rodger's Report relating to natural history, we hope to give figures of the most remarkable species, as well as further notes on their manners and habits, by the naturalists who accompanied the expedition.

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*July 1st, 1862.*

DR. BRIDGES, Vice-President, in the Chair.

Fifteen members present.

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*July 8th, 1862.*

DR. BRIDGES, Vice-President, in the Chair.

Thirteen members present.

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*July 15th, 1862.*

DR. BRIDGES, Vice-President, in the Chair.

Nine members present.

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*July 22d, 1862.*

DR. COATES in the Chair.

Six members present.

The following papers were presented for publication, and referred to Committees :

Notes on the family of Scombroids. By Theo. Gill.

Notes on the genera of Fishes of Western North America. By Theo. Gill.

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*July 29th, 1862.*

DR. BRIDGES, Vice-President, in the Chair.

Thirteen members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings :

**Note on the Family of SCOMBROIDS.**

BY THEODORE GILL.

Incited by the discovery of the existence of radiating spines at the angle of the preoperculum as a characteristic feature of the youth of the Carangoids, I turned my attention to the family of Scombroids, and have ascertained that the same feature exists in that family. *The Scombroids, then, in extreme youth, have the preoperculum armed with three spines, above and below which are generally smaller ones, all of which are afterwards absorbed in the substance of the bone.* I have myself verified this law on the young of a new species of Sarda, of which a single specimen, about an inch and five-eighths in length,

[July,

was obtained at Cape St. Lucas by Mr. Xantus. The *Dicrotus armatus* of Günther was also founded on a young fish, of which it was remarked by its describer, with a happy foresight, that "several of the characters mentioned may be modified in a mature state." That species might, indeed, but for the homogeneity of the dorsal and anal fins, be considered as the young of *Prometheus prometheoides*. As Dr. Günther has, however, positively denied pinnules to the genus, and, as the pinnules appear to be developed in the young as well as the old, the genus *Dicrotus* may, until further known, be regarded as distinct.

The subfamily of *Orcyninæ*, as characterized in a former paper, might, perhaps, be rather subdivided, if the number of pyloric appendages should be found to be coincident with other characters. In that case the following arrangement might be advisable :

#### SCOMBRINÆ.

*ORCYNINÆ*.—Caudal peduncle of adult with a median adipose carina, and two converging backwards, one above and one below. Pyloric cæca dendritical or very numerous.

*THYRSITINÆ*.—Caudal peduncle not carinated. Pyloric cæca developed in moderate or rather small numbers, (7—10.)

#### GEMPYLINÆ.

The genus *Acanthocybium*\* having the spinous dorsal longer than the soft, the proportions of those fins cannot be used in the present state of our knowledge to distinguish the two subfamilies.

The name *Orcynus* has been, by an unfortunate misapprehension, applied instead of *Orcynus*; and it is hoped that the latter will in all cases be substituted as the correct orthography.

### Note on some Genera of FISHES of Western North America.

BY THEODORE GILL.

In the Proceedings of the Academy for July, 1861, a number of genera have been established for species previously described from the western waters of North America. In the present article, several additional genera are introduced; and to formerly established ones, species described under other generic names have been referred.

#### SCORPÆNOIDS.

##### SEBASTICHTHYS Gill.

This genus embraces all the species referred to the genus *Sebastes*, which has eleven to twelve (XI. + I.—XII. + I.) spines in the first dorsal fin, palatine teeth and the physiognomy of *Sebastes* (*Norvegicus*.) I believe that I may be permitted to announce, that Dr. Ayres, in a letter of May 6th, has informed me that he knows eleven species belonging to the Cuvierian genus *Sebastes* to be inhabitants of the Californian waters. Five of them have been referred to the genus *Sebastes* and six to *Sebastodes*, the latter having been modified to embrace the species of which the head is "nearly smooth," while the name *Sebastes* is restricted to those of which "the summit of the head is strongly ridged." Such a division appears to me to be inadmissible, and I believe that *Sebastodes* must be retained with the characters I have assigned to it, while all other described species of California belong to one and the same natural genus, for which the name *Sebastichthys* has been proposed. The

\* The *Cybium petus* of Poey and *C. solandri* C. V. are true species of this genus. 1862.]

only species of whose affinity I entertain any doubt is the *S. elongatus* Ayres; that species, however, appears to be either a *Sebastichthys* or closely related to that genus. As to the number of species, I am disposed to doubt whether all are valid or even distinct from each other; the *S. helvomaculatus* Ayres appears to be identical with *S. ocellatus* Cuv. et Val. As Dr. Ayres kindly announces his intention to forward a full series, I trust soon to be enabled to satisfy myself regarding such doubtful points.

1. *SEBASTICHTHYS NIGROCINCTUS* = *Sebastes nigrocinctus* Ayres.

#### CARANGIDS.

*PARATRACTUS* Gill.\*

*PARATRACTUS BOOPS.* *Syn.* *Trachurus boops* Grd.

#### GOBIOIDS.

*EUCYCLOGOBIUS* Gill.

*Eucyclogobius* differs from *Lepidogobius* in form, nudity of the head and the smaller second dorsal fin.

2. *EUCYCLOGOBIUS NEWBERRYI.* *Syn.* *Gobius Newberrii* Girard.

#### GOBIESOCIDS.

*CAULARCHUS* Gill.

The present genus differs principally from *Gobiesox* Lac. (= *Sicyogaster* *Boerneville*) by the nearly equal size of the dorsal and anal fins, and the nearly horizontal direction of the six compressed trenchant incisors of the lower jaw.

3. *CAULARCHUS RETICULATUS.* *Syn.* *Lepodogaster reticulatus* Girard.

#### CYCLOPTEROIDS.

*EUMICROTREMUS* Gill.

Differs from *Cyclopterus* *Artedi* by the smaller branchial apertures situated at the horizon of the eyes, and by the development of the spinous dorsal fin. The type is the *Cyclopterus spinosus* of Müller.

*EUMICROTREMUS ORBIS.* *Syn.* *Cyclopterus orbis* Gthr.

#### SALMONOIDS.

*HYPSIFARIO* Gill.

This genus embraces a single known species, distinguished by its compressed body, projecting snout, &c.

*HYPSIFARIO KENNERLYI.* *Syn.* *Salmo kennerlyi* Suckley.

#### PLEURONECTOIDS.†

*LEPIDOPSETTA* Gill.

*LEPIDOPSETTA UMBROSA* = *Psettichthys umbrosus* Grd.

*HYPSOPSETTA* Gill.

*HYPSOPSETTA GUTTULATUS* = *Pleuronichthys guttulatus* Grd.

*ORTHOPSETTA* Gill.

*ORTHOPSETTA SORDIDA* = *Psettichthys sordidus* Grd.

*UROSETTA* Gill.

*UROSETTA CALIFORNICA* = *Hippoglossus californicus* Ayres.

\* Type *Caranx pisquetos* C. V. = *C. chrysos* auct. nec *Mitc.*

† A synopsis of this family may be soon expected.

## TETRAODONTOIDS.

GASTROPHYSUS Müller.

GASTROPHYSUS POLITUS. *Syn.* Tetraodon politus Girard.

## STURIONOIDS.

ANTACEUS Fitz. and Heckel.

ANTACEUS BRACHYRHYNCHUS. *Syn.* Acipenser brachyrhynchus Ayres.ANTACEUS TRANSMONTANUS. *Syn.* Acipenser transmontanus Rich.ANTACEUS MEDIROSTRIS. *Syn.* Acipenser medirostris Ayres.ANTACEUS ACUTIROSTRIS. *Syn.* Acipenser acutirostris Ayres.

## CHIMÆROIDS.

HYDROLAGUS Gill.

Distinguished from Chimæra on account of the absence of an anal fin and the triple division of the sexual organs of the male.

HYDROLAGUS COLLIEI. *Syn.* Chimæra colliei Lay and Bennett.

## HETERODONTOIDS.

GYROPLEURODUS Gill.

GYROPLEURODUS FRANCISII = Cestracion francisci Grd.

## MYLIOBATOIDS.

HOLORHINUS Gill.

This genus is founded on a species which differs from Myliobatis by the transverse entire snout. The median teeth are very broad, and the lateral hexagonal ones have nearly equal sides.

HOLORHINUS VESPERTILIO. *Syn.* Rhinoptera vespertilio Girard.

## PETROMYZONTOIDS.

LAMPETRA Gray.

LAMPETRA PLUMBEA. *Syn.* Petromyzon plumbeus Ayres.

ENTOSPHEXUS Gill.

ENTOSPHEXUS TRIDENTATUS = Petromyzon tridentatus Rich. = P. lividus Grd.

" EPIHEXODON = " tridentatus Grd. (nec Rich.)

" CILIATUS = " ciliatus Ayres.

" ASTORI = " astori Grd.

The following list of the genera belonging to the Fauna of the Western coast of America north of Cape San Diego, not presented in Dr. Girard's Report, and exclusive of those in my "Notes," may be of use:

PERCOIDS. Stereolepis Ayres.

PIMELEPTEROIDS. Girella Gray.

SCIEŒNOIDS. Rhinoscion Gill (vice Ambledon Grd.) Menticirrhus Gill (vice Umbrina Grd. fide spec.) Genyonemus Gill (vice Leiostomus Ayres, Grd.) Atractoscion Gill. Cynoscion Gill, (Ayres.) Seriphus Ayres.

LABROIDS. Semicossyphus Gthr. Chærojulis Gill.

EMBIOTOCOIDS. Hypsurus A. Ag. Holconotus Ag. Cymatogaster Gib. (vice Holconotus Grd.) Hyperprosopon Gib. (vice Ennichthys Grd.) Hypocritichthys Gill. Brachyistius Gill.

CARANGOIDS. Naucrates Raf., Gthr.

STROMATEOIDS. Poronotus Gill, (Ayres.)

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ECHENEIDIDS. *Echeneis* L. *Remora* Gill.

COTTOIDS. *Potamocottus* Gill, (*Cottopsis gulosus* Grd.) *Onecottus* Gill.  
*Gymnacanthus* Sw. *Temnistia* Rich. *Blepsias* Cuv.

AGONOIDÆ. *Podothecus* Gill,\* (= *Paragonus* Gill.)

CHIROIDS. *Oxylebius* Gill.

TRICHODONTOIDS. *Trichodon* Steller.

GOBIOIDS. *Lepidogobius* Gill.

BLENNIOIDS. *Anoplarchus* Gill, *Günther*.

PSYCHROLUTOIDS. *Psychrolutes* Gthr.

AULORHYNCHOIDS. *Aulorhynchus* Gill.

ALEPIDOSAUROIDS. *Caulopus* Gill.

SALMONOIDS. *Hypomesus* Gill, (*lapsu calami etiam Mesopus*.) *Osmerus* Art.  
 (vice *Thaleichthys* Grd.)

CYPRINODONTOIDS. *Cyprinodon* Lac. (Grd.)

CLUPEOIDS. *Alausa* Val.

MURÆNOIDS. *Muræna* L. (*Ayres*.)

OPHIDIUROIDS. *Myrichthys* Girard.

SYNGNATHOIDS. *Dermatostethus* Gill.

GALEORRHINOIDS. Nov. gen. *Isoplagiodon* Gill, a sp.

RHINOIDS. *Rhina* Klein, (*Ayres*.)

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Aug. 5th.

Vice-President BRIDGES in the Chair.

Ten members present.

The following papers were presented for publication :

A Report upon Mr. Buckley's Description of Plants, No. III., Gramineæ. By Asa Gray.

Notes on certain Reptiles of the New World. By E. D. Cope.

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Aug. 26th.

Vice-President Bridges in the Chair.

Thirteen members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings :

A Report upon Mr. S. B. Buckley's "Description of PLANTS, No. 3, Gramineæ."  
 Published in the Proceedings of the Academy of Natural Sciences of Philadelphia, February, 1862.

BY ASA GRAY.

As it appears to have been impracticable to act upon the suggestion with which I concluded my remarks upon Mr. Buckley's preceding botanical papers, (vide p. 168,) all that remains is, to repair the damages sustained by this

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\* Deceived by the comparisons of authors, the identity of *Podothecus peristethus* with *Agonus acipenseroides* was not recognized until an opportunity was afforded of examining Tilesius' description and figure.

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foray as well as we can, sincerely hoping that it may be the last. The specimens which Mr. Buckley has here described having been kindly collected (a few excepted which have not yet been found) by the Botanical Curators, I referred them, in the first instance, to our best instructed agrostologist, Professor George Thurber. His careful and conscientious notes (except in a few instances) form the basis and substance of the following report. I have, however, verified them as far as I could; and I hold myself responsible for the statements herewith presented. If some of my comments be thought severe, it should be understood that Mr. Buckley was duly warned of the injury he was about to inflict upon science, and was besought to submit the specimens of his supposed new species of grasses to some competent agrostologist before publication. This disregard of good counsel and reckless miscalculation of scientific fitness for such undertakings, and the astonishing breach of comity and confidence (to use the gentlest words) by gross appropriation or suppression of the names of Nuttall and others, recorded in a public herbarium, which the following pages disclose, are traits which seem to illustrate and explain each other.

*Polypogon alopecuroides*, Buckley. The first thing to notice is, that Mr. Buckley has suppressed Nuttall's name, under which he communicated the plant to the Academy's herbarium, and doubtless to the Hookerian, if not to other herbaria,—viz.: *Deyeuxia alopecuroides*! Then he has mistaken the genus at least as widely as Nuttall did. In fact, this grass differs from *Agrostis exarata*, Trin. in nothing notable except in its denser and lobate panicle and in the awn; which last Bongard detected in some specimens of *A. exarata*. If distinct, Nuttall's specific name will be adopted, unless the plant is already published under some other; i. e., it will be *Agrostis alopecuroides*. We have a far larger form of it from Hooker's Oregon duplicates, without a name.

*Vilfa agrostioides*. No specimens so ticketed have yet been found. But one of *Sporobolus cryptandrus*, ticketed by Mr. Buckley "*Agrostis*, Northern Texas," is probably the plant in question.

*Sporobolus* (*Vilfa*) *angustus* is *Sporobolus Indicus*, R. Br., *Agrostis Indica*, L. Having adopted the genus *Vilfa* in the preceding and following cases, Mr. Buckley has a curious way of including it under *Sporobolus* besides.

*Vilfa rigida* is *Calamagrostis gigantea*, Nutt., also *C. longifolia*, Hook.

*Vilfa* (*Sporobolus*) *alba*. Here, *vice versa*, *Sporobolus* is subordinated to *Vilfa*; and the present new species of this double-headed genus is *Eatonia obtusata*!

*Sporobolus* (*Vilfa*) *arenaceus*, (again this side up!) is described from No. 737 of Wright's collection, and the fact suppressed: it is *Sporobolus asperifolius*, Nees and Meyen, fide Munro.

*Uralespis* (*Tricuspis*) *elongata*, which is the same as 2054 of Wright's coll., and 307 of one of Drummond's collections, is *Tricuspis trinervigumis*, Munro, MSS., near *T. mutica*, Torr.

*Vilfa* (*Sporobolus*) *varians*, described from some specimen of Nuttall's, which is not yet found.

*Sporobolus* (*Vilfa*) *diffusissimus* is *S. airoides* Torr.

*Vilfa* (*Sporobolus*) *Sabeana* is *S. Coromandelianus*, Kunth (non Trin.), an old and widely diffused species, to which, according to Col. Munro, belong *S. commutatus*, Kunth and Trinius, *S. argutus*, Kunth, *S. Arkansanus*, Trin., and *Vilfa ambigua*, Stend.

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*Agrostis aquatica*, from Texas. No specimen of this is communicated.

*Agrostis scabriuscula* is founded on a specimen of familiar *A. scabra*, ticketed by Nuttall "*Agrostis scabrata*," the name a little altered.

*Agrostis albicans* is founded on a slender form of *A. exarata*, Trin., named by Nuttall *A. Oregonensis*.

*Muhlenbergia arenicola* is *M. gracillima*, Torr., in Whipl. Rep. It is Wright's No. 735, and Fendler's 968 and 969. The specimens described are from Wright's collection.

*Muhlenbergia monticola* is founded on Wright's specimens Nos. 731 and 733, which were referred by Col. Munro to *M. sylvatica*, Torr., var. *ligulis elongatis*, *foliis angustis*.

*Muhlenbergia pauciflora* is described from a scanty, depauperate specimen of Wright's No. 732,—the source concealed as usual, and the character no better than would be expected. The species is, so far as we know, a new one, allied to *M. Willdenovii*.

*Muhlenbergia Texana*. No specimen communicated under this name, but one given by Mr. Buckley to the Academy's herbarium under the name of "*Agrostis barbatus*, Buckl." may, from the description, be the plant intended. This is a form of *Sporobolus ramulosus*.

*Calamagrostis Oregonensis*. Mr. Buckley's ticket is thrown into a sheet containing three specimens of Nuttall's, respectively ticketed by him "*Calamagrostis purpurascens*, Columbia River," "*C. gracilis*, Dry Plains, Columbia," and "*C. pumila*, Rocky Mountains." The first of these belongs to *C. Langsdorffii*, Trin. and *C. strigosa*, Bong., (between which we can draw no valid distinction;) the other two appear to belong to *C. stricta*, Trin. or *C. Lapponica*, which are also combined by some. From Mr. Buckley's pleonastic phrase, "*aristisque et pilis corollam excedentibus*," it may be supposed that he was describing only the first-named specimen; but the "*panicula 3-5-policari longis*" [sic] seems to include all three. (Nuttall's *C. Columbiensis*, ined., we may remark, seems also to be *C. Langsdorffii*, a form with the awn inserted much above the middle, and exactly *C. elata*, Blytt., from Norway.)

*Calamagrostis rubescens* is indicated as "*Oregon, Nuttall*;" but Nuttall's ticket is not preserved. The specimen is an imperfect fragment. The spikelets in structure perfectly accord with those of the next, of which we suppose it to be a coarctate form. It would agree very well with the character of *C. varia*, var. *purpurascens*, Fl. Ross., but not with *C. purpurascens*, R. Br.

*Calamagrostis albicans* is described from Nuttall's specimen of his "*C. pallida*," this name on the ticket erased, and "*albescens*, Buckl." substituted, and that changed to "*albicans*." The plant we take to be *C. aleutica*, Bong. It is allied to some forms of *C. varia*, (into which *C. sylvatica* appears to merge,) but is probably quite distinct.

*Aristida curtiseta* is founded on depauperate specimens of *A. purpurea*, such as were gathered in Sitgreaves' Expedition.

*Aristida pauciflora* is *A. oligantha*, Michx.

*Aristida filipendula* is *A. purpurea*, Nutt., a form near the var. *Berlandieri*, Trin. The species is polymorphous.

*Bouteloua pumila* is *B. polystachya*, Torr., Pacific R. R. Surv. 5, (*Chondrosium*, Benth.) a small-flowered form of the species. Described from some of Wright's No. 754.

*Bouteloua brevifolia* is *B. eriopoda*, Torr. Described from Wright's 748

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and Fendler's 950, (not 946 as on the ticket in herbarium Acad.)—with the usual omission to mention it.

*Uralespis* (*Tricuspis*) *brevicuspida* is *Leptochloa dubia*, Nees, *Chloris dubia*, H.B.K. (767, Wright.)

*Uralespis* (*Tricuspis*) *pilosa*, described from Wright's specimens, No. 781, the ticket of which bore the note "*Tricuspis*, n. sp." in Mr. Thurber's handwriting, is *Tricuspis acuminata*, Munro, in herb., mixed with one specimen of *T. avenacea*, Thurber, (*Triodia avenacea*, H.B.K.) It is also Wright's 2058, Fendler's 915, and Lindheimer's 738.

*Uralespis* (*Tricuspis*) *poæoides*, founded on Fendler's No. 932 (and duly credited!) was long ago published, and the number cited as *Eragrostis Fendleri-ana*, Steud., Glum., 1, p. 278; and it is *Sclerochloa Californica*, Munro, in Pl. Hartw. p. 342.

*Uralespis* (*Tricuspis*) *densiflora* (same as Drummond's 274 and 278, 2d coll.) is *Windsoria stricta*, Nutt., therefore *Tricuspis stricta*. (No. 314 of Drummond's same collection is *T. albescens*, Munro, ined.)

*Uralespis* (*Tricuspis*) *composita* is a well-known large form of *Leptochloa fascicularis*, Gray, Man. What is meant by "leaves at the joints of the culm without sheaths and stems," we need not endeavor to make out.

*Uralespis* (*Tricuspis*) *pilosa*,—the second of the same name,—is *Tricuspis mutica*, Torr., in Pacific R. R. Surv., 4, p. 156, a large form, with hirsute sheaths, better developed. The lower palea often bears a minute mucro. It is described from one of Wright's specimens, in whose collection it is Nos. 779, 780 and 2046.

*Pleuraphis mutica*. Upon this Professor Thurber remarks: "I think this may be a good species. It differs from *P. Jamesii* (Fendl. 946) in the glumes of the lateral spikelets, which are cuneate-obovate, 5-7-nerved, and do not enclose the flowers, but form a sort of involucre, as in *Elymus*. Glumes of the central spikelet 2-cleft, 5-nerved; the nerves confluent below, the middle one produced as an awn, which is shorter than the lacerate-fringed lacinia. Lower palea of the perfect flower muticous." It is Wright's 760 and 2108.

*Glyceria bulbosa*. This is founded on a diminutive bit of stem and two separate spikelets of Nuttall's, named by him "*Bromus* (*Phrenachyris*) *muticus*." Upon the sheet Prof. Thurber had last year noted "*Glyceria bulbosa*, Thurb.," a plant so named by him in the Botany of Wilkes' Expedition, yet unpublished. Whereupon, Mr. Buckley furtively erases the "Thurb." and substitutes "Buckl." If we mistake not, the species has been published under two names already, viz., *Melica poæoides*, Nutt., in Pl. Gamb., &c., and *Melica bulbosa*, Geyer, in Hook. Kew. Jour. Bot. 8, p. 19.

*Glyceria stricta*, if reckoned as a normally pluriflorous grass, is no *Glyceria*, but would be ambiguous between *Uniola* and *Brizopyrum*. We have reason to regard it, however, as an abnormal state of *Vilfa Drummondii*, Trin., which is a form of *V. aspera*, Beauv. In this the paleæ are often elongated in this fashion, (but not nerved, as some of them are in Mr. Buckley's specimen,) and the tendency to develope one or more additional flowers in the spikelet is not rarely manifest.

*Glyceria leptostachya* and *G. microtheca* are both alike, and both Nuttall's MSS. names, which Mr. Buckley has appropriated in the coolest manner writing "Buckl." after the name upon Nuttall's autograph tickets. They belong to a grass, common in Oregon and northward, which differs a little from *G. pallida* of the Northern States, (in the rather broader and shorter florets and shorter and more rounded glumes,) and which already has names enough, being 1862.]

doubtless the *G. pauciflora* of Presl., as it certainly is the *G. spectabilis*, var. *flaccida*, Trin. and Bongard, from Russian America and Kamtschatka; therefore, *G. Norvegica*, according to Ruprecht, *Poa arundinacea*, of Bieberstein (and so *G. arundinacea*, Kunth), according to Grisebach, and *G. remota*, of Fries, on the same authority. But authentic Swedish and Norwegian specimens of *G. remota*, Fries, do not well accord with the N. W. American plant, especially in the glumes.

*Glyceria montana*. Another appropriation of a MSS. name of Nuttall, Could Nuttall complain, however, he should transpose the words of the poet and say, "He that filches my *good name* steals trash;" for the species is "poor indeed." He who so confidently enters upon Nuttall's labors should be competent to discern the patent fact that this *Glyceria montana* of Nuttall's is just the same as his *Poa airoides*, of which the original specimen is preserved in the same sheet. *G. airoides* would be the name, (Steudel's homonym being an *Eragrostis*, as he himself asserts); but Col. Munro reduces it to *G. (Atropis) distans*.

*Poa laxiflora*—the name appropriated from Nuttall, as usual—whatever else it may be, accords with *P. leptocoma*, Trin., from Sitcha. It is probably a woodland form of an old species.

*Poa tenuifolia*—still another of Nuttall's unblushingly appropriated—is a common grass west of the Rocky Mountains, which has much puzzled botanists, and occurs in herbaria and some published lists under several names. It is *Atropis Californica*, Munro, ined. (probably founded on Douglasian specimens, coll. 1833), and exactly the plant so named from Fidalgo Island. But Hartweg's No. 2035, correspondingly named (*Sclerochloa Californica*) seems to be rather different. *Atropis* is equivalent to *Glyceria* sect. *Helechloa*, of which this must be only an ambiguous member.

*Poa densiflora* is *P. arachnifera*, var.  $\beta$ . Torr., in Marcy, Rep. p. 301; a form with the long wool either scanty or almost wanting, except in one old specimen.

*Eragrostis diffusa* is the common *E. Purshii*, Bernh.

*Eragrostis curtipedicellata* (ticketed *brevipedicellata*) is a familiar-looking species, not identified among the published ones—the same as Drummond's 327 of the second collection, and Wright's 772.

*Eragrostis sessilis* is *Leptochloa rigida*, Munro. It is Fendler's 926, and Wright's 760 and 2091.

*Festuca gracilentia* is founded on specimens quite too young and poor to be meddled with. It may be either of three described species, more likely *F. microstachys*, Nutt., which is near *F. bromoides*.

*Festuca reflexa*—another name of Nuttall's appropriated—is *F. microstachys*, var. *divergens*, Torr., probably well referred to that multiform species.

*Festuca pusilla*—boldly appropriated from Nuttall, as usual—accords with No. 2030 of Hartweg's collection, which Col. Munro refers to *Festuca microstachys*, except in its smoothness.

*Bromus breviaristatus*. This is described from a specimen of Nuttall's, named by him "*Bromus parviflorus*," to which Prof. Thurber had appended the note "*Bromus breviaristatus* (*Ceratochloa*, Hook.)" So Mr. Buckley claps his "Buckl." to the ticket, and prints his "new species," sagely adding his mark of doubt to the synonym.

*Bromus virens* is founded on *B. virens*, *nitens* and *Californicus*, of Nuttall, all the same species, and all *Ceratochloa grandiflora*, Hook., as a note of Prof. Thurber's had pointed out; but Mr. Buckley suppresses the clue.

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*Bromus setaceus* is *B. sterilis*, L.; probably introduced.

*Uniola* (*Brizopyrum*) *flexuosa* is *Brizopyrum spicatum*, Hook. and Arn.

*Elymus interruptus*. We cannot quite match this among the various puzzling forms of the genus from Texas.

*Elymus triticoides*—another name furtively appropriated from Nuttall—is a depauperate form of No. 2072, Hartweg, (and nearly of 2072, Wright), named by Col. Munro *E. dasystachys*, Trin., var. *E. condensatus*, Presl.

*Elymus glaucus*—also Nuttall's—appears scarcely, if at all, distinct from *E. Sibiricus*, L.

*Trisetum glabrum* is *Aira danthonioides*, Trin., the same as Hartweg's 2027; new to Texas.

*Trisetum interruptum* is *T. elongatum*, H.B.K.; it is in Lindheimer's and in one of Wright's earlier collections.

*Trisetum canescens* is the more hairy-leaved and striate form of *T. cernuum*, Trin., described from the specimen of "*T. elatum*," Nutt., which name Mr. Buckley has erased from the ticket, for no obvious reason (as the name is a good one), except to give some variety in form to his depredations.

*Hierochloa occidentalis*,—Nuttall's name appropriated as usual—is *H. borealis*, Rœm. & Schult.

Happily Mr. Buckley has spared the *Panicæ* and the *Andropoginæ*; for which, in the interest of all American botanists, I tender him my sincere thanks.

#### Notes upon some REPTILES of the Old World.

BY E. D. COPE.

*Atheris squamatus* Cope.

*Toxicoa squamata* Cope, Proc. Acad. Nat. Sci. Phila., 1859, p. 341.

*Echis squamatus* Hallow.

Professor Jan states\* that Schlegel's *Vipera chlorocelis* (*Toxicoa*, Cope, l. c.) possesses keeled gular scales as in *Tropidolamus*. I find that *Echis squamata* of Hallowell exhibits the same peculiarity. In this respect these species differ from *Echis arenicola* Gray; moreover, they are tree-vipers, having a compressed body, angular gastrosteges and prehensile tails, just as in the American tree-moccasins,—species of *Thamnocenchris*, *Salvin*, and *Teleuraspis*† Cope. They further represent these genera in having uniserial urosteges. The keeled gular scales are found in *Tropidolæmus*, another *Crotalid* genus whose species abound in Malaysia; and *Megæra*, also one of the *Crotalidæ*, is an evident representative in the forests of Ceylon.

A very different type among the *Solenoglypha* (*Viperidæ* Cope) is the family *Atractaspididæ* (*-inæ* Cope.) *Atractaspis* and *Brachycranium* appear to be well defined genera. Whether *Polemon Jan* belongs here, and how it differs from *Atractaspis*, has not been stated. The *Elaps irregularis* Reinhardt, placed by Jan in that genus, and identified by Günther with the *A. inornatus*, is evidently the type of an unnamed genus. It differs from the other genera in its biserial urosteges. From *Homeroselaps Jan*, (*Pæcilophis* Gth., preoccupied among *Apodes*), it differs externally in the two nasal shields. It may be called *Eurystephus*.

\* Rev. Mag. Zool., 1859, No. 12.

† Mr. Falvin speaks of *Teleuraspis* (P. Z. S., 1860, 459), as being cylindrical in form. However this may be with the *T. nitidus*, the *T. schlegelii* has a prehensile tail, and is much compressed.

*Tarbophis* sp. I have seen a specimen of a species of this genus, from Ooroomiah, Persia, which is possibly different from that found in Southern Europe. The head is relatively shorter, the vertical and particularly the occipital plates being less elongate. There are ten upper labials, all narrow and high, the fourth, fifth and sixth bounding the orbit. In Bonaparte's coll. specimen there are eight, eye over third, fourth and fifth as described by Duméril and Günther; the seventh is very minute, the eighth horizontal. There are eleven inferior labials; twelve in the Ooroomiah specimen, which has also three postoculars. Coloration much as in the *vivax*; there is a narrow vertebral line and the belly is very dark.

What this serpent should be named, if requiring it, is uncertain. The plates in Eichwald and Savigny's works resemble it, while the figures of Schlegel, Fleischmann and of the "Voyage dans la Russie Meridionale," etc. are different.

*Natrix leopardina.*

*Callopeltis leopardina*, Fauna Italica.

This species bears considerable resemblance to *Pityophis catenifer*. There seems to be no reason why Laurenti's original name for the *Callopeltis* or *Coluber flavescens* of some authors should not be retained as well as his *Coronella*, *Naja* and *Dipsas*; especially in view of the want of uniformity in the practice of naturalists in the matter. Besides the names above mentioned, the genus has received those of *Scotophis* (Baird et Girard) and *Elaphis* (Hallow. fide Dum.)

It contains the species *longissima* (*Col. flavescens* auct.), *quadrilineata*, *leopardina*, *rufodorsata*, *conspicillata*, *mandarina*, *callicephala*, in the Old World; *quadrivittata*, *gut-tata*, *laeta*, *confinis*, *rhinomega*, *vulpina*, *allegheensis* and perhaps others, in North America.

*Tyria gracilis.*

From Ahmednuggur, India, has been received this species, quite recently described by Dr. Günther as *Zamenis gracilis*. *Tyria* is an older name than *Zamenis*, hence we are compelled to write *Tyria atrovirens*, *T. ventrimaculata*, *T. hippocrepis*, etc. While *Periops* Wagl. is rightly regarded by Günther as a synonym of *Tyria*, Fitzinger's *Chilolepis*, typified by *C. cliffordii*, seems to be a valid genus not generally recognized. The *Coryphodon fasciolatus* of Günther, poorly described by authors, seems to be a *Tyria*, if I have properly identified it. The separate posterior upper maxillary tooth is shorter than usual in the genus.

*Bascanium anthicum.*

Scales in seventeen longitudinal rows. Teeth equal. Head moderately distinct, plane in profile; supercilia prominent, muzzle rounded. Rostral plate much higher than broad, prominent. Seven or eight superior labials, eye over third and fourth or fourth and fifth. Nasals high, loreal oblique, as high as long. Two preoculars, inferior very small, superior not reaching vertical. Two postoculars; two large and two small temporals in contact with occipitals; the latter are rounded, broad, their common suture not so long as the vertical plate. Superciliaries broad; vertical laterally concave; postfrontals longer than prefrontals. Anal divided. Total length 34 inches; of rectus 10 lines; of tail 9 inches 3 lines.

Color black, varied with many yellow scales; which are either single or arranged in irregular spots; beneath yellow. Head brown, with yellowish brown spots which are most distinct on the occipital and labial regions.

The native country of this species is not certainly known; some circumstances lead me to think that it is from Siam. If so, we have another instance of the close similarity of North American and Eastern Asiatic forms. In Siam alone we have a *Plethodon*, and a form scarcely differing from

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*Thamnophis*,—viz.: *Prymniodon*. *Bascanium anthicum* is very nearly allied to *B. constrictor*: the only differences are in the outline of the front—plane in the former, arched in the latter—the more convergent canthus rostrales of the latter, and that of coloration.

*Uriechis nigriceps* Peters, *Homalosoma lutrix*, *Philothamnus semivariatus*, *Bucephalus typus* vars. *B. C. D.*, *Causus rhombeatus* and *Clotho arietans* have been sent to the Academy from Umvoti, Natal, by our correspondent, the Rev. Dr. Grout.

*Contia modesta*.

*Ablabes modestus* Günther.

From Ooroomiah. This species belongs to the same genus as the American *C. episcopa* and *C. mitis*, which principally differs from the *Homalosoma*\* of Africa in a divided anal plate. Perhaps the "*Ablabes*" with two nasal plates belong to a different genus: at all events the name adopted by most herpetologists must give way to Fitzinger's *Lycodonomorphus*, proposed for the *Coronella rufula* long previously.† Fitzinger did not give characters to his genera, on which account they ought to be rejected, were it not that it is impossible for naturalists to arrive at an agreement as to what constitutes a good, sufficient, insufficient, or nul diagnosis. It seems also to be rightly conceded by many, that an author cannot change his own name, if it be not preoccupied or false in signification. Thus, Wagler's *Catostoma* should be retained, though he afterwards altered it to *Geophis* (which I overlooked on a former occasion), as it is sufficiently distinct from *Catostomus*.

*Rhoptrura Peters* has been suspected by me‡ to be identical with *Charina Gray*, on account of the entrance of the style of structure of the plates as described by Dr. Gray, within the extensive range of variation exhibited by the latter genus. Prof. Peters has, however, shown that it does not possess palatine teeth; this character at once separates it from all other *Peropoda*.

*Cryptoblepharus wahlbergii* Smith.

From Umvoti, Southeastern Africa, whence also has been received *Euprepis vittatus* Gray, and a variety which is light olivaceous above; on each side a light band, which is dark-bordered above. Other markings obsolete.

*Gerrhosaurus bibronii* Smith.

Brown bordered. The internasal plate is very transverse, as figured by Wagler in the *flavicularis*, and widely removed from contact with the frontal by the extensive intervention of the contiguous fronto-nasals. Dr. Smith figures the latter as separate, and the former in contact, in both species.

*Mancus macrolepis* Cope.

*Char. gen.*—The same as that of *Chamæsaura*, except in the absence of the anterior pair of extremities. Tongue slightly emarginate at the tip. The animal upon which this genus is established, so closely resembles in generic and specific peculiarities the *Chamæsaura anguina*, that it may be doubted whether it is entitled to the distinction I have proposed for it. The question of the disappearance of organs is one of much interest. Our impression of the importance of a peculiarity as affecting generic or specific rank is derived from consideration of its constancy during the adult age of the animal. That the assumption of generic structural

\* Another genus, which only differs from *Homalosoma* in its more slender tail and diacranterian dentition, is *Cryptodacus*, (*Gundlach*, Monatsb. Akad. Berlin, 1861, 1002.) *C. vittatus* is found in Cuba; it was described in November. In the following February the author introduced it as *Arrhyton bivittatum* (in Proceed. Philada. Acad.) The specimen described wants the dorsal band.

† Proceed. Acad. Nat. Sci. Philada., 1860, p. 256.

‡ L. c., p. 305.

peculiarities\* takes place at very different points in the advance of development of animals as compared with each other, all very well known.† If such change took place only in case of unusually prolonged life of certain individuals, we would have an instance of what we call the undependability of a character which we elsewhere rely on. This method of accounting among higher groups especially, for this phenomenon (with which students of nature are so familiar), may be worthy of being placed side by side with that which looks upon it as a state of transition from a condition of inferior to one of superior adaptation to peculiar circumstances of life,—or with the usual “accidental variation” subterfuge. The number of toes is justly relied on as a safe index to generic groups among Batrachia, Gradientia and Lacertilia, yet in *Amphiuma* its value is very doubtful, and in *Chalcides* it is not only not characteristic of the genus, but fails to be constant in the same species. The difference between a limb scarcely developed and one obliterated, possesses no greater significance than the same case among the digits; the genus *Trichiurus* illustrates this. As regards the absent members in the genus *Mancus*, they first appear (i. e. in *Chamaesaura*) in a condition of comparatively full development. The history of the latter process is, however, necessary in order to determine finally the validity of the separation of the genus which I have proposed.

The position of the two genera is near the *Ecpleopodidae*, as Dr. Gray arranges them. In the *Erpetologie Générale*, *Chamaesaura* is one of the heterogeneous group called *Cyclosaura Ptychopleura*.

*Char. specif.*—Generally as in *Chamaesaura anguina*. The plates of the head are the same; they are elongate, especially the interparietal, which is bounded on each side by two parietals. The scales are large, very acute and strongly keeled, in only twenty-two longitudinal rows on the body, (four less than in *C. anguina*), of which the two dorsal are largest. Thirty-six transverse series from temple to vent. Eight scales border the vent; one femoral pore. Tibia shorter than femur, not terminating in a claw, both covered with keeled scales.

Length of head and body 5 inches 10 lines; of tail 19 inches 9 lines.

General color pale brown, whitish beneath, shaded with coppery above. Two brown bands extend from the occiput on the outer half of each median row and all of the row next exterior, to the end of the tail. A trace of a lateral band is seen on the second and third rows below the dorsal.

This lizard was sent to the Academy of Natural Sciences from Natal, in a collection made by the Rev. Mr. Grout. Other species contained in it were *Chamaeleo dilepis* Leach, *Monitor niloticus* Gray, *Stellio capensis* Dum., and *Agama nigricollis* Smith. In the last it may be noted that the liver-brown variations enclose three light brown rhombic spaces on the dorsal line. General tint above rather dark brown. Fourth toe a trifle longer than third. A strong dorso-lateral dermal fold on each side.

*Lacerta strigata* Eichw.

Regarded by Duméril and Bibron as a variety of *L. viridis*, but believed to be distinct by Gray, Berthold and others. The specimen at my disposal differs from *L. viridis*, from the same region and from Italy, in its relatively smaller head and smaller and more numerous plates of the collar. The temporal shields are quite similar.

*Daactylethra laevis* Gthr.

*Rana ?mascariensis* D. B.

General form slender; head elongate, narrow, muzzle prominent. Distance

\* i. e. Those which illustrate a greater or less advance towards the extreme of divergence of the family series.

† Vide Synopsis of *Holcosus* and *Ameiva*, etc., p. 6.

between external nares and orbit to that between nares and end of snout as three to two. Skin without corrugations, but with numerous elongate longitudinal plicæ. Tympanum half the size of the orbit. Ostia pharyngea not larger than internal nares. Vomerine teeth in nearly transverse series, commencing at the anterior margin of the nares. No vocal vesicles. Second finger little shorter than fourth; terminal phalanges, especially of the toes, acute. One metatarsal tubercle. Web reaching the base of the antepenultimate phalanx of the very long fourth digit; to the penultimate of the others. Length of head and body 1 in. 3 lin.; of posterior extremity 2 in. 1 lin.

Above brown, with a pale median line from the end of the muzzle, and a few darker brown small round spots. Superior labial and frenal regions pale. A dark blotch covers the tympanum. Femora and tibiæ distantly brown-banded. Beneath pure white.

The specimens at my disposal possesses the peculiarity in the form of the terminal phalanges, which is found in the *R. hexadactyla* and *leschenaultii*. The *R. mascariensis* is not recorded as occurring on the African continent.

*Dicroglossus angustirostris* Cope.

Outlines of muzzle convergent at an acute angle; the end obtuse, prominent. Canthus rostralis rounded. Nostrils vertico-lateral. Interorbital space a little wider than palpebra. Tympanum small, one-fourth the size of the eye. Skin of the upper surfaces coarsely tuberculous. End of first finger marking middle of third. Posterior extremities stout; a tarsal and two metatarsal tubercles. Toes half palmate. Tongue oval, obcordate. Ostia pharyngea larger than posterior nares; the latter very anterior. Muzzle to hinder border of tympanum 4 lin.; tympanum to end of coccyx 10 lin.; length of hinder extremity 1 in. 7 lin.

General color dark brown, hinder extremities and labial regions varied with darker. Below white, a large brown pectoral and several small labial spots. Groin pale, brown spotted.

*Dicroglossus a dolfi* Gthr., the other known species of the genus, is Himalayan. The discovery of the present species extends the range of the genus so as to coincide with that of *Tomopterna*, Bibr.

*Chilophryne dialopha* Cope.

Head broad; muzzle prominent, conic. Cranium strongly ridged. Pre- and postocular, supratympanic, and superciliary ridges well developed, the last making a very open angle with that of the canthus rostralis, and sending off posteriorly a parietal, which first converges toward that opposite, and then runs transversely on the occiput to meet it; failing in this by a very slight interval. A small nuchal pit. Tympanum in contact with postorbital ridge, only one-fourth the size of the orbit. Tongue small, narrow, half free; a strong symphyseal tubercle fitting a premaxillary pit. Paratoids large, short, subtriangular, lateral. Skin everywhere rigidly rugose, subspinous on the tarsus. The joints of the extremities are pale and appear swollen. Fingers slender; first shorter than second, which equals the third. One metacarpal tubercle only. Toes short, one-third webbed; two acute metatarsal tubercles, the internal large, incurved, like a flattened spur, yellow, brown tipped. Length of head and body 10 lines; of hinder extremity 12 lines. Above dark brown, with a pale vertebral band, on either side of which are two blackish dorsal spots, one temporal and one on the canthus rostralis. A black band from orbit to angle of mouth. Beneath light brown, blackish shaded.

This very distinct species is said to have been brought from the Sandwich Islands by the American zoologist, John K. Townsend. Museum Academy, Philada.

*Hyperolius horstoeckii* Gthr. and *H. marmoratus* Rapp, have been obtained at Umvoti in Natal by the Rev. Dr. Grout.

1862.]

**Hyperolius concolor.**

*Ixalus concolor* Hallow., Pr. A. N. S. Philada., 1857, p. 72.

Head of medium size, as long as broad; muzzle not projecting, canthus rostralis straight, loreal region not concave. Tympanum concealed. Tongue large, broadly obpyriform, deeply emarginate. Fingers scarcely palmate, two terminal phalanges of fourth toe free. No tubercles or folds on the upper surfaces. Length of head and body 1 inch 6 lines; of hinder extremity 2 inches. Above dark brown; the brachium and femur similar to the back. No spots or bands. Below brownish white.

This species does not appear to have been described by Dr. Hallowell. Western Africa is its native country.

**Hyperolius cinetiventris** Cope.

Head quite broad; muzzle truncate; canthus rostralis concave. Frontal region broad, convex; eyes not very prominent. Tympanum concealed; tongue elongate broad and extensively notched posteriorly. Fingers one-fourth, toes half webbed. All the inferior surfaces except the gular, granulate, the median abdominal most coarsely. A strong postgular fold; another surrounds the median abdominal region, including an acute angle at the pubic region. A temporo-crural fold. Skin of upper surfaces with distant small tubercles. Length of head and body nine lines. Light yellowish brown above; a narrow brown line through the eye. Entire femur and under surfaces of extremities, also the annular space between the abdomen and the lateral and gular folds, black.

**Hyperolius spinifrons** Cope.

Tympanum concealed; head not broad, muzzle rounded; canthus rostralis rounded, swollen; nostrils anterior; profile continuous to lip. Tongue elliptic, deeply nicked; inner nares widely separated. Skin of upper surfaces smooth, except upon the front and muzzle, where it is studded with acute tubercles as in the cyprinid genera *Ceratichthys*, etc. Digits slightly palmate. Appressed femur scarcely exceeding elbow. Length of head and body one inch. Beneath brownish yellow; above yellowish brown, with a dark brown lateral band between the eye and groin, which is pale bordered anteriorly; also a median band which commences between the eyes, and becomes wider and more indistinct posteriorly. Extremities brown, immaculate; femur not paler than tibia; brachium yellow all round at axilla.

**Hyperolius sugillatus** Cope.

Tympanum concealed. Head very broad, eyelids not much developed; outlines of muzzle convergent, truncate; profile of its extremity vertical. Tongue rounded, broadly emarginate; ostia pharyngea well developed. Brachium very short; fingers slightly, toes three-fifths, webbed. Hinder extremities long; appressed femur reaching much beyond elbow. Skin above weakly corrugated. Length of head and body one inch. Belly yellow; above straw color, a yellow band extending from end of muzzle to sacral region; it is bounded beneath on the muzzle by a purple line; there is also a purple spot upon each eyelid, (whence the name.)

The four species of *Hyperolius* here described as new, and the *Crumenifera pusilla*, formed part of the very valuable collection made by Mr. Grout at Umvoti.

**Hyperolius coccotis** Cope.

Muzzle prominent, subacute, canthus rostralis nearly straight. Frontal space more than twice the breadth of a palpebra. Tongue as broad as long, roundly emarginate. Ostia pharyngea smaller than posterior nares; tympanum concealed. Skin of the upper surfaces smooth. A supra-axillary fold. Coarse granulations posterior to orbit and round canthus of mouth; abdomen

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and femora coarsely areolated. Fingers one-fourth, toes more than half webbed. Length of head and body 1 in. 5 lin.; of hinder extremity 1 in. 9 lin. Above greenish blue, darkest on the head; beneath yellowish.

*Crumenifera pusilla* Cope.

Fam. Polypedatidæ: characters those of *Hyperolius*, except in the presence of a large vocal vesicle, which is prolonged posteriorly and bound beneath by a median frenum, on each side of which a plicate pouch projects deeply into the vesicular cavity.

Head small, muzzle short, truncate; canthus rostralis concave. Tympanum concealed. Tongue obovate, extensively free and deeply notched. Skin above smooth; of the abdomen transversely areolate; of the femora smooth. Fingers one-fourth, toes three-fourths webbed. Many granulations about the angle of the mouth. Length of head and body 10 lines; of hinder extremity 14 lines. Color (in alcohol) pale straw color; a faint brown line on the canthus rostralis.

It may be mentioned in this connection, that the genus *Heteroglossa* of Hallowell is a Polypedatid, not a Ranid as has been hitherto supposed. The statement regarding mandibular teeth, "nine in the lower jaw," should be read "none in the lower jaw." It differs from *Hyperolius* in the less development of the digital expansions and greater tenuity of the median attachment of the tongue.

*Neurergus crocatus* Cope.

Of the family Salamandridæ of the British Museum Catalogue,\* and subfamily Tritoninæ (*Pleurodelidæ* Gray, Proc. Zool. Soc., 1858, 137), and second section, where the fronto-temporal arch is replaced by a ligament. There is a line of pores on the inferior lateral region; paratoids present, small; skin rough; tail much compressed; tongue free laterally and posteriorly.

This genus resembles *Hemisalamandra* (*Duges* not *Cope*; *Pyronicia* Gray part.) in every particular except the form of the tongue; in this it is similar to *Euproctus* and *Glossoliga*; it has not the fronto-temporal arch of these, nor the os quadrato-jugale of the latter. *Lissotriton* differs in wanting paratoids. The head is depressed as in *Salamandra maculosa*, but the muzzle is more rounded, as in *Amblystoma*. The eyelids are slightly developed. The palatine teeth are in two widely divergent series, whose angle of convergence is opposite to the posterior borders of the interior nares. The latter are widely separated. The skin of the sides is rather corrugated. The digits are all depressed, without fringe and rather elongate; the third and fourth posterior are equal. The anterior extremity appressed, extends to the heel of the ap-

\* The system adopted by Dr. Gray in the work alluded to, is evidently the true one. The separation of the Spelerpine from the Amblystomidæ as a group of equal rank with it, as proposed by the author of the present notice, is unnatural. Dr. Gray's later arrangement of the Salamandridæ (*Salamandrinæ* Cope) supplies a great desideratum, which the author attempted later and in ignorance of the memoir of the English savant.

On reviewing my former work in connection with the new light furnished by Dr. Gray, the following seems to be the nearest approximation to truth to which I can arrive at present:

Tritoninæ (*Tritones* Cope, *Pleurodelidæ* Gray.) Genera *Pleurodeles*, *Glossoliga*, *Notophthalma* (this genus I now believe to be distinct from the next), *Cynops* (incl. *Taricha* Gray), *Euproctus* (incl. *Calotriton* Gray), *Lophinus* Raf. (incl. *Ommatotriton* Gray, equivalent to *Triton*, *Ommatotriton* Cope, exclus. *T. alpestris*), *Lissotriton* (wants the paratoids of *Hemisalamandra*; is not characterized by the freedom of the tongue posteriorly; \* includes *Hemitriton* Duges, Gray, *alpestris*, in which I find a lateral line of pores,†) *Neurergus*, *Hemisalamandra* (*Triton* † *Triton* Cope, *Pyronicia* Gray), *Triton* (*Hemisalamandra* Cope): ten genera.

\* As stated Proc. Acad. Nat. Sci., 1859, p. 127.

† In specimens labelled by Bonaparte; they are stated by Dr. Gray to be wanting.

pressed hinder limb. Soles smooth; tarsus very broad. Tail longer than head and body, not much elevated, compressed, subcylindrical at base: a slight rudiment of a crest. Total length 6 inches 6 lines; of tail 3 inches 6 lines.

General color above brownish black; this is everywhere relieved by large oval yellow spots; of the latter those on the inferior lateral region are more or less confluent with the deep saffron of the abdomen. Chin and median line of tail beneath rather paler than belly.

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The following verbal communication should have been inserted under date of August 5th:

Mr. Cope called attention to a curious Cuban Bufonid (*Peltaphyrne empusa*) for the possession of which the Academy was indebted to Professor Philippe Poey of Havana. The genus, which had not been previously characterized, differed from *Bufo* and *Chilophyrne* as did *Trachycephalus* from *Hyla* among tree-toads; *i. e.* in the dermo-osseous coating of the head. Thus two of the predominant genera of the regio neotropica are represented in this insular portion of it by types differing from them in the same manner. The continental portion of the region is known to abound in forms characterized by peculiar dermo-ossifications. Such are its Batrachian genera *Calyptocephalus*, *Brachycephalus*, *Ceratophrys*, *Phrynocerus*; its *Alligatoridæ*, its *Goniodontidæ*, and shielded *Nematognathi*.

In *P. empusa* the ossification was more extensive than in *P. peltoccephala*, and in one respect was farther developed than in the genera *Phrynocerus* and *Ceratophrys*; inasmuch as a broad bridge connected the mastoid and quadrato-jugal regions, extending posterior to the tympanum. The covering-in of the maxillo-quadrato sinus was a degree of ossification in both species of *Peltaphyrne* not observed in the two genera mentioned; nor did it possess the (?) crotaphite foramen exhibited by them. Externally in the latter region the dermo-ossification was like that of *Ceratophrys dorsata*, and less extensive than in *Phrynocerus testudiniceps*.

The prominence of the superior labial border, and other points of physiognomy, produced a peculiar grotesqueness in the expression of the animal, which suggested the trivial name. The following diagnosis was offered:

Supraorbital ridges very prominent, not crenate, presenting a posterior process. Postorbital and supra-tympanic processes prominent, obtuse; preorbital straight, more acute. Canthus rostrales acute, converging so as to produce a very acute angle; their profile very declive, that of the muzzle more so, but not perpendicular. Maxillary region oblique from a front view; the labial border forming a prominent rim, which is thickened and everted posteriorly. Two occipital knobs on each side. Tympanum small, one-fourth or one-third the length of the palpebral border in diameter. Paratoid gland small, rounded, lateral, studded with warts; the dorsal region is similarly studded, most abundantly anteriorly. Sides, extremities and gular region covered with smaller warts; belly areolate. One large oval flat metacarpal tubercle; a large one at the base of the interior digit. Two metatarsal tubercles; the interior most elongate and acute, blackish brown. A short, thickened, internal tarsal fold. Toes half-webbed, palm slightly rugose.

Length from end of muzzle to tympanum 11 lines; of antebrachium and hand, 14.5 lines; axilla to vent, 2 inches; vent to end of fourth toe, 3 inches 1 line.

The head is brown; color elsewhere brownish yellow; on the nape and sides marbled with deep brown, somewhat oblique-longitudinally on the latter region. Limbs cross-banded with brown.

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*Sept. 2d.*

MR. CASSIN in the Chair.

Ten members present.

The following papers were presented for publication :

Additions to the Nomenclature of North American Lepidoptera,  
No. 2. By Aug. R. Grote.

Descriptions of Fossils from the Marshall and Huron Groups of  
Michigan. By Alex. Winchell.

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*Sept. 9th.*

MR. CASSIN in the Chair.

Fifteen members present.

The following papers were presented for publication :

Catalogues of the Reptiles obtained during the Explorations of the  
Paraguay, Vermejo and Uruguay Rivers, by Capt. T. J. Page, U. S. N.,  
and of those procured by Lieut. N. Michler, U. S. Top. Eng., Com-  
mander of the Expedition conducting the Survey of the Atrato River.  
By E. D. Cope.

Supplementary note to a Synopsis of N. American Colymbidæ, &c.  
By Elliott Coues.

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*Sept. 16th.*

MR. CASSIN in the Chair.

Ten members present.

The following papers were presented for publication :

Synopsis of the Carangoids of the Eastern Coast of North America.  
By Theo. Gill.

Description of a new generic type of Mormyroids, &c. By Theo. Gill.

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*Sept. 23d.*

Vice-President Bridges in the Chair.

Seventeen members present.

The following papers were presented for publication :

Monograph of the family Teredidæ. Notes on American fresh water  
Shells, &c. Description of a new Genus and Species of Pholadidæ.  
By Geo. W. Tryon, jr.

Remarks on the species comprising the genus *Pediocætes*. By D.  
G. Elliott.

On the synonymy and systematic position of the Genus *Etelis*. By  
Theo. Gill.

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*Sept. 30th.*

DR. BRIDGES, Vice-President, in the Chair.

Fifteen members present.

On report of the respective Committees, the following papers were  
ordered to be published in the Proceedings :

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Catalogues of the REPTILES obtained during the Explorations of the Parana, Paraguay, Vermejo and Uruguay Rivers, by Capt. Thos. J. Page, U. S. N.; and of those procured by Lieut. N. Michler, U. S. Top. Eng., Commander of the Expedition conducting the Survey of the Atrato River.

BY E. D. COPE.

### *I. The Paraguay Collection.*

The expedition commanded by Captain Page, was sent out by the United States Government, during the administration of President Fillmore, in the year 1853. It ascended the Parana river, to the mouth of the Paraguay; which stream it explored as far north as Curumba, in Brazil, lat. 19° S. Among the most important points at which observations and collections were made, were La Paz, Corrientes, Abulquerque, and Fort Coimbra, in the Argentine Confederation, and Assuncion and Salvador, in Paraguay. On the return voyage, an expedition ascended the Vermejo River, one hundred and twenty miles. A land expedition across the Paraguayan territory was also made, which reached the banks of the Parana near the island of Iquibe.

Capt. Page subsequently left Buenos Ayres for Santiago and Tucuman, by an overland route; from which point he descended the Salado, to Monte de la Cueva de Lobo. Previous to this, he had ascended the Uruguay River to the Salto Grande, lat. 31° 15' S. In 1858, another and less extensive expedition left the United States for the La Plata and confluent waters. On this occasion, the vessel commanded by Capt. Page, was the *Argentina*, vice the *Water Witch*, which had conveyed the first expeditions.

The zoological collections made by the naturalists accompanying the expeditions, are extensive and valuable. Partial investigations among them have been made, and recorded in appendices to Capt. Page's narrative and statistical work, "*La Plata, the Argentine Confederation and Paraguay*," New York, 1859. Attention is called to some remarks by Dr. Girard, of Washington, on the fish and reptiles, at p. 602.

Fifty-nine species of reptiles were obtained; with these and others, we know about seventy species, a sufficient number from which to deduce most of the distinctive features of the reptile fauna of the Paraguay and Parana basins: as yet we can obtain but little clue to the extent of its zoological limits.

Of the seventy species, eighteen (marked (Braz.) in the catalogue) are identical with those of the regions drained by the tributaries of the Amazon, and by the eastern Brazilian coast streams. But three are found in the Chilian district. At least forty have not been discovered out of the region in question. Of these, nineteen are represented by nearly allied species in the Brazilian district; five find their closest representatives west of the Andes. The following genera, so far as is known, are peculiar: *Phyllosira*, *Phimophis*; *Teius*, *Scartiscus*; *Lysapsus*, *Pyxicephalus*, *Phryniscus*, *Scytotis*. *Heterodon* does not occur in any other section of the regio neotropica. We miss the more æquatorial types *Catostoma*, *Rhinostoma*, *Tantilla*, *Spilotes*, *Herpetodryas*, *Dryophis*, *Dipsas*, *Olisthenes*, *Brachyrhynchus*, etc.

Of the species brought home by the expedition, twenty-five had not been previously known to zoologists. Four of these represent types of genera new to the system, viz.: one ophidian, one lacertilian and two batrachian.

The preservation of the specimens composing the collections, was under the immediate care of Mr. Christopher Wood of Philadelphia.

#### TESTUDINATA.

*Hydraspis hilaيري Gray.* Dum. Bibr., *Erp. Gen.*, ii. 429. (Braz.)

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## OPHIDIA.

*Caudisona terrifica* Laur. Cope in Mitchell's Resear. on Venom of Rattlesnake, p. 120. No. 5783. (Braz.)

*Bothrops alternatus* Dum. Bibr., Erp. Gen., vii. p. 1512. No. 5822.

*Bothrops diporus* Cope.

Second superior labial as in *B. alternatus*, not forming the anterior boundary of the fossette, and in contact with small scales below and behind the nasals. Superior labials eight; suture between third and fourth, a little behind anterior margin of orbit. Scales of vertex strongly keeled; lowest row of temporals smooth. Superior margin of rostral one-third the length of inferior; superolateral margins very concave. Muzzle a little depressed in profile; canthus rostralis strongly pronounced, not acute. Scales in twenty-five rows, strongly biporous. Caudal horn elongate. Gastrosteges 168, urosteges 50. Length of head and body 36 inches; of tail, 5 inches 6 lines. Ground-color yellowish brown, with numerous deep brown black-bordered triangular spots, sometimes alternating, sometimes confluent at their apices. On the sides their bases appear as though cut off by a longitudinal band of the ground-color, and the middle portions of them obliterated; a general cruciform outline often results when the confluence of the apices is complete. A longitudinal spot on each side of the nape and occiput, a round one on each parietal region, and one on the muzzle; all obscured in old specimens. A black band from orbit crossing upper parts of posterior superior labials. Beneath yellowish, punctulated with brown. Dark brown spots on the ends of the gastrosteges. From the Vermejo River region. No. 5401.

*Elaps frontalis* Dum. Bibr., l. c. vii. p. 1223.

Frontals pale bordered, or a pale band across postfrontals (var. *balio-coryphus*.) (Braz.)

*Elaps altirostris* Cope, Pr. A. N. S. Philada., 1859, p. 345.

The native country of this species is now first ascertained. It is readily distinguishable by its rather elevated front and elevated labial shield. The gular region is almost entirely black. No. 5346.

*Elaps pyrrochryptus* Cope.

Rings in threes—six triads on the body and one on the tail in the specimen described; the red interspaces are a little longer than the middle black ring; the scales which they involve are so broadly tipped with black as to obscure (in one place completely) the red ground. Middle black ring twice as wide as outer black ring; the latter twice as wide as the inclosed yellow ring. Neck to occipital plates covered by a red space. Head black, the frontals narrowly, the labials broadly margined with yellow or red. Gular region light, inferior labials margined with black. Rings complete on the belly. Head depressed; muzzle obtuse, short. Rostral plate broader than high; postnasal smaller than prenasal, well in contact with preocular. Lateral, occipital and frontal borders of vertical equal. Total length. No. 5395.

This species is allied to *E. melanogenys* and *maregravii*.

*Cochliophagus inaequifasciatus* Dum. Bibr., Erp. Gen., vii. p. 480.

The genus *Cochliophagus* differs from *Dipsas* (*Leptognathus*, Gthr.) in the absence of a larger vertebral series of scales, and in the compression of the head posteriorly. The maxillary bones exhibit a rudiment of the horizontal wing, so developed in *Dipsas*. The native country of the only species has been supposed to be Brazil, by Duméril and Bibron. No. 5815.

*Oxyrhopus trigeminus* Dum. Bibr., viii. p. 1013, No. 5818. (Braz.)

*Phimophis guerini* Cope, Pr. A. N. S. Philada., 1860, p. 79, Dum. Bibr., vii. p. 991.

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*Thamnodynastes nattereri* Wagler, Dum. Bibr., vii. p. 1149. (Braz.)

This species was taken swimming in the river, near Assuncion. Its aspect is not very dipsadine; perhaps it should be removed, with the *Phrynonax lunulatus*,\* to the neighborhood of *Hypsirhynchus* and *Tomodon*. Boie more nearly expressed its affinities in calling it a *Tropidonotus* than others have who denominate it *Dipsas*.

*Xenodon ?severus* Boie, Erp. Gen., vii. 756. Nos. 5798-9. (Braz.)

*Heterodon d'orbignyi* Dum. Bibr., l. c. vii. 772. No. 5808.

*Helicops lepieurii* Dum. Bibr., l. c. vii. 750. Günther, Ann. M. N. H., 1861, p. 427. No. 5400. (Braz.)

*Dimades plicatilis* Gray, Dum. Bibr., l. c. vii. 344. No. 5802. (Braz.)

*Opheomorphus meremii* Fitz.

Var. *semiaureus* Cope, of a yellowish brown, the scales and head plates without black borders. Abdomen yellow, gastrosteges dark-bordered posteriorly; gular and labial regions bright yellow. No. 4665.

*Opheomorphus doliatus* Cope, Synopsis Holcosus and Ameiva, &c. 15.

*Liophis doliatus* Reinhardt, Herpetologiske Meddelelser, p. 14.

Scales in nineteen rows. Var. *sublineatus* Cope, Proc. Acad. Nat. Sci. Philada., 1860, 252. No. 4666. Var. *cæsius* Cope. Light leaden brown, the scales black bordered; temporal regions black; head plates black bordered. Short irregular transverse brown lines on the dirty white abdomen. Superior labials white. Trace of a lateral black band on posterior part of body and tail. Santa Fe. No. 5393.

This serpent looks as though intermediate between the var. *sublineatus* and *O. meremii* of Brazil, and *Liophis subfasciatus*. Close resemblance may be traced between the var. *sublineatus* and *Lygophis rutilus*. These species of the genus *Liophis* as formerly understood, are in a very interesting condition—somewhat better defined than the forms of *Herpetodryas*, and more as in *Xenodon*, *Thamnophis* and *Oxyrhopus*. Careful observation of such species must be of the greatest value in the demonstration of the more difficult problems of natural science.

*Liophis subfasciatus* Cope, Synopsis Holcosus and Ameiva, &c., p. 17. No. 6310, 5809-4-3.

*Lygophis rutilus* Cope, l. c. p. 20. Buenos Ayres. No. 5397.

*Lygophis flavifrenatus* Cope, l. c. p. 20. No. 5398.

*Lygophis dilepis* Cope, l. c. p. 21. No. 5861.

*Lygophis lineatus* Fitz, Dum. Bibr., Erp. Gen., vii. p. 655. Nos. 5810, 6088. (Braz.)

*Pseudophis schottii* Fitz, Dum. Bibr., l. c. vii. p. 1118. (Braz.)

A large specimen of this species (No. 5801) measures sixty-seven English inches. A second species of *Pseudophis* is the *P. patagoniensis*—*Callichinus* of Girard.

*Philodryas aestivus* Gthr., Dum. Bibr., vii. p. 1111. No. 5812. (Braz.)

*Philodryas latirostris* Cope, Synopsis of Holcosus and Ameiva, &c., p. 13.

The preocular plates do not always reach the vertical in this species. Scale pores single. Nos. 5364, 5811.

\* *Tropidodipsas lunulata* Cope, Pr. A. N. S. Philada., 1860, p. 517, exhibits a union of the peculiarities of tree and water snakes, and is the type of the genus *Phrynonax*, Cope. The body is rather short, much compressed; a few median rows of scales weakly keeled. Anal plate entire. Scales biporous. Head distinct, broad, muzzle rounded. Two nasals, one loreal, one preocular. Eye large, pupil round. Dentition isodont. Allied to *Hypsirhynchus*. Differs from *Spilotes* in the long slender tail and broad depressed muzzle.

*Phyllosira flavescens* Cope.

*Char. gen.*—Subfam. Athætullinæ. Dentition syncranterian. Two nasals, one loreal and preocular. Body cylindrical. Scales in subtransverse series, with two larger median dorsal rows, which alone are keeled. *Postabdominal scutellum entire*. Pupil round.

*Char. specif.*—Scales in ten longitudinal series. Eight superior labials, eye over fourth and fifth; two postoculars. Two large, one small temporal. Lateral borders of vertical slightly concave, not touching preocular; prefrontals as long as postfrontals; rostral as high as broad. Front slightly convex. Length of head 9 lines; of body 17 inches 5 lines; tail mutilated. Color yellowish brown anteriorly, posteriorly brownish yellow. Below yellow. No. 5813.

This genus is nearly allied to *Athætulla*. The species seems to bear some resemblance to Schlegel's *Dendrophis auratus*.

*Thrasops marginatus* Cope.

Eight superior labials, eye over the fourth and fifth. Three large temporals. Preocular sometimes in contact with vertical. Two postoculars; loreal none; postnasal no longer than prenasal; its posterior border vertical, as long as its frontal. Scales in fifteen longitudinal rows, all keeled but the inferior; tail scales smooth. Angulation of abdominal shields weak. Length of rectus 1 inch; of head and body 33 inches 9 lines; of tail 16 inches 9 lines.

General color greenish straw color; the scales with their margins and keels brown. Median dorsal region bluish green; head dark green, the plates margined with black; labials pale, not margined. No. 4667.

This species resembles the *occidentalis* in the scutellation of the head; that species differs in its uniform bright green color, and fewer keeled scales. The *athætulla* exhibits two longitudinal blue bands, more numerous superior labials, and a more elongate nasal shield.

*Pseudolaps pantherinus* Fitz., Dum. Bibr., vii. p. 181. No. 5796. (Braz.)

*Erythrolamprus venustissimus* Boie, Dum. Bibr., vii. p. 851. No. 5862. (Braz.)

*Phalotris tricolor* Cope, Pr. A. N. S. Philada., 1861, p. 524, Dum. Bibr., vii. p. 837. No. 5816.

*Epicrates crassus* Cope.

Scales in thirty-nine longitudinal rows. Head short, wedge-shaped, muzzle rather narrow; superior labials twelve, sixth and seventh entering orbit. Head plates as in *E. cenchria*. General form thick and short. Tail less than one-eighth of total length; the latter 36 inches 6 lines; length of head 1 inch 5 lines.

General color leather brown; three rows of darker spots on each side, the inferior broken up, the superior bordered with whitish above on the thirteenth row of scales. These borders uniting form a band on the anterior third of the body, immediately above a brown band formed by the confluent spots. About thirty-four distinct pale oval spots on each side the vertebral line, sometimes confluent with those of the opposite side; they form a longitudinal band on the nape. A median and two temporal brown bands on the head. Cadosa, Parana River. (Sm. No. 5409.)

The number of species of *Epicrates* without subocular plates is perhaps a matter of uncertainty. The specimens of *E. cenchria* (as figured by Prince Neuwied), which I have seen, have the seventh and eighth superior labials entering the orbital rim. So has the *E. maurus*, according to Dr. Gray, who states that it is further characterized by a very elongate ninth. There is a common brown species, of which I have seen none but adult specimens, procured in Trinidad, Venezuela, and Panama, in which the eye rests upon the sixth and seventh superior labials; occasional traces of lateral and dorsal  
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spots may be observed on some of them. These agree in all points of squamation with the specimens often seen, which exhibit pale dorsal and numerous lateral spots and a lateral stripe. This is var. A of *Ep. cenchria* of Dr. Gray. I have seen only young specimens of this, though the author just mentioned enumerates "an adult stuffed." Can it to be the young of the brown species above mentioned? Perhaps it is the *Boa lateristriga* of Boie, but that species does not appear to have been described. No doubt there are other names applicable to it. The *E. crassus* resembles it in point of labial plates and coloration, but differs from it and the *cenchria* in having ten rows of scales fewer. This is the most important peculiarity, it may be noted, which characterizes the *Eunectes notaeus* of the same region.

*Eunectes notaeus* Cope, Synopsis Holcosus and Ameiva, &c., p. 10. No. 4707. Taken in the Paraguay River about thirty miles south of Fort Coimbra, Brazil, near lat. 20° S.

*Stenostoma melanotermia* Cope.

Scales in fourteen rows. Tail five or six times the breadth of the head in length; anal plate large. Eye large; postnasal elevated to its line of position, widely separate from the comparatively broad superciliary. Rostral narrow; prenasal and fronto-nasal separate. Parietals and postparietals well developed, narrow. General color pale reddish white, with fourteen longitudinal chestnut brown bands, one on each series of scales. Head and tip of tail black.

I have compared this species with *S. albifrons*, from Trinidad, where the nasal and superciliary are in contact. If d'Orbigny's figure is correct, the *S. albifrons* from Buenos Ayres is another species, having a broad rostral plate and separate postnasal and superciliary.

The *melanotermia* was taken at Corrientes. No. 5406.

#### AMPHISBÆNIA.

*Amphisbæna camura* Cope.

Body thick, short; tail short, obtuse, with sixteen rings. Preanal plates ten, longer than broad; preanal pores four. Muzzle abruptly contracted, short, higher than broad; swollen arched in profile. Rostral plate five-sided; naso-rostrals nearly transversely parallelogrammic; frontonaso-rostrals nearly as broad as long; occipitals rounded anteriorly and posteriorly. Labials four, three; high. Eye in the superior angle of the ocular, which is acute anteriorly, and bounded behind by three segments of the first annulus. Mental plate nearly as broad as long. Length of head and body 15 inches; of tail, 2 inches 6 lines. Head and upper parts of body and tail brown; below, and a broad collar, yellow. No. 5860.

This species is most nearly related to *A. angustifrons*, from Buenos Ayres. The head and plates are relatively much shorter and more obtuse; there is one more labial; the yellow collar is not seen in the latter.

#### LACERTILIA.

*Ophiodes striatus* Wagl., Dum. Bibr., v. 789.

*Ophiodes* exhibits the peculiar structure of the scales and tongue characteristic of the *Diploglossinae*, as stated to exist in *Panolopus*, &c., by the author in a previous memoir.\* It evidently succeeds the latter genus in the system. No. 5819. (Braz.)

*Emœa frenata* Cope, Pr. A. N. S. Philada., 1862, p. 187.

*Mabuia dorsivittata* Cope.

A species to be contrasted with the *surinamensis* in the author's table

\* Pr. A. N. S. Philada., 1862, p. 188.



of species of *Mabuia*.\* The size is much less. Eight superior labials, eye over sixth; seven inferior. Supranasals separating rostral from internasal; the latter is nearly twice as broad as long, and is extensively in contact with the frontal. Fronto-nasals small, transverse. Frontal pentagonal cuneiform; its longest side bounded by first supraorbital only; of the latter there are three. Fronto parietals large, interparietals broad; postoccipitals present. Ear without lobes; thirty longitudinal rows of scales; six preanal scales. A few calcarian tubercles. From muzzle to ear-orifice 5 lines; from ear to vent 1 inch 6 lines. Vent to end of tail 3 inches 9 lines.

*Color*.—Below greenish white. Sides (six and a half rows of scales wide) brownish black, traversed by two longitudinal white lines, one from the muzzle and one from the lip, two and two half rows of scales apart. Dorsal region brown for a width of only two and two half rows of scales, divided by a narrow median blackish line from nape to rump. Head brown above. Tail brown, with the lateral bands continued. (No. 5405.)

*Teius viridis* Merr., Dum. Bibr., Erp. Gen., v. 143. Nos. 4399-5856.

*Ameiva surinamensis* Gray, Cope, Synopsis Holcosus and Ameiva, &c., p. 8. (Braz.)

*Tupinambis teguexin*? Dum. Bibr., x. p. 85. No. 4708. (Braz.)

*Ortholæmus fitzroyi* Girard, U. S. Expl. Exped., p. 373. No. 5853.

*Taraguiria torquata* Gray, Dum. Bibr., iv. p. 344. No. 5897. (Braz.)

*Microlophus spinulosus* Cope.

This species differs from the *peruvianus* in possessing three rows of scales anterior to that which is homologous with the internasal, instead of two; the anterior two are entirely transverse, and composed of four scales each; the posterior of two large ones. Two parietals, narrower than interparietal. Supraorbitals short, separated by two rows of scales from the superciliary series. Supraorbital margin thickened posteriorly. Two rows above the labials, and two series of loreals. Temporals spinulose. Infralabials longitudinal. A group of tubercles on anterior margin of ear; other groups on the neck folds. Scales of sides as large as the abdominal. Inguinal and axillary scales, and those of the extremities, especially of the posterior face of the femur, with their keels prolonged into recurved spines. Crest scales twice as high as long, thickened on the nape. Palatine teeth present. Length from muzzle to neck fold 1 inch 6 lines; neck fold to vent 4 inches 3 lines; vent to end of tail 6 inches 6 lines; of anterior extremity 2 inches; posterior extremity 2 inches 10 lines. General color bright olivaceous, with indistinct brown variations; extremities narrowly brown barred. (No. 5956.)

*Scartiscus caducus* Cope, Pr. A. N. S. Philada., 1862, p. 182. No. 5852.

*Polychrus anomalus* Wiegman, Dum. Bibr., iv. 69.

#### BATRACHIA.

*Lysapsus limellum* Cope, Pr. A. N. S. Philada., 1862, p. 157. From the Curumba River.

The genus *Lysapsus* is very nearly allied to *Pseudis*, and can scarcely be placed in another family. Renewed examination shows, as before, that the sacral diapophyses are dilated, and the digital expansions as large as those of *Acris*, and more developed than in *Pseudacris*. A difficulty in distinguishing between *Oxydactyl* and *Platydictyl* groups of *Opisthogloss* *Anura* has been experienced by some zoologists, and to the author it seems that such a primary division cannot be maintained. It is not impossible that certain genera

\* Pr. A. N. S. Philada., 1862. *M. (Riopa) albipunctata* Gray, Am. M. N. H. xvii. 430. was omitted from the list.  
1862.]

may embrace species with dilated and undilated digits, *e. g.* *Lithodytes*, Fitz. In Prof. Peters' genus *Plectromantis* those of the hinder extremity only, are furnished with discs. The distinguished herpetologist, Baird, has developed\* an important peculiarity of most *Platydactyla* or *Hylaformia*, † viz: the syndesmosis of the external pair of metatarsal bones (called by mel. c. basal phalanges.) This, however, exists in the *Cystignathidæ* among *Oxydactyla*. This author also employs the areolation of the abdominal integument, but Duméril has mentioned the existence of exceptions to this rule; such are species of *Hylodes*, *Elosia* and *Hylarana*; so were *Lysapsus*, if its digital expansions be regarded of primary value. Neglecting the latter point, the genus just mentioned would fall into the *Discoglossidæ* of Günther. The propriety of such a separation from *Pseudis* is very questionable, for the value of difference in the form of the sacral diapophyses is reduced to its minimum in view of the existence of a *P. mantidactyla*, from Buenos Ayres, which I describe as follows. It will be seen that it bears much resemblance to the *L. limellum*:

General form that of *P. paradoxa*. Two vocal vesicles. Tympanum nearly as large as eye. Skin of back smooth, pustulous, most so posteriorly. Skin of tibia and foot minutely roughened; several rows of acute rugosities on the former. One acute cuneiform tubercle. Skin beneath entirely smooth. Tips of toes very slightly dilated, brown. Above uniform light brown. A yellowish band from axilla to femur; another above it on the lumbar region. Femora cross-banded with brown above and with three longitudinal brown bands on their posterior face. A light band on the posterior face of the brachium. The sacral diapophyses are cylindrical. Length of head and body 1 inch 6 lines; tarsus to end of longest toe 1 inch 2 lines; tibia and femur 1 inch 5 lines. Mus. Acad., Philada.

*Pyxicephalus* — ? n. sp.

Vomerine teeth in two elevated fasciculi opposite the posterior border of the internal nares. Ostia pharyngea smaller than nares. Tongue oval, scarcely emarginate. Muzzle elevated, higher than the length of the short, approximated canthus rostrales. Palpebræ prominent, thickened, covered with transverse glands, broader than the interorbital space. Tympanum concealed. Extremities short; numerous antibrachial palmar and subdigital tubercles. Cuneiform process strongly developed. Toes half-webbed. Skin of inferior surfaces glandular, areolated. Sides and superior surfaces coarsely glandular; a series of four or five larger glands extends from each orbit, and there are two parallel rows on the occipital region. Extremities glandular. Expanse of rami mandibuli 10 lines. Muzzle to end of coccyx 2 inches 2 lines. Anterior extremity 1 inch 2 lines. Posterior 1 inch 10 lines. Tarsus 4·5 lines.

Ground-color pale brown or whitish, with a series of large dark brown pale bordered spots on the median dorsal region, and smaller spots on the sides. The former interrupt a pale vertebral vitta. Three spots on each maxillary region, and one between the orbits. Extremities brown spotted. No. 5825.

If the short descriptions of the *P. americanus* (hitherto the only species) are reliable, this animal differs in the position of the vomerine teeth and in coloration.

*Pleurodema bibronii* Tschudi, Dum. Bibr., viii. 410.

*Pleurodema biligonigera* Cope.

*Liuperus biligonigerus* Cope, Pr. A. N. S. Philada., 1860, p. 517.

This species was described from a specimen in which the vomerine teeth and lumbar gland were obliterated. It differs from the *bibronii*, and from the species or varieties enumerated by Mr. Bell, in the absence of dermal glandules. As compared with our specimen of *bibronii*, the head is

\* Pr. A. N. S. Philada., 1854, p. 59.

† Exceptions are seen in *Hylarana*, *Potypedates* and *Rhacophorus*.

narrower and shorter, and the gape of the mouth less; the aspect is more that of *Engystoma*. The expedition specimen has the lumbar gland black. It is probably one of Günther's varieties of *bibronii*. No. 5840.

*Cystignathus fuscus* Gthr. Var. No. 5842. (Braz.)

*Cystignathus podicipinus* Cope, Pr. A. N. S. Philada., 1862, p. 156.

*Phryniscus nigricans* Wieg., Dum. Bibr., viii. 723. No. 5834, et var. with very large (?) white spots on the sides, belly, and labial regions. No. 5833.

*Phrynoideis agua* Cope, Dand., Dum. Bibr., viii. 703. (Braz.)

*Bufo diptychus* Cope.

Cranium without longitudinal ridges. Canthus rostralis concave rounded; muzzle elevated, not protruding. Orbit as wide as length of muzzle anterior to it. Tympanum small, scarcely perceptible. Tongue elongate, subcylindrical. Internal finger slightly longer than second, shorter than third; toes one-third palmate, third longer than fifth. A tarsal cutaneous fold continuous with the inner metatarsal tubercle; outer tubercle subconical. Paratoids beginning behind upper margin of tympanum, divergent, trilateral, extending posterior to the axilla, and continuous with a lateral dermal fold. Skin above smooth, with a few scattered tubercles. Femora, sides and abdomen rugulose; the first partly bound by the integument of the sides. The extended limbs reach, the anterior to the femur, the posterior to the end of the muzzle. Muzzle to vent one inch. Above light brown, with a whitish vertebral line; there are four deep brown spots on each side of this, and a broad chevron-shaped band of the same from border to border of the upper eyelids. A brown band on canthus rostralis, and two from orbit to lip. One from orbit to shoulder on outer edge of paratoid, continuous with a blackish shade beneath the lateral fold. Abdomen brownish white, with a median series of blackish variations from sternum to abdomen. No. 5841.

This species bears some resemblance to *Phrynoideis variabilis* of Dr. Günther, a species furnished with cranial ridges and a distinct tympanum. It differs from *B. poeppigii* Tsch., as described by Girard, in the form of the muzzle, and condition of skin, and coloration. The paratoids are larger than in *B. thauli* Lesson (fide Girard) and *B. chilensis*; the skin is much smoother, and the coloration different. In *B. pantherinus* (*maculatus* Hallow., Pr. A. N. S., 1854, p. 101) and *guineensis*, the paratoids are elongate oval.

*Hypsiboas raniceps* Cope.

Vomerine teeth in two oblique curves, whose inner limb is very short,—the structure prevailing in *Hypsiboas*. External digits one-third webbed. Only two phalanges of the fourth toe free. Appressed femur extending five-sixths the distance to the axilla; no calcaneal appendage. Fingers reaching femur. Head longer than broad, subacuminate; loreal region oblique, not grooved; canthus rostralis slightly curved, rounded. Tympanum more than half the size of the eye. Tongue oval, entire. Skin everywhere smooth, except upon the usual regions—abdominal, thoracic, and inferior femoral. A subgular vocal sac, with very large oval openings. Expanse of rami of mandible 9 lines; muzzle to arms 2 inches 9 lines; anterior extremity 1 inch 6 lines; posterior extremity 4 inches 5 lines. Ashy, reddish, or dark brown above, with darker cross-bands or broken marblings, which are most distinct posteriorly. A dark brown band from end of muzzle through eye to posterior margin of tympanum. Brachium, whole length of sides, and all the surfaces of the posterior extremity, except postero-internal of femur and external of tarsus, vertically or transversely brown banded. A whitish band on outer face of the antebrachium, and of tarsus and foot. Subanal region paleish. Abdomen immaculate; thorax and gular region shaded and spotted with

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brown; mandibular border whitish, maxillary border brown; one specimen with a brown vertebral line.

This species resembles the *H. fasciatus* of Günther in some respects, but is more allied to *H. boans*. In the latter three phalanges of the fourth digit are free; the canthus rostralis is acute, and there are various differences in coloration. The *raniceps* was obtained on the Rio Vermejo. Nos. 5408-5036.

*Hyla acuminata* Cope

Head longer than wide, muzzle rather pointed, depressed, the canthus rostralis almost obsolete. Nostrils not pierced in a swelling. Eyes prominent, not large, twice as large as tympanic disc. Skin of upper surfaces warty or nearly smooth; gular region areolated. Heel reaching anterior border of orbit; two phalanges of fourth toe free. Fingers entirely free, vomerine teeth in two straight transverse series, opposite the posterior margin of internal nares. Tongue short elliptic, slightly emarginate. Muzzle to posterior border of tympanum 7 lines, do. to anus 1 in. 9 lin., anterior extremity 10 lin., posterior do. 2 in. 5 lin. No. 5843. A subgular vocal vesicle.

General color brownish gray, beneath uniform, or with a few blackish vermiculations; above with a blackish triangular spot between the eyes, and shades and streaks on the sacral and scapular regions. Hinder extremity crossbanded with blackish, most distinctly on femur; the anterior and posterior surfaces of the latter marbled with blackish.

This species resembles *Cystignathus podicipinus* in form, and *Hyla versicolor* in coloration.

*Hyla nasica* Cope

Head small, as long as broad, narrow anteriorly, muzzle depressed, prominent, faint. Eye rather small, twice the extent of the tympanum. Tongue elliptic, scarcely emarginate, vomerine teeth in two transverse contiguous short rows between the internal nares. Fingers free or nearly so. Skin above slightly tuberculous. Gular region faintly areolated, a vocal sac. Length of head and body 1 in. 5 l. Breadth of gular region 4.5 lines. From anus to end of fourth toe 1 in. 9. lin.

Beneath pale, uniform. Above dark rufous brown with some darker longitudinal markings on the back. A dark band from muzzle through tympanum to side. Femur and posterior lateral region varied with dark brown. No. 5835.

This animal resembles the *vauterii*, but the head is smaller, narrower and more acuminate; the tongue is more elongate and the vomerine teeth are more anterior.

*Hyla vauterii* Bibr. Günther, Catal. Brit. Mus., 106. No. 5407. (Braz.)

*Scytotis hebes* Cope.

*Char. gen.*—Maxillary and vomerine teeth. Tongue slightly free posteriorly. Ear perfectly developed, tympanum not concealed. Diapophysis of sacrum dilated. Toes webbed. Large paratoids, which are confluent, covering the anterior part of the back and top of head to muzzle.

This genus, it will be seen, enters the "family" *Pelodyradidæ* of Dr. Günther, which has been heretofore represented by but one genus, established for an Australian species.

*Char. spec.*—Ostia pharyngea and internal nares large, the vomerine teeth in two straight transverse series behind the posterior border of the latter. Tongue broader than long, scarcely emarginate. Tympanum horizontally elliptic, overhung by the paratoid; half as large as eye. Eyelid not prominent, encroached upon by the paratoid. Skin above with a few depressed protuberances; head and body beneath everywhere coarsely areolated; the skin thick and coriaceous. Head broader than long, loreal region concave.

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canthus rostralis obtuse. Palettes of the fingers nearly as large as tympanum; digits slightly webbed; two phalanges of fourth toe free. Heel reaches to orbit when the leg is extended. No vocal pouch in the specimen (5837) examined. From angle to angle of mouth beneath, 1 in. 3 lin.; from symphysis to postgular fold 6 l.; muzzle to vent 3 in. 3 lin.; posterior extremity 5 in. 6 l.; anterior do. 1 in. 7 lin.

Above leathery brown, with deep brown shades on the back, and cross-bands on the limbs. Sides and posterior faces of femora reticulated with the same, enclosing on the former, yellowish areas. Beneath yellowish brown.

*Phyllomedusa azurea* Cope.

Muzzle short, elevated, truncate; canthus rostralis rounded, a little concave. External nares entirely lateral. Supra-palpebral region not prominent, the visual fissure rather restricted. Tympanic disc near the posterior canthus of the latter, equalling less than half its extent. Skin of the superior regions smooth; a narrow median band of areolations on the inferior surface of the femur. Paratoids very slightly developed. Anterior limbs extended posteriorly, reaching hinder side of femur. Heel about reaching tympanic disc. Internal nares anterior, smaller than the eustachian orifices. An acute median emargination in the premaxillary region. Two external of the anterior digits, longest, nearly equal, their basal phalanges, united by the integument: thumb shortest, almost opposable. Soles slightly tuberculous. Length of head and body one inch six lines; from end of muzzle to tympanum four lines; length of antebrachium 4.5 lines; of tibia 7 lines; of tarsus 5.5 lines; metatarsus and longest digit 5 lines.

Color of the upper surfaces of the body and extremities, except that of the brachium, milky purplish blue. Beneath white or yellowish. The edges of the jaws are margined with the same, which margins form a narrow, lateral band, which extends to the middle of the side. Posterior lateral region, with the white surfaces of the extremities, with vertical blackish-brown bands. The blue is reduced to a narrow band on the femur; it is margined with white on the anterior extremity and the tarsus. No. 5832.

I cannot find a trace of vomerine teeth in the two specimens at my disposal. Their absence may be accidental; perhaps it is a specific character—its importance is not greater than this.

This species differs from *P. hypochondrialis* of Surinam (*Hyla hyp.* Daud.) in its smaller and relatively less depressed head, shorter hinder extremities, and absence of dark spots upon the anterior lateral region.

The *hypochondrialis* is believed by Prof. Schlegel, (Abbild. Amph., Dec. i., p. 24,) to be the young of *bicolor*. The same statement is made by Dr. Tschudi, (Classif. der Batrachier, p. 27,) and by Duméril and Bibron. Drs. Burmeister and Günther apparently acquiesce in this opinion. There are no reasons to doubt the correctness of this view, other than such as a consideration of the following differences may furnish. The *hypochondrialis* is apparently destitute of the lateral, extremital, and gular yellow spots of the *bicolor*; on the contrary, the color of the back has a straight outline, and is distinctly defined upon the sides. The superior labial yellow border is not seen in the *bicolor*, nor is the bright color of the upper surfaces wanting upon the humerus, as in *azureus* and *hypochondrialis*.

## II. The Darien Collection.

The objects and direction of the expedition to which we are indebted for the collection below catalogued, have been explained briefly by Mr. John Cassin, the well-known ornithologist, in these Proceedings.\* He has also stated the positions of the localities at which portions of the collection were made. Thirty-two species of reptiles were obtained, of which thirteen were new to

\* 1860, p. 132.

science. A brief notice of them has been given by Arthur Schott, Esq., the exploring naturalist and geologist, at p. 255 of Lieut. Michler's Report to the United States Government.

## CROCODILIA.

*Jacare sclerops* Dum. Bibr. Turbo. No. 5253.

*Crocodylus* sp. young. Turbo. 4311. Vide Mr. Schott's Report, l. c.

## OPHIDIA.

*Elaps corallinus* Wied., Dum. Bibr., vii. 1207. No. 3005.

*Elaps melanogenys* Cope, Pr. Ac. Nat. Science Phil., 1860, p. 72.

Var. with ten sets of rings, and the postocular cross-band interrupted by the black ground on the temporal region. It resembles the *dissoleucus*\* slightly, but wants the acute, prominent muzzle, and small rostral plate of that species. The labials are not so elevated as in that species, and *lemniscatus* and other allies, the fourth (subtending the orbit) being as long as high. The prefrontals are not so small, relatively, as in *dissoleucus*, but are more as in *lemniscatus*, where they are smaller than in *pyrrhocryptus*. Carthagera.

*Himantodes cenchrea* Dum. Bibr., vii. 1065. Nercua. No. 4300.

*Sibon annulatum* Fitz., Dum. Bibr., vii. 1141. No. 4301, 4353.

*Oxybelis acuminatus* Cope, Dum. Bibr., vii. 819, Carthagera. No. 4306.

*Herpetodryas carinatus* Boie, Dum. Bibr., vii. 207.

*Pliocercus euryzonus* Cope, Pr. Ac. N. Sc. Phila., 1862, p. 72. No. 4303.

*Liophis epinephelus* Cope, l. c., p. 78. No. 4305.

## LACERTILIA.

*Sphærodactylus casicolus* Cope, Pr. A. N. S. Phila., 1861, p. 499.

*Iguana tuberculata* Laur., D. and B., iv. 203. No. 4314.

*Iguana rhinolopha* Wieg., D. and B., l. c., 207. Truando.

*Basiliscus americanus* Laur., D. and B., l. c., 181 ♂ ♀. No. 4112, 4322

*Anolis* ??reticulatus Gray, Cat. Brit. Mus., 204. Truando. 4321, ♂ jr. Turbo. 4313 ♂.

*Anolis radulinus* Cope, Pr. A. N. S. Phil., 1862, p. 180. Truando. 4327-8.

*Anolis poecilopus* Cope, l. c., 179. Truando. 4320-31.

*Anolis vittigerus* Cope, l. c., 179. Truando. 4332.

*Anolis pentaprion* Cope, l. c., 178. Truando.

*Cnemidophorus lemniscatus* Dum. Bibr., a. 128. Carthagera. 4336.

*Cnemidophorus*. Carthagera. Specimens like *murinus* Dum. Bibr., v. 126, with plates on the superior and anterior faces of the humerus, and an olive band internally pale bordered on each side of the back, and otherwise similar. What is *C. festivus* Licht. et von Martius?

*Tupinambis nigropunctatus* Spix, Dum. Bibr., v. 20. Turbo. 4319.

*Brachypus pallidiceps*.

Digits 4-3; scales in thirty-four transverse series from axilla to groin, and twenty-three longitudinal; those of the abdomen broader, rectangular, those of the upper regions hexagonal. Internasal plate longer than broad, hexago-

\* Possibly this name conveys error, the supposed white spots, having, perhaps, been yellow. The species was described from an alcoholic specimen recently taken, in which the red was brilliant; the supposed white had not then the appearance of faded yellow.

nal, its nasal suture longest, the others shorter in the following order, frontal, rostral, fronto-nasal. Nostril between first upper labial and nasal: one frenal, one subocular resting on the third, fourth and fifth superior labials; of these, the sixth and last is longest. Five temporals, two supraorbitals. Frontal much longer than broad, eight-sided, as follows:—longest, occipital, then supraorbital, internasal, frontonasal, interoccipital. Five inferior labials, a small symphyseal, a mental longer than broad; three infralabials on each side, the anterior two very large, the first of each series extensively in contact; a cross row of eight gular plates, the median pair largest. One pair of sternal shields. Four preanals, the anterior subtriangular, the posterior narrow. Length of head, 3.5 lines; of body and neck, 2 inches 3 lines; of tail, 9.3 inches 6 lines; total 9.6 inches.

General color plumbeous, the scales margined with black; head cinereous. A light brown band extends along each side of the back, separated from its fellow by four rows of scales. Truando river region. (4324.)

This species seems to indicate a necessity for dispensing with Tschudi's name *Microdactylus* for the *Chalcides schlegelii* of Dum. Bibr. unless the latter animal can be generically distinguished by some other peculiarity than the number of its digits. While it possesses three digits on all the feet, and the *B. cuvieri* four, (usually) the *pallidiceps* has four anterior and three posterior. *Chalcis heteropus* of Lichtenstein and Von Martius, judging from the name, must exhibit a similar peculiarity. I have not been able to see their description.

#### BATRACHIA.

*Cystignathus poecilochilus* Cope, Pr. Ac. N. Sci. Phila., 1862, p. 156. No. 4347.

*Craugastor hallowellii* Cope, l. c., p. 153.

*Craugastor pulchrigulus* Cope.

Distal end of tibia reaching beyond muzzle; feet one-fourth webbed. Head elongate, muzzle subtruncate. Teeth in straight lines behind the internal nares; tongue broad oval, entire. Dark-brown, white spots on hinder face of femur. Sides and gular region shaded with dark-brown; a bright yellow band beginning on the intermaxillary region, extends to the thorax. A light spot under the eye. Length of head and body 10 lines. Truando, 4354.

?*Otilophus margaritifer*, Cuv. young, 4337—8, '40—1. Truando.

*Chilophryne conifera* Cope, Pr. A. N. S. Phila., 1862, p. 156. Turbo.

*Phrynoidis intermedius* Cope. *Bufo intermedius* Gthr., Catal. Brit. Mus., p. 140, Carthagera. No. 4350.

*Bufo simus* Schmidt, Denkschr. Acad. Wiss. Wien, 1858, p. 254. No. 4339. Truando.

In our specimen the toes are very slightly webbed, and not at all margined; there is a short acute tubercle on the inner face of the tarsus. The tympanum is visible, though indistinct. The warts on the back, nape, and head, are very numerous, especially on the latter two regions, where some are linear. There is a short reddish median line on the coccyx. The belly is pied, blackish and ? white; gular region black, with a white median vitta. A large vocal sac.

*Rhæbo hæmatiticus* Cope.

\* *Bufo hæmatiticus* Cope, l. c., 157.

The Dumerilian genus *Bufo* has been subdivided by Dr. Fitzinger, of Vienna, into several groups, to which he has given names. That that genus is a union of several I do not doubt, but that they are as numerous as Dr. Fitzinger indicates, I cannot perceive. The following table exhibits the relative characters of those that seem to be recognizable. *Calophrynus* is introduced on the authority of Dr. Günther:—

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Paratoids distinct, dorso-lateral.

No dermo-ossification upon the cranium.

Cranium with longitudinal ridges.

A parietal branch ridge..... Chilophryne.

No parietal branch ridge.

Orbito-tympanic ridge enormously developed... Otilophus.

Orbito-tympanic moderate, or none..... Phrynoidis.

Cranium without ridges.

Canthus rostralis and paratoids rounded; form stout..... Bufo.

Canthus rostralis and paratoids sharp angled; form slender; toes nearly free..... Rhaebo.

Cranium covered with a dermo-ossification..... Peltaphryne.

Paratoids wanting, or scarcely visible..... Schismaderma.

Paratoids confluent, covering the back..... Calophrynus.

These genera contain the following species:

<i>Chilophryne Fitzinger.</i>		<i>Bufo insidiator Gird.</i>	Mexico.
<i>d'orbignyi Fitz. ex D. &amp; B.</i>	W. S. Amer.	<i>trifolium Tsch.</i>	W. S. Amer.
<i>dialopha Cope</i>	Sandwich Is.	<i>politus Cope</i>	Central Amer.
<i>celebensis ex Gthr.</i>	Celebes	<i>cruentatus Tsch.</i>	Java.
<i>biporcata ex Gravenh.</i>	Malaysia.	<i>lamentor Girard.</i>	Utah.
<i>americana ex Le Conte</i>	E. N. Amer.	<i>acbilis, Girard.</i>	Mexico
<i>cognata ex Say</i>	Central N. Amer.	<i>boreas B. &amp; G.</i>	W. N. Amer.
<i>lentiginosa ex Shaw</i>	E. N. Amer.	<i>columbiensis B. &amp; G.</i>	" "
<i>nebulifera ex Gird.</i>	Mexico.	<i>halophilus B. &amp; G.</i>	" "
<i>conifera Cope</i>	N. W. S. Amer.	<i>tbau Lesc.</i>	W. S. Amer.
<i>veraguensis ex Schmidt</i>	" "	<i>chilensis Tsch.</i>	S. Amer.
<i>ocellata ex Gthr.</i>		<i>diptychus Cope</i>	E. S. Amer.
<i>lineomaculata ex Gay</i>	W. S. Amer.	<i>rubropunctatus Gay</i>	W. S. Amer.
<i>Otilophus Cuvier</i>		<i>poeppigii Tsch.</i>	W. S. Amer.
<i>margaritifer Cuvier</i>	N. S. Amer.	<i>speciosus Gird</i>	Mexico.
<i>? pleuropterus ex Schmidt</i>	N. W. S. Amer.	<i>punctatus B. &amp; G.</i>	Centr. N. Amer.
<i>Phrynoidis Fitz. Pseudobufo</i>		<i>tuberosus Gthr.</i>	W. Africa.
<i>Tsch. (Nomen hybridum)</i>		<i>guineensis Gthr.</i>	"
<i>Nectes Blkr. Docidophryne</i>		<i>angusticeps Smith</i>	S. Africa.
<i>Fitz.</i>		<i>gariensis Smith</i>	"
<i>asper Fitz. ex Grav.</i>	Java.	<i>pantherinus Boie</i>	Africa.
<i>isos ex Lesson</i>	Bengal.	<i>calamita Laur.</i>	S. Europe.
<i>melanostictus ex Schn.</i>	S. and E. Asia.	<i>viridis Laur.</i>	"
<i>agua ex Daud.</i>	E. S. Amer.	<i>vulgaris Laur.</i>	Europe, E. Asia.
<i>molitor ex Tsch.</i>	W. S. Amer.	<i>kelaartii Gthr.</i>	Ceylon.
<i>ornatus ex Spix.</i>	E. S. Amer.	<i>Rhaebo Cope. Phrynomorphus</i>	
<i>granulosus ex Spix.</i>	" "	<i>Fitz. (Nom. præocc.)</i>	
<i>gutturosus ex Latr.</i>	" "	<i>hematiticus Cope</i>	N. W. S. Amer.
<i>intermedius ex Gthr.</i>	N. W. S. Amer.	<i>gracilis ex Gird.</i>	E. S. Amer.
<i>alvarius ex Gird.</i>	Cent. N. Amer.	<i>leschenaultii Cope ex D. &amp; B.</i>	N. E. S. Amer.
<i>lugubrosus ex Gird.</i>	W. S. Amer.	<i>? ceruleostictus ex Gthr.</i>	N. W. S. Amer.
<i>Bufo Laurenti. Phryne. Aadenomus Cope, (founded on a B. kelaartii, with the proximal phalanges contracted, leaving terminal dilations.)</i>		<i>Peltaphryne Fitz.</i>	Cuba.
<i>simus Schmidt.</i>	N. W. S. Amer.	<i>peltacephala Fitz.</i>	"
<i>anomalus Gthr.</i>	Mexico.	<i>empusa Cope</i>	"
		<i>Schismaderma Smith</i>	
		<i>carens Smith</i>	S. Africa.
		<i>Calophrynus Tsch.</i>	
		<i>pleurostigma Tsch.</i>	Borneo.

*Bufones gymnuchen Bleeker, griseus and melanogaster Hallow., erythronotus and quercicus Holb., B. woodhousei Gird.,* I have not been able to refer to any of the preceding genera.

*Hyla phaeota Cope.*

Head broad, depressed, canthus rostralis rounded concave; eye large, prominent, tympanum more than half its extent. Tongue round, entire; vomerine series nearly transverse, between the large internal nares; ostia pharyngea large. A vocal sac. Skin of upper surfaces entirely smooth; a



strong fold from orbit over tympanum. Three outer fingers slightly webbed; nearly three phalanges of the fourth toe free, the web, however, margining its outer side. Heel of the extended hind limb reaching beyond the muzzle. Breadth of gular region from angle to angle of mandible, 9 lines; length of head and body 1 in. 10 lines; of anterior extremity 1 in.; of posterior 4 in. Color above grayish-brown, shaded with a pale plumbeous tint, like the bloom of some fruit. Abdomen, upper jaw, postorbital region, and the borders of the upper eyelid, tarsus and antibrachium, and of a brown spot near the vent, white. A dark brown line on the canthus rostralis, and band between the eyes; a longitudinal band or series of spots on the back, which bifurcates anteriorly; a spot on the coccyx. A dark brown band from angle of eye to scapular region, involving the whole of the tympanum. Femur with narrow cross-bands; posterior face reticulate or unicolor. Tibiæ more broadly cross-banded. Sides with brownish vermiculations. Gular region brown shaded.\* From Turbo. No. 4347.

### Additions to the Nomenclature of North American LEPIDOPTERA. No. 2.

BY AUG. R. GROTE.

On pages 59, 60, Proc. Acad. Nat. Sci., 1862, I described three species of Heterocera, under the genus *Platypterix*, Lasp., adopting the classification of Heydenreich, in his Cat. Method. Lepidop. Europ.

I have since recognized my *P. formula* to be identical with *Drepana rosea*, Walker, C. B. M. viii. and also with *Cilix Americana*, H. S. Lepidop. Exot. p. 60, fig. 470.

This species seems, however, properly classified under neither of the above genera, and for the reasons following. The genus *Cilix*, Leach, was created for such Heterocera, which, closely allied to *Platypterix*, Lasp., are aberrant from that generic type by the straight outer margin of the anterior wings. It was established upon a European species, *C. spinula*, H., formerly included and described under *Platypterix*, Lasp., as the termination of its specific name indicates. Herrich-Schaeffer is, however, evidently in error, in placing his *C. Americana* under *Cilix*, Leach, as the outer margin of the anterior wings, unlike the type of that genus, is falcate; differing, on the other hand, from *Drepana*,

\*A species in the Smithsonian Museum, obtained by Dr. Chas. Sartorius at Mirador, Vera Cruz, resembles this species in most respects. It is, however, different in the following respects:

It is dark slate above, with blackish confluent spots, in two parallel series; there are no white borders or anal spot. Gular region uniform yellowish; a few warts on hinder face of antibrachium. Posterior face of femur uniform slate. No light spot under eye; broad cross-bands on femur and tibia. Heel reaching anterior border of orbit. Length from muzzle to vent 3 inches. It is allied apparently to Baird's *H. vanvlietii*. It may be called *H. muricolor*.

A beautiful species has been presented to the Academy by Capt. Field, in a collection made by him in Panama. It is *Hyla callidryas* of the author, and may be distinguished as follows:

Head elongate, maxillary outlines convergent, nearly straight; loreal region subvertical, canthus rostralis straight, rounded. Eyes not large, transparent portion of inferior palpebra reticulated with white; iris cupreous. Tympanum nearly as large as eye, obliquely elliptic. Tongue elongate elliptic, openly emarginate. Inner nares large, widely separate; vomerine teeth between them, in two oblique series, convergent posteriorly, anteriorly opposite anterior border of nares. Fingers one fourth webbed; pallettes very large; toes one-half palmate, margined. Heel reaching end of muzzle when extended. Skin above smooth. From muzzle to vent 1 inch 9 lines; do. to angle of mouth 7 lines.

Blue purple above, greenish on the scapular region; humerus, femur, except a narrow blue stripe, and under surfaces, uniform saffron. Numerous oblique bands of a lighter yellow on the sides.

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Schr. and *Platypteryx*, Lasp., by the convexity of the outer margin near the middle. This difference is noted by Walker when describing this species under *Drepana*, Schr., which genus is synonymous with *Platypteryx*, Lasp., inasmuch as Walker's species, with the exception of his *D. rosea*, and *D. emarginata*, C. B. M. viii., as well as those I have described, do not differ generically from European species classed under *Platypteryx* by most authorities; which latter genus, having apparently the priority, should be retained for our species. I propose for Walker's *D. rosea*, which specific name has the priority over *Americana*, H. S., as also for *D. marginata*, Walker, of which latter species I have seen no specimen, but which appears from Walker's description to belong here, the following genus:

*DRYOPTERIS*, nov. gen.

Antennæ bi-pectinate in the male; simple, or nearly so, in the female. Palpi short, wings broad, anterior pair obtusely falcate, with the outer margin convex near the middle and extending outward to a nearly straight line with the falcate tips. Body rather stouter than in *Platypteryx*; shorter than the posterior wings.

The species under this genus are readily distinguished from the true *Platypterygides* by their brighter colors and somewhat broader and heavier wings. I have carefully compared specimens of my *P. fabula*, and *P. genicula* with the description of *D. arcuata*, Walker, C. B. M. viii., but while the description presents points of resemblance with both, I can positively identify it with neither, and must consider it as a distinct species awaiting a comparison of actual specimens. A simple enumeration of the number and coloring of the bands on the anterior wings in this genus must necessarily lead to some confusion, as there exists a great similarity in point of markings and coloring among the different species comprising it. *P. fabula* may, however, be readily recognized from *P. genicula* by the ground color; being in *fabula* dirty white; in *genicula*, pale brownish yellow. The second and third wavy lines from the base of the wing, in the former species, run close together, and unite three times near the lower margin, forming two enclosed spaces; in *P. genicula* the second and third lines run wide apart, being also much straighter than in *P. fabula*, in which they zigzag with acute angles, the third line crossing the outside and largest discal spot; while in *P. genicula* the same line runs outside of it. My descriptions are taken from males of both species. This would seem the proper place to correct an error in the obs. to *P. fabula*, page 59. It is in the American, and not in the European species, that the second and third lines run together on the anterior wings, forming enclosed spaces, as will be seen by the body of the description. The following is a list of all our hitherto described species under this family following the classification of Herrich-Schäffer, in his *Syst. Verz. der Europ. Schmett.*

*DREPANULINA*, H. S.

*Dryopteris*, Grote.

— *rosea*, Walker, C. B. M. viii. *Cilix Americana*, H. S. *Lepidop. Exot.* p. 60, fig. 470, female. *Platypteryx formula*, Grote, *Proc. Acad. Nat. Sci.* 1862, p. 60.

— *marginata*, Walker, C. B. M. viii.

*Platypteryx*, Laspeyres.

— *fasciata*? Steph. Morris, *Synopsis*, N. A. *Lepidop. Smithsonian Misc. Coll.* vol. iv. 218.

— *arcuata*, Walker, C. B. M. viii.

— *fabula*, Grote, *Proc. Acad. Nat. Sci.* 1862, p. 59.

— *genicula*, Grote, *Proc. Acad. Nat. Sci.* 1862, p. 59.

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List of the **PSEUDONEUROPTERA** of Illinois contained in the Cabinet of the writer, with descriptions of over forty new species, and notes on their structural affinities.

BY BENJAMIN D. WALSH, M. A.

[N. B.—Except where otherwise stated, the following species have been taken by myself within four miles of the city of Rock Island. None of my specimens are alcoholic. The species with an exclamation point (!) affixed have been kindly identified by Dr. Hagen, the author of the Smithsonian Synopsis of American Neuroptera, from duplicates which I sent him in 1860; but to prevent possible mistakes I have compared most of them with his diagnoses.]

#### TERMITINA.

*TERMES FLAVIPES*, Kollar, South Illinois.

#### PSOCINA.

?? "Tarsi two-articulate, discoidal cell closed, quadrangular." (*Psocus*, Subgenus C, Hagen.)

*PSOCUS VENOSUS*, Burm.! *P. CONTAMINATUS*, Hagen! (South Illinois.) *P. NOVÆ SCOTIÆ*, Walker! *P. LICHENATUS*, Uhler (auctore ipso). This last species is not included in Dr. Hagen's synopsis.

*PSOCUS PURUS*, new species.—Head cinereous, with a large fuscous spot on the posterior nasus, a small round one on the ocelli, and two on the occiput, which are sometimes almost obsolete; antennæ black, with three basal joints whitish. Thorax and abdomen black, with the sutures whitish. Legs whitish; knees and tarsi a little fuscous. Wings hyaline, except a small black spot on the middle of the posterior margin; veins black, except the posterior side of the discoidal cellule and basal half of 1st sector, which are white; pterostigma triangular, hyaline, with a small fuscous spot at its basal angle; its nervures black, except the basal half of the inner nervure, which is conspicuously white; posterior wings hyaline, with violet reflections.

Length to the tip of wings  $6\frac{1}{2}$  millimetres. Expanse of anterior wings 12 mill. Described from three specimens.

*PSOCUS SEMISTRIATUS*, n. sp.—Head yellowish cinereous; nasus sometimes conspicuously, sometimes obscurely, lined with black; in one specimen entirely black; a small black spot on the ocelli; eyes ♂ globose, prominent; antennæ fuscous, two basal articulations, and sometimes part of the third, pale; antennæ ♂ with the seta hairy. Thorax and abdomen black, with the sutures whitish. Legs pale, with the tarsi, and sometimes the tips of the tibiae and the femora, a little fuscous. Wings entirely hyaline, except a small fuscous spot on the middle of the posterior margin; veins black; pterostigma triangular, rounded behind, more or less fuscous, sometimes almost black, always with the basal angle paler; posterior wings hyaline, with green reflections.

Length to tip of wings 4—5 mill. Expanse of anterior wings 7—9 mill. Described from eighteen specimens.

*PSOCUS PERPLEXUS*, n. sp.—♀ Differs from the above in size, in the greater proportional length of the antennæ, which extend beyond the wings, in the ocelli being much wider apart and not connected by any black spot, and in the pterostigma being of uniform fuscous color and proportionally longer and not rounded behind.

Expanse of anterior wings 11 mill. One ♀ specimen. The discal bifurcation of the anterior wing is peduncled, but this is occasionally seen in *semistriatus* mihi.

*PSOCUS POLLUTUS*, n. sp.—Head yellowish cinereous; front with a round discal 1862.]

black spot, and an oblique whitish line on each side near the eyes; nasus obscurely lineated with fuscous; antennæ fuscous. Thorax fuscous, with whitish sutures. Legs pale, with knees and tarsi fuscous. Wings hyaline; an irregular band on the apical margin, connected with the pterostigma by about four irregular spots, an irregular median band attaining the costa, and the base of the costa, fuscous; veins black, except the posterior side of the discoidal cellule, and a small spot at the furcation of the 1st sector, which are white; pterostigma fuscous at tip, at base hyaline; posterior wings hyaline, with violaceous reflections.

Length to tip of wings 4 mill. Captured one specimen in South Illinois.

*PSOCUS AMABILIS*, n. sp.—Head dull luteous, immaculate; antennæ robust, pubescent, fuscous, with two basal joints and the base of joints 3—6 pale. Thorax and legs dull luteous, the tarsi a little fuscous. Wings hyaline, with a black spot on the middle of the posterior margin; pterostigma hyaline, truncate at tip, with a black spot at its base; veins black, except the discal bifurcation, which is white. This bifurcation is not angular, as in all the above species, but rounded and peduncled, as in the species figured in Westwood's Introduction (ii. p. 18, fig. 8); from which, however, this species differs by its two-jointed feet, closed discoidal cellule, and the presence of a posterior marginal cellule.

Length to tip of wings not quite 3 mill. One specimen, found dead in the room where I keep my insects.

§§ "Tarsi two-articulate, discoidal cellule open, absent." (*Psocus*, Subgenus D, Hagen.)

*PSOCUS ABRUPTUS*, Hagen! *P. CORRUPTUS*, Hagen. *P. AURANTIACUS*, Hagen.

*PSOCUS GEOLOGUS*, n. sp.—Yellowish brown, ranging to almost black. Eyes normal; antennæ normal, villose, fuscous. Feet pale, with the tarsi and tips of tibiae sometimes fuscous. Wings hyaline, all with golden reflections; veins black; pterostigma triangular, rounded posteriorly, hyaline, with a small spot at the basal angle; posterior marginal cellule semicircular.

Length to tip of wings  $1\frac{1}{2}$  mill. Ten specimens, found in the drawers of a geological collection, into which paper had been pasted. Very near *salicis*, Fitch, but distinguishable at once by the pterostigma not being truncate.

The normal neurulation of *psocus* is, apparently, a discal bifurcation with the anterior furcation throwing out one branch and the posterior one throwing out two, in each case towards the margin. In the groups with the discoidal cellule closed, the posterior furcation seems at first sight to throw out three branches instead of two; but this is in reality caused by the submedian nervure, which closes the discoidal cellule by uniting with the posterior furcation, afterwards leaving that furcation and running to the margin. Any one may convince himself of this fact by comparing those species where the submedian nervure comes very close to the posterior furcation, but does not quite touch it, with those where it does actually touch it. What I have here called the discal bifurcation seems analogous to the "sectors" of the "arc" in the odonata; and the cross-vein from which it rises analogous with the "arc" itself. Dr. Hagen has observed, that "the reticulation in *P. abruptus* and *P. corruptus* is abnormal, and may constitute a distinct subgenus or rather genus." At first sight there seems to be a *tri-* not a *bi-* furcation in these species, or in other words, three sectors to the arc instead of two. But a closer inspection will show that there are in reality only the normal number—two—the anterior one throwing out its branch a short distance from the arc, and the posterior one throwing out at the usual distance one branch instead of two, which is the only abnormal feature in the neurulation of these two species.

#### PERLINA.

*PTERONARCTYS NOBILIS*, Hagen. *PERLA* (*Acroneuria*) *ABNORMIS*, Newm.

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### §§ PERLA. Subgenus ACRONEURIA.

ACRONEURIA RUPINSULENSIS, n. sp.—♀ Obscure luteous. Head broader than the prothorax, bright testaceous, the epistoma scarcely excavated; a transverse line at tip, a raised discal line in the form of an M with its sides divaricate, and a subobsolete basal line commencing at the eyes and curving backwards, fuscous; the usual two interocular tubercles oval, oblique; palpi fuscous; antennæ fuscous, with the joints from 2 to about 7, and the first joint beneath luteous. Prothorax nearly twice as wide as long, subcordate, anterior and posterior angles acute, excurved, the sides nearly parallel before the middle, gradually contracted behind the middle, the prothoracic episternum not thrust underneath as in other Perlæ, but distinctly visible behind from above, so as to give at a distance a quadrangular appearance to the whole prothorax; the middle longitudinal stria acute, surface rugulose, luteo-fuscous with fuscous rugæ. Prosternum and anterior half of metasternum bright luteous. Legs luteous, with obscure fuscous vittæ. Abdomen and venter with obscure fuscous markings; abdominal setæ luteous, annulate with fuscous towards their tips, not pilose except under the lens; ♀ antepenultimate ventral segment regularly rounded, so as at the centre, where it is slightly emarginate, to cover one half of the penultimate segment, with a subobsolete linear transverse tubercle before the apex. Wings subhyaline; veins of anterior wings mostly brown, of posterior mostly clay-yellow; the vein accessory to the subcosta in the anterior wing throwing out four branches, one of which occasionally becomes bifid; in one specimen the veins on the posterior apical submargin are obsolete; from four to thirteen subterminal cross-veins.

Length to tip of wings ♀ 39 mill. Alar expanse ♀ 64—71 mill. Length of abdomen ♀ about 9 mill. The ♂ I have not yet met with. Described from two specimens.

Differs from *abnormis* in the greater relative width of the prothorax, in its sides not being straight, and its not having any luteous dorsal line. Also in the greater extension of ♀ antepenultimate ventral segment, and its having a subterminal tubercle. From *ruralis* and *arida* it differs in the accessory subcostal being 4 (not 5 or 3) branched.

### §§ PERLA. Subgenus A.—Accessory vein two-branched; three ocelli.

PERLA FLAVESCENS, n. sp.—Clay-yellow. Head a little broader than the prothorax, bright clay-yellow, with a divaricating unequal carina proceeding from each side of the anterior ocellus to the anterior sub-margin, where there is sometimes a large dilated puncture on each side; a large quadrangular fuscous spot at tip, and another at the base, from which last issue two wide branches nearly attaining the base of the antennæ, the two spots sometimes almost confluent; palpi fuscous; antennæ fuscous, second joint luteous, third to about the eighth luteous annulate with fuscous; the under side of the head is more or less fuscous at base. Prothorax rugose, entirely fuscous, its breadth exceeding its length by one-half, considerably narrowed behind, with its sides straight, its anterior angles acute, and its posterior ones a little rounded; meso- and meta-thorax brown-black, polished, with clay-yellow margins. Legs clay-yellow, femora sometimes vittate beneath, and always strongly above, with brown-black, a triangular spot at their tips confluent with the upper vitta, and the posterior femora fuscous at base; tibiæ vittate above with fuscous; tarsi fuscous. Sternum fuscous almost entirely. Abdomen ♀ sometimes fuscous only at the sides and tip, sometimes with the base of each segment fuscous; abdomen ♂ with the 3 or 4 basal segments clay-yellow and the rest fuscous; venter in both sexes obscure luteous, banded with fuscous; setæ brown-black, pubescent; ♂ last few abdominal segments are curved upwards, and the last, which is small and only visible at the sides, triangularly open above; ♀ antepenultimate ventral segment is semicircularly produced in the middle, so as to cover one-

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half of the penultimate. Wings subflavescent, the subcostal vein and its accessory brown, the rest mostly luteous.

Alar expanse ♂ 26—29 mill., ♀ 35—40 mill. Length ♂  $3\frac{1}{2}$ —4 mill., ♀ 4—6 mill. Four ♂, three ♀. Allied to *P. capitata*, Pictet, but distinct. In one ♂ and one ♀, the accessory subcostal of one wing is only one-branched. In ♂ of this species the 5th abdominal segment is semicircularly elongated, so as to conceal almost entirely the upcurving abdominal joints 6—8, and the 9th ventral is entirely concealed by the 8th, which is large.

*PERLA VARIANS*, n. sp.—Fuscous. Head as wide as, or wider than the prothorax in some specimens, with the usual divaricating carinae equal and polished, and obscurely returning in the form of an inverted W; epistoma longer than usual, with a dilated puncture on each side; occiput with a semicircular or transverse yellow or luteous spot, which is never longer than wide, and sometimes extends to the sides of the head; beneath luteous; palpi and antennae fuscous. Prothorax nearly twice as wide as long, quadrangular, not contracted behind, the sides straight, the angles acute before, scarcely rounded behind, rugulose, with a yellow or luteous vitta in the middle, and a more or less obvious submarginal luteous cloud on each side. Sternum luteous. Legs luteo-fuscous, with coxae, trochanters and knees luteous. Abdomen with the last joint luteous; venter obscurely marked with luteous on the disk and sometimes the tip. Setae fuscous, sometimes with a few basal joints luteous; ♀ antepenultimate ventral segment semi-oval behind, sometimes a little angulated in the middle, almost entirely covering the penultimate segment. Wings subhyaline; veins of anteriors brown, with a small brown cloud on the anterior part of the "arc," which is never entirely obsolete; veins of posterior wings partly luteous.

Length to tip of wings 14—18 mill. Alar expanse 28—36 mill. Length of abdomen  $5\frac{1}{2}$ —8 mill. It comes very near to *P. postica*, Walker, but that species has the occipital spot hastiform, and no subcostal spot on the wings. Described from eleven specimens. The species is remarkable for having almost always a cross-vein behind the accessory subcostal vein and outside the "arc," so as to form there a trapezoidal or pentagonal cell. Sometimes this cross-vein is present in one wing in the same individual, and absent in the other; in one specimen there are on one side three additional subapical cross-veins, making four altogether, thus approximating to *Acroneuria*, and none at all on the other side. The accessory subcostal vein is incurved at its origin, and generally appendiculated there; and is further remarkable for sometimes throwing out only one branch, sometimes as many as three, the wing being often normal on one side and abnormal on the other.

In the ♂ the 9th ventral segment is distinct, and never concealed by the 8th. In the ♀ the 7th abdominal segment is prolonged laterally much beyond the other abdominal segments, so as to partially cover the base of the antepenultimate ventral.

*PERLA DECIPIENS*, n. sp.—Bright clay-yellow, sometimes verging on orange. Head wider than the prothorax, with a square black spot enclosing the ocelli, and a smaller round submarginal one before, which are sometimes almost confluent, sometimes obscure fuscous, sometimes, but not often, obsolete; the usual divaricating carina is generally a little depressed in the middle of each branch and scarcely returns backwards; palpi and antennae fuscous, the latter luteous joints 2—8. Prothorax one-third wider than long, rugulose, quadrangular, its sides straight, very slightly narrowed behind, anterior angles acute, posterior ones scarcely rounded; fuscous or obscure, always with a narrow central yellow or luteous vitta; meso- and meta-thorax more or less obscured with fuscous. Legs clay-yellow, with a fuscous vitta above on the femora and tibiae, and the tarsi fuscous. Abdomen sometimes a little varied with fuscous, especially above, in one mature specimen entirely fuscous above and below. Setae hairy,

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a little fuscous towards their tips; ♂ with the last ventral segment invisible; ♀ with the antepenultimate ventral segment truncate, sometimes longitudinally striate in the middle, sometimes rounded and dehiscent. Wings ♀ hyaline, hind wings sometimes with violaceous reflections; veins ♂ ♀ brown, except the costal and subcostal veins and their cross-veins which are yellowish-hyaline in both wings; two or three apical costal cross-veins. In one specimen the subcostal accessory vein throws off but one branch on the right wing, thereby approximating to subgenus C. In ♂ all 4 wings are subfumose.

Length to tips of wings 10—13 mill. Expanse of wings 19—25 mill. Length of abdomen 3—4 mill. Eleven specimens. May be easily confounded with *Chloroperla bilineata*, Say (noticed below,) but is always distinguishable at once by the sides of the prothorax being fuscous or obscure, never yellow. It differs from *P. placida*, by the prothoracic vitta and by the costal neuration being almost hyaline, so that the cross-veins are seen with difficulty; from *P. occipitalis* by the vitta, and also by having three ocelli; and from *P. dilaticollis* by having three ocelli, and by the accessory subcostal vein not being incurved. The 8th ventral segment ♂ is large, the 9th being concealed by it. no appearance of any suture.

♂♂ PERLA, subgenus B. Accessory vein two-branched; two ocelli.

PERLA OCCIPITALIS? Pict.—♀ Luteo-fuscous. Head wider than the prothorax, bright testaceous, clouded before with fuscous and with a round black spot on the ocelli; the epistoma is scarcely excavated, and the usual divaricate carina is subobsolete; the two usual interocular tubercles are prominent and round; antennæ fuscous, except the tip of the first joint and joints 2 to about 7, which are luteous; palpi fuscous. Prothorax one-third wider than it is long, the sides very slightly sinuate, contracted behind, rugulose, the margins fuscous. Pro- and meso-sternum luteous. Legs luteous; femora and tibiæ above and also the tarsi fuscous. Abdominal setæ clay-yellow, dusky at tip; ♀ antepenultimate ventral segment truncate. Wings subhyaline, sometimes with green and violaceous reflections on all of them; veins brown, the costa and subcostal apical cross-veins yellowish-brown; accessory vein not incurved at its origin. The ♂, which is hitherto unknown, differs from ♀ in being entirely luteous beneath, and in the four wings being fumose. Abdomen and venter constructed as in ♂ *P. flavescens*.

Alar expanse 23—29 mill. Length of abdomen 3—3½ mill. Differs from *P. dilaticollis* by the subcostal vein being direct, and from *P. occipitalis* by the veins being brown, not testaceous. One ♂, four ♀.

♂♂ PERLA. Subgenus C. (New.) Accessory subcostal vein throwing out only one branch; abdomen very long; two ocelli; several subcostal apical cross-veins and several postcostal\* cross-veins in the anterior wing.

The ♂, which is hitherto unknown, differs from ♀ in being entirely luteous beneath, and in the four wings being fumose. Abdomen and venter constructed as in ♂ *P. flavescens*.

PERLA PRODUCTA, n. sp. Brown. Head wider than the prothorax, with the usual divaricate carina prolonged nearly to the tip, and obscurely reverting; clay-yellow or obscure luteous, clouded with fuscous at tip, with a black or

\* I apply this term to the posterior basal corner of the wing, or postcostal space (space postcostal,) in which sense it is used throughout the Synopsis, and in *Monographie des Calopterygines*; (see Plate I., fig 1). Mr. Uhler, probably through some clerical or typographical error, is made to say, in the Glossary affixed to the Synopsis, that "Postcostal" is synonymous with "Postcubital." That this cannot possibly be so, at least in Dr. Hagen's nomenclature, may be easily seen by any one who possesses a copy of the Synopsis. The genus *Agrion*, as distinguished from the genera *Pseudostigma* and *Mecistogaster*, which have one or two series of areoles in their postcostal space, is there characterized by having "the postcostal space simple," (p. 74); and on inspecting the diagnoses of the 47 N. A. species of *Agrion*, it will be found that they have a number of postcubital cross-veins ranging from 7 to 16.

fuscous basal quadrangle enclosing the ocelli, longer than wide and throwing off on each side at tip a small branch reaching the two interocular tubercles which are round; beneath clay-yellow or luteous obscure; antennæ fuscous, except joints 2—6 or 8, which are more or less luteous; palpi fuscous. Thorax one-third wider than long, a little contracted behind, its sides straight, anterior angles slightly, posterior ones much rounded, rugulose, luteous with fuscous markings, or sometimes entirely fuscous. Legs luteous, femora and tibiæ vittate above with fuscous; tarsi and generally the knees fuscous. Abdominal setæ clay-yellow, with long hairs; conspicuously banded with fuscous in their central portion and fuscous at tip; ♀ antepenultimate ventral segment truncate, with a triangular tubercle sometimes apparently bifid at its apex; ♂ last abdominal segment small and only visible laterally. Front wings hyaline, with a slight brownish tinge; veins brown, a little lighter on the costa; from two to five subcostal apical cross-veins; accessory vein direct; from two to four postcostal cross-veins. Hind wings hyaline, the veins pale, except at the tips.

Length to tip of wings 12—17 mill. Alar expanse 21—29 mill. Length of abdomen  $3\frac{1}{2}$ — $6\frac{1}{2}$  mill. Twelve specimens. I obtained a single specimen at Chicago which has the accessory subcostal in one wing two-branched. In more than fifty Rock Island specimens which I have examined, it is one-branched in both wings. The tip of the 8th ventral segment ♂ is luteous, and conceals the 9th.

*PERLA FUMIPENNIS*, n. sp.—Differs from the preceding in the anterior and posterior wings being distinctly and equally subfumose, the veins fuscous, and as dark in the hind as in the front wings; and also in the costa of both wings being yellowish. The head is bright clay-yellow, the spot enclosing the ocelli black, and the thorax is brown-black, immaculate. Three postcostal cross-veins.

Alar expanse 17 mill. Length abd.  $4\frac{1}{2}$  mill. One ♂ specimen.

♀♀ *PERLA*. Subgenus D.—Differs from the preceding only in the ocelli being three in number.

*PERLA ELONGATA*, n. sp.—♂ Differs from the ♂ of *producta* in being one-third larger, in the antennæ and setæ being fuscous, immaculate, and in the prothorax having a wide clay-yellow vitta on each side the middle, extending outwards on the anterior and posterior margins. The head is clay yellow, with the spot enclosing the ocelli black; subcostal apical cross-veins 2—4; postcostal cross-veins 4—5.

Alar expanse ♂ 23—25 mill. Abdomen ♂ 5— $5\frac{1}{2}$  mill. Three ♂; ♀ unknown. The prothoracic markings resemble those of *P. nigrocincta*, Pictet, but that species is larger, has only two ocelli, and is, besides, arranged as having the accessory subcostal two-branched. The 9th ventral ♂ is concealed by the 8th, which has at its tip a large, smooth, transversely oval tubercle, with a striated outline, as in ♂ *Acroneuria abnormis*.

♀♀ *PERLA*. Subgenus *CHLOROPERLA*.

*CHLOROPERLA BILINEATA*? Say.—The epistoma has generally, as Say describes it, "an obscure triangular spot," or is more or less clouded with fuscous, but I have not seen a specimen "with two straight fuscous lines before the discal ones" on the head, as described by Dr. Hagen. Neither are the veins "testaceous," as Dr. Hagen describes them, except on the disk and tip of the front wings; elsewhere they are yellowish-hyaline. For these reasons, and because I believe I forwarded specimens of my species to Dr. Hagen in 1860, and he reported them to me as "*Chloroperla*, new species," I conjecture that my insect is the true *bilineata*, Say, and that Dr. Hagen has described under that name a different insect, or at all events a geographical race of Say's species. Say indeed states that "the scutellum is bimaculate, spots blackish, placed transversely," which is not the case in any of my specimens, and is not stated to be the case in Dr. Hagen's diagnosis. But this is so contrary to the general style of ornamentation in *Perlina*, that Say was probably mistaken, and mistook a cloud for two spots. In my specimens the meso- and meta-thorax are luteous, more or less obscurely clouded with fuscous.

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Sometimes in my species the head is pure yellow, with only the eyes and ocelli black. The abdomen is sometimes pure yellow, sometimes with a wide fuscous band in the middle, sometimes entirely fuscous. But the prothoracic vittæ are always distinct. The ♂ has the last abdominal joint small, internal.

The ♀ antepenultimate ventral segment is triangularly extended so as to completely cover the penultimate. The 9th ♂ ventral is apparently concealed by the 8th, which is very large and triangularly extended at tip, with no appearance of any suture.

Length to tip of wings 11—14 mill. Alar expanse 21—27 mill. Length of abd. 3—4 mill. Twenty specimens.

*CHLOROPERLA BRUNNIPENNIS*, n. sp.—Brown-black. Head much wider than the prothorax; ocelli three; epistoma generally luteous; antennæ luteous at base. Mouth, base of abdomen, and all beneath, generally obscure luteous. Prothorax rather wider than long, its sides straight, contracted behind, its angles slightly rounded. Setæ luteous at base, sometimes all but their tips luteous. Antepenultimate segment ♀ venter covering  $\frac{1}{2}$  the penultimate. Legs luteous, femora with a broad median black band, sometimes interrupted beneath, especially in the front legs; tibiæ black on their basal half, sometimes luteous beneath, especially in the front legs. Wings all brownish, the costa yellowish; veins the color of the wing; front wings with a streak between the postmedian and postcostal veins, and the region of the origin of the accessory subcostal, hyaline.

Alar expanse 16—21 mill. Length abd.  $3\frac{1}{2}$ —4 mill. Two ♂ one ♀.

*CHLOROPERLA NANA*, n. sp.—Differs from the above in size, in the head being immaculate above and below, and in the prothorax being one-half wider than long, its angles rounded, and with a broad, median, luteous vitta. The hyaline streaks on the wings are absent.

Length to tip of wings  $6\frac{1}{2}$  mill. Alar expanse  $11\frac{1}{2}$  mill. Abd. 2 mill. One ♀? specimen.

*ISOPTERYX CYDIPPE*, Newman! (= *Perla imbecilla*, Say?) *CAPNIA MINIMA*? Newport. *TÆNIPTERYX FASCIATA*, Burm.! (= *T. frigida*, Hagen?) *NEMOURA COMPLETA*, Walker.

### EPHEMERINA.

(Anterior tarsi always five-jointed; the others generally five-jointed, but four-jointed in *Ephemer* and *Cloe*.)

Cross-veins numerous; costal cross-veins numerous, robust, regular. (Wings 4, hind wings wide with numerous veins; very few short, terminal isolated veinlets at the tips of any of the wings.)	Eyes ♂ contiguous, simple. (Intermediate setæ, when present, rudimental.)	<div> <div>First tarsal joint longer than the second, except in anterior ♂ tarsus, where they are equal.</div> <div>First tarsal joint always longer than the second.</div> <div>First tarsal joint shorter than the second.</div> </div>	<div> <div>BETIS, subgenus A.</div> <div>BETIS, subgenus B.</div> <div>BETIS, subgenus C.</div> </div>
	Eyes ♂ contiguous, double. (Three subequal setæ both in imago and subimago.)		POTAMANTHUS.
	Eyes ♂ not contiguous, simple; intermediate setæ, when present, short or rudimental.	<div>Legs all short; intermediate seta short.</div> <div>Legs all short, except ♂ anterior legs; intermediate seta rudimental.</div> <div>Legs all long; no intermediate seta.</div>	<div> <div>PALINGENIA, subgenus A.</div> <div>PALINGENIA, subgenus B.</div> <div>PALINGENIA, subgenus C.</div> </div>
	Eyes ♂ remote, simple; three long setæ, subequal in imago, equal in subimago.		EPHEMERA.

Cross-veins less numerous; costal cross-veins, except the basal cross-vein and on the terminal $\frac{1}{2}$ of costa, almost invisible and partially absent. (Many short terminal isolated veinlets at the tips either of the front or hind wings, except in <i>Canis</i> .)	Eyes ♂ contiguous, simple. (Wings 4, hind wings wide, with numerous veins.)	Three long and equal setæ. Three setæ, the middle one rudimental.	EPHEMERELLA, n. g. BETISCA, n. g.
	Eyes ♂ contiguous, double. (Wings 4 or 2; hind wings with 2 or 3 veins.)	Wings 4, cross-veins rather numerous (50 or 60.) Wings 4, cross-veins sparse (14-18.) Wings 2, cross-veins sparse (14-18.)	CLOE, subgenus A. CLOE, subgenus B. CLOE, subgenus C.
	Eyes ♂ remote, simple. (Wings 2, setæ 3.)		CÆNIS.

As it is often difficult in the dried specimen to distinguish whether the ♂ eyes are single or double, and as sexual generic characters are practically inconvenient, the following synoptical table, which excludes them, except in two subgenera, has been prepared:

Costal cross-veins numerous, robust, regular; wings 4.	Setæ 3, subequal.	First tarsal joint entirely obsolete in ♂ ♀ 4 hind legs.	EPHEMERELLA.
		First tarsal joint indistinct and connate with the tibia in ♂ ♀ 4 hind legs, but not obsolete.	POTAMANTHUS.
	Setæ 3, the middle one short.)		PALINGENIA, subgenus A.
		First tarsal joint shorter than second.	PALINGENIA, subgenus B.
	Setæ 3, the middle one rudimental.	First tarsal joint longer than second, except in anterior ♂ tarsus, where they are equal.	BETIS, subgenus A.
		First tarsal joint longer than second in all ♂ ♀ legs.	BETIS, subgenus B.
	Setæ 2.	First tarsal joint shorter than second, indistinct and connate with the tibia in all ♂ ♀ legs.	BETIS, subgenus C.
		First tarsal joint shorter than second, distinct and free in all ♂ ♀ legs.	PALINGENIA, subgenus C.
	Wings 4, hind wings wide.	Three equal setæ.	EPHEMERELLA, n. g.
		Three setæ, middle one rudimental.	BETISCA, n. g.
Costal cross-veins, except at tip and extreme base, very slender; entirely absent on some part of the costa.	Wings 4, hind wings narrow.	Cross-veins rather numerous, (50-60.)	CLOE, subgenus A.
		Cross-veins sparse, (14-18)	CLOE, subgenus B.
	Wings 2.	Two setæ; cross-veins sparse, (14-18.) Three setæ; cross-veins very sparse, (4-6)	CLOE, subgenus C. CÆNIS.

#### BETIS.

♀♀ *Betis*. Subgenus A.—First tarsal joint distinct, large, always larger than any of the three following, except in the anterior ♂ tarsus; joints 1-4 regularly and notably diminishing in length, except in the anterior ♂ tarsus, where joints 1-4 are long and subequal and joint 1 is distinctly free. A rudimental intermediate seta, distinctly articulate, sometimes turned downwards.

*BETIS FEMORATA*, Say.—Undescribed imago.—♂ Piceous. Eyes in the living insect pearly whitish on their superior  $\frac{3}{4}$ , with a moveable black spot; the inferior  $\frac{1}{4}$  pale dusky, divided from the whitish part by a definite line; antennæ dusky, pale at extreme tip. Prosternum a little marked with whitish, sometimes almost entirely whitish; a broad transverse oblong whitish band between the hind coxæ, sometimes very conspicuous. Abdomen with joints 1-5 whitish hyaline, each with a narrow piceous band before the incisures, an obscure, oblong, medial spot on each side of the dorsum, and a slight piceous pulverules-

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cence above; on the lateral base of joints 6 and 7 a semi-oval whitish spot extending to their middle, and a similar spot covering the whole side of the last joint; venter whitish hyaline; anal processes whitish, sometimes with only their middle joint whitish; setæ whitish, with fuscous incisures alternately wide and narrow. Anterior legs a little longer than the body, with very long tarsi, pale brown, sometimes with the basal half of their femora brown; the four posterior legs paler; all six with a broad postmedian band on the femora, the base and tips of the tibiæ, and the tarsal incisures and tips brown. Wings hyaline; veins and cross-veins, hyaline, subequal, moderate, except the three veins of the costa, one discal sector with its basal cross-veins, and sometimes some of the other veins, which are fuscous; at the discal bifurcation of this sector there is a more or less obvious small brown spot; subcostal cross-veins fuscous, rather coarse; a coarse medial black line immediately behind the third vein of the costa, about a millimetre long, and sometimes a slight brown cloud at the costal tip; posterior wings hyaline, with hyaline veins and cross-veins, except one long and one short series of cross-veins on the basal costa, which are strongly fuscous and enclose a brown cloud.

The ♀ differs from the ♂ as follows: joints 1—5 of abdomen are piceous brown above, paler towards their base; the anterior legs, as usual in ephemeral ♀ imagos, are shorter; and there is no basal cloud on the hind wings.

Length ♂ 12—13½ mill.; ♀ 12½—14 mill. Alar exp. ♂ 25—28 mill.; ♀ 28—29 mill. Setæ ♂ 20—24 mill.; ♀ 13—16 mill. Ant. leg ♂ 14 mill.; ♀ 9 mill. Eight ♂, two ♀.

The subimago, which alone was known to Say, is a very different looking insect from the imago; but having found a specimen drowned in the act of moulting, I succeeded in detaching the subimaginal film from the abdomen and from one wing, thus proving their identity. Say states that in ♂ "the nervures are brown and margined with brown, more particularly so at the base, middle and tip of their costal margins." This makes, of course, 3 darker clouds on the base, middle and tip respectively of the costal margin, which are more or less plain on all my specimens both ♂ and ♀, the central cloud always very distinct, the basal one the least so. Dr. Hagen has misunderstood Say's language, and abridging his description says, "veins clouded with fuscous, especially the basal discoidal and apical ones," which would make three fuscous fasciæ. It may be added to Say's description, that the antennal seta is fuscous, the basal joints pale, sometimes tipped with fuscous; that the ♂ and ♀ anterior legs are a shade darker than the posterior ones; and that besides the femoral bands, the base and tip of the tibiæ, and the tarsal incisures and tips, are also brown in all the legs. The abdominal setæ are pale brown with brown incisures, pilose at tip; and the wings are very finely ciliated behind.

Length 10½—14 mill. Alar exp. 24—32 mill. Setæ 10—14 mill. Ant. ♂ leg 9 mill. Ant. leg ♀ 8½ mill. Five ♂, two ♀.

*BÆTIS ALTERNATA*? Say.—♂ Piceous brown. The lower ¼ of the eyes, in the living insect, is separated from the upper ¾ by a black line; antennal seta dusky; epistoma pale. Base of scutell yellowish all round. Sternum a little marked with yellowish. Abdomen with two lateral basal triangular yellowish spots on segments 2—9 or 4—9 more or less confluent, sometimes extending to the dorsum; on joints 7 and 8 and sometimes on 6, one or both of these spots often enclose a longitudinal brown line and are much elongated; venter pale, each joint generally with a small central basal spot, two transverse medial dots and an oblique slightly abbreviated lateral line, brown; joints 1—2 and 8—9 sometimes almost brown; setæ whitish with brown incisures; anal appendages pale, generally brownish at base. Anterior legs pale brown, posterior 4 almost pale, all with the extreme base and tip and a wide subterminal band on the femora, base and tips of the tibiæ and the tarsal incisures and tips, brown. Wings hyaline, glittering, with fuscous veins and cross-veins, the veins rather fine, except the three on the costa which are quite coarse, and the cross-veins,

except the oblique basal subcostal one which is quite coarse, so very fine as to be almost imperceptible to the naked eye, giving the whole wing a very peculiar appearance. The anterior ♂ tarsus is very long; in the living insect the first joint is seen to be freely moveable.

The ♀ has two diverging carinae between the ocelli, the anterior and lateral edges of the vertex, and sometimes its medial carina, and on each side two abbreviated vittae, yellowish. The markings of the abdomen are occasionally indistinct.

Length ♂  $10\frac{1}{2}$ — $12\frac{1}{2}$  mill.; ♀  $10$ — $11\frac{1}{2}$  mill. Alar exp. ♂  $23$ — $30$  mill.; ♀  $26$ — $32$  mill. Length ♂ seta  $19$ — $31$  mill.; ♀  $18$ — $19$  mill. Length ♂ ant. leg (one specimen)  $16$  mill. Ant. tarsus  $9$  mill.; ♀ ant. leg (same size)  $8$  mill. Described from fifteen ♂, six ♀. Say states that the wings are "whitish," or "hyaline with a whitish reflection." In other respects his description agrees with the ♀ of the above. Very abundant at Rock Island, and I have also taken it on Coal Valley Creek, Rock Island Co. and the Des Plaines River near Chicago.

The ♂ and ♀ subimago, with which Say was not acquainted, differ from the imago in the colors and markings being darker and more obscure, and in the wings being fumose and the veins and cross-veins coarser and more distinct. The tips of the hind wings, including the nervures, are pale greenish. As in all other subimagos known to me, the posterior edge of the wings, when held up to the light, exhibits under a strong lens a ciliated appearance, and the setae are pilose. The ♂ anterior legs are no longer than those of ♀.

Length ♂  $11$  mill.; ♀  $10$ — $12$  mill. Alar exp. ♂  $29$  mill.; ♀  $29$ — $30$  mill. Seta ♂  $13$  mill.; ♀  $14$ — $15$  mill. Length ant. ♂ leg  $8$  mill; it tarsus  $4$  mill. One ♂, two ♀.

?? *Batis*. Subgenus B.—First tarsal joint large, always larger than any of the three following; in anterior ♂ and ♀ legs free, distinct; in 4 posterior ♂ and ♀ legs connate, indistinct; joints 1—4 regularly and moderately diminishing in length; no difference in the relative proportions of ♂ and ♀ anterior tarsal joints. A rudimental intermediate seta, sometimes turned downwards.

*BÆTIS ARIDA?* Say.—♂ Ferruginous. Head light ferruginous; ocelli not approximate, subequal; a large black spot on the inside orbit of each posterior ocellus, and a small spot on the back part of the front one; eyes in the dried specimen black, occasionally with a broad interior pale purple vitta; seta pale at tip, sometimes entirely pale. Thorax and abdomen piceous above, except the last abdominal segment, with ferruginous semicircles or triangles on the basal half of each piceous segment of the abdomen; longitudinal middle of sternum and venter piceous; seta pale greenish; anal appendages sometimes fuscous towards the tip. Anterior legs long, obscure greenish, fuscous on the terminal half of the femora and the tibial and tarsal tips, occasionally entirely fuscous, except the basal half of the tarsal joints; four hind legs greenish white, a little cloudy at the tips of the tarsi; the first tarsal joint in the anterior leg is free in the living insect. Wings hyaline; veins and cross-veins subequal, rather fine, greenish-hyaline, with a trace of fuscous at the extreme base of the costa.

The ♀ differs from the ♂ as follows: The eyes of the living specimen are ferruginous, with a broad yellowish vitta dividing them into two equal portions, in the dead specimen dark ferruginous; the vertex is yellow, sometimes with a ferruginous vitta. Except in two specimens, where the markings are similar to those of ♂, the body is of a nearly uniform ferruginous color; the anterior legs are generally marked as in the exceptional ♂ specimen; and the nervures of the wings, except occasionally on the posterior margin of the front wings, are pale fuscous. Similar sexual variations in the color of the wing veins occur in *Palingenia*.

Length ♂  $10$ — $12$  mill.; ♀  $9$ — $13$  mill. Alar exp. ♂  $22\frac{1}{2}$ — $25\frac{1}{2}$  mill.

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♂ 23½—32 mill. Seta ♂ 18—23 mill.; ♀ 17—26 mill. Length anterior leg ♂ 9½ mill.; ♀ (same size) 7½ mill. Described from six ♂, nine ♀. Say says, "Vertex with a small black spot each side on the orbit." Did he refer to the orbits of the ocelli? There are no other spots on the head in my species. His description was posthumously published, and lacks the word "brown" or "piceous" at the end.

The ♂ ♀ subimago, which are undescribed by Say, and from which I have bred numerous specimens of the imago, differ from the imago as follows: The ♂ body is often of an obscure grayish fuscous color, the lateral markings of the abdomen, when present, being more obscure than in the imago; in the ♀ these markings are never visible. The eyes of the living ♂ insect are separated by a narrow fissure, sometimes visible even in the dried specimen, whereas, in ♂ imago they are always contiguous. The abdominal setæ are greenish obscure, sometimes a little dusky at tip, always pilose under the lens. The anterior legs ♂ ♀ do not differ in length from one another, and are generally entirely fuscous, except the base of the first and sometimes of the second tarsal joints. The wings are clouded with dusky, especially towards the tips; veins and cross-veins dusky, rather coarse, subequal; all the cross-veins bordered with fuscous; hind wings conspicuously and widely bordered with fuscous behind.

Length ♂ 8—11½ mill.; ♀ 9—12½ mill. Alar exp. ♂ 20—24 mill.; ♀ 26—32 mill. Seta ♂ 12—14 mill.; ♀ 10—14 mill. Eight ♂, five ♀. Differs from *B. ignava*, Hagen (a subimago) chiefly in the feet not being rufous.

*BÆTIS SICCA*, n. sp.—♂ Ferruginous. Head light ferruginous; seta pale; eyes in the dried specimen blackish; orbits of ocelli not conspicuously darker inside. Thorax piceous; pleura ferruginous; sternum piceous. Abdomen piceous above, except the last segment; setæ pale greenish, slenderly incised with fuscous; anal appendages a little darker towards the tip. Anterior legs short, piceous, except the tip of the tibia, which is black, and the first tarsal joint, which is always conspicuously pale, except at the incisures; four posterior legs pale greenish, extreme tarsal tips cloudy. Wings hyaline, veins and cross-veins subequal, rather fine, fuscous, in a very mature specimen pale fuscous.

The ♀ differs from ♂ in the thorax and abdomen being immaculate, and in the anterior tarsi being pale fuscous, except the first joint, which is pale as in ♂.

Length ♂ 8½—10 mill.; ♀ 8½—11½ mill. Alar exp. ♂ 19—22 mill.; ♀ 23—27 mill. Seta ♂ 19 mill.; ♀ 15 mill. Anterior leg mature ♂ 6 mill.; ♀ (similar size) 5½ mill. Three ♂, two ♀. May be easily confounded at first sight with *arida*, but is sufficiently distinct by the short anterior ♂ legs, the pale first tarsal joint in ♂ ♀ anterior legs and the fuscous ♂ wing-veins. This, as well as *arida*, Say, differs from *vicaria*, Walker, and *annulata*, Walker, in the four posterior legs not being two- or more banded, and in some other respects.

The ♂ ♀ subimago are scarcely distinguishable from those of *arida*, but the eyes of the living ♂ are contiguous. The species occurs a month later than *arida*.

§§ *Bætis*. Subgenus C.—First tarsal joint indistinct, connate, moderate, equal to about ⅔ joint 2, except in anterior ♂ tarsus, where it is about ⅓; joints 2—4, moderately diminishing in length in all ♂ ♀ legs. No intermediate seta visible, even in the living insect.

*BÆTIS DEBILIS*? Walker, Catal.—♂ Ferruginous. Eyes in the living insect with their lower fourth fuscous and their upper three-fourths brown, and with coarser facets; seta of antennæ dusky, pale at tip. Thorax generally piceous. Abdomen with the terminal third or half of each joint more or less piceous; anal appendages pale; seta whitish, immaculate. Legs pale greenish, with a median narrow band on the femora, and generally the knees, fuscous; the anterior legs generally with the tips of the tibia and tarsal incisures and tips fuscous; the four hind legs with only the tarsal tips fuscous. Wings hyaline; veins and

cross-veins moderate, subequal, pale greenish hyaline, except the basal third of the three costal veins, and occasionally their tips, which are fuscous; in the hind wings they are all immaculate.

The ♀ differs from ♂ as follows: The general color is paler; the thorax is generally almost yellow; the abdomen ferruginous, each joint generally darker at tip; and the wing-veins are dusky along the costa and at the tip of the wing, gradually becoming hyaline as they approach the postcostal angle.

Length ♂ 4—5½ mill.; ♀ 5—7 mill. Alar exp. ♂ 14—15 mill.; ♀ 15—16 mill. Seta ♂ 13—14 mill.; ♀ 8—11½ mill. Anterior leg ♂ 7 mill.; ♀ (same size) 5 mill. Eight ♂, eight ♀. The diagnosis of *debilis* is so brief that it is scarcely sufficient.

The ♂ subimago differs from the imago in the general color being obscure; the thorax is almost yellowish, and the abdomen obscure piceous or ferruginous, immaculate; the anterior tarsi are fuscous; the abdominal seta cloudy at tip and pilose under the lens; the wings are fumose, the veins and cross-veins fuscous, the former rather coarse, the latter moderate; and the fringe on the posterior edge of the wings is long and dense.

Length ♂ 4½—5½ mill. Alar exp. ♂ 13—15 mill. Seta ♂ about 5 mill. Anterior leg ♂ (same size as ♂ imago) 5 mill. Two ♂; ♀ unknown.

#### POTAMANTHUS.

*POTAMANTHUS CUPIDUS*, Say.—Undescribed imago.—♂ Piceous, highly polished; venter, except the penultimate joint, ferruginous; anal processes pale; setæ whitish, with fuscous incisures alternately wide and narrow on the basal half, uniform behind the middle, and towards the tip becoming very wide. Anterior legs brown, darker at the knees and the tips of the tibia; four hind legs pale yellowish brown, immaculate. Wings hyaline, veins rather coarse, especially on the costa, cross-veins fine, the former fuscous, except on the postcosta, where they are hyaline; the latter hyaline, except at the subcostal tip of the front wing, where they are fuscous.

Length ♂ 7½ mill. Alar expanse ♂ 18 mill. Setæ ♂ 18½ mill.; intermediate seta about 16 mill. Anterior leg ♂ 8 mill. One ♂; ♀ unknown.

The subimago, which alone was known to Say, and from which, after several unsuccessful attempts, I finally succeeded in breeding the ♂ imago, occurs rather abundantly on rafts of Wisconsin pine-logs from the middle of May to the middle of June, unaccompanied, so far as I could discover, by the imago. The "two divergent, abbreviated, obsolete, whitish lines" which Say mentions as peculiar to the ♂ (= ♀ apud Say) I noticed only in a single ♀, and they disappear in death.

Length ♂ 7—9 mill.; ♀ 9 mill. Alar exp. ♂ 20—26 mill.; ♀ 19—24 mill. Setæ ♂ 11—14 mill.; intermediate seta ♂ 9—12 mill. Setæ ♀ 8½—11½ mill.; intermediate seta ♀ 8—10½ mill. Ant. leg. ♂ 8 mill.; ♀ (same size) 7 mill. Eleven ♂, three ♀.

*POTAMANTHUS ? ODONATUS*, n. sp.—Piceous; sex uncertain; head, anterior legs and abdomen deficient. Posterior legs pale ferruginous, tips of tarsi cloudy. Wings hyaline; veins moderate, fuscous; paler towards base; cross-veins fine, fuscous at terminal half, hyaline at basal half; terminal one-third of anterior wing dusky, with a definite outline.

Alar expanse 25 mill. I have referred this fragmentary specimen, which I found drowned in a pool of water, to *Potamanthus*, because it agrees with that genus in its tarsal structure (which is the same as that of *Batis*, subgenus C,) and also in its peculiar neurulation,—viz.: four veins on the postcosta, the anterior one much curved, and emitting anteriorly from its centre a bifurcate vein. I am not aware that there are any other examples in *Ephemera* of the style of ornamentation, so characteristic of the *Odonata*, which prevails in the wings of this species.

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## PALINGENIA.

§§ *Palingenia*. Subgenus A.—First tarsal joint distinct in the anterior legs, indistinct and connate in the four posterior legs; legs short, hind legs not nearly attaining the tip of the abdomen; intermediate seta rather short; eyes of ♂ separated by a space as wide as the orbit of the posterior ocellus.

*PALINGENIA VITTIGERA*, n. sp.—♂ Yellowish. Ocelli and vertex piceous; antennæ pale ferruginous, seta whitish at tip. Prothorax piceous on its dorsum; thorax piceous to the base of the wings. Abdomen piceous on its dorsum, dorsum of each joint with two narrow, yellowish, divergent basal vittæ extending half way to its tip; anal appendages yellowish; setæ whitish, immaculate. Legs yellowish, anteriors with the base and tips of the tibiæ, and the tarsal incisures and tips fuscous; four hind legs with only the tips of the tibiæ and the tarsal tips fuscous. Wings hyaline; veins and cross-veins fine, subequal, hyaline, except on the costa, where they are coarse, the first vein fuscous at base, yellowish at tip; the second and third yellowish throughout; the costal cross veins fuscous at base, becoming yellowish towards the tip of the costa; in the hind wings two costal veins, with their connecting cross-veins, are pale fuscous.

Length ♂ 18 mill. Alar expanse ♂ 32 mill. Setæ ♂ about 40 or 50 mill. Intermediate seta ♂ 5 mill. Anterior leg ♂ 9 mill.; ♀ unknown.

§§ *Palingenia*. Subgenus B.—First tarsal joint distinct in the anterior legs, indistinct and connate in the four posterior legs; legs short, except the ♂ anterior legs, hind leg not attaining the tip of the abdomen; intermediate seta rudimental; eyes ♂ separated by a space twice as wide as the orbit of the posterior ocellus.

*PALINGENIA LIMBATA*, Pictet, (= No. 4, *P. bilineata*, Say, apud Hagen,) *P. BILINEATA*, Say, (= No. 5, *P. limbata*, Guérin, apud Hagen.)—An attentive comparison of Say's description with Dr. Hagen's diagnoses will, I think, satisfy any one that Dr. Hagen has wrongly identified Say's species, and that his No. 5, not his No. 4, is the true *bilineata*, Say. The following particulars in Say's description apply to No. 5, as described by Dr. Hagen himself, and not to No. 4: "Prothorax blackish each side and before;" "wings hyaline, *whitish*, with *fuscous* nervures;" [Say describes the ♀ of his species, and the ♀ of No. 4 has *yellowish* wings with *yellow* veins;] "a double series of *whitish*, *OBLIQUE*" —[typographical or clerical error for *OBLONG*?]—"dilated abbreviated lines" on the abdomen. Moreover, Say describes it as "appearing in considerable numbers." Now, No. 5 positively swarms at Rock Island every summer, and I found it in similar profusion in Southern Illinois on the Ohio River; No. 4, on the contrary, is quite rare; I have met with only nine or ten specimens in five years near Rock Island, and in Southern Illinois I did not meet with any at all. Mr. Uhler agrees with me, as appears from his note in Say's Works, (i. p. 203.)

§§ *Palingenia*. Subgenus C.—First tarsal joint distinct in all the legs, freely movable by the living insect in the anterior legs; legs all long; hind legs much more than attaining the tip of the abdomen; no intermediate seta; eyes ♂, separated by a space at least as wide as the orbit of the posterior ocellus.

*PALINGENIA FLAVESCENS*, n. sp.—♂ Yellowish. Ocelli fuscous; vertex ferruginous; seta dusky, whitish at tip. Thorax ferruginous, sometimes verging on piceous. Dorsum of abdomen ferruginous, joints 1—6 darker at tip, and with two subobsolete pale basal vittæ on the dorsum; venter pale greenish, except the three or four last joints; anal processes pale, fuscous at tip; setæ whitish, the incisures fuscous, occasionally towards the base alternately white and narrow. Anterior legs pale ferruginous; a medial and terminal band on the femora, tips of tibiæ and tarsal incisures and tips fuscous; four hind legs

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yellowish, with the tips of femora fuscous, and the tarsal incisures and tips a little cloudy. Wings hyaline, with a pale ferruginous cloud along the costal tip; veins and cross-veins moderate, subequal, fuscous, except the three costal veins which are coarse, yellowish on their basal two-thirds, fuscous on their terminal one-third, where the cross-veins also are coarse, the oblique basal cross-vein being always very coarse; half way to the tip the second costal vein is always thickened and obfuscated for the length of half a millimetre, sometimes obviously, sometimes indistinctly.

The ♀ is paler than the ♂; the vertex and thorax being rather luteous than ferruginous, and the dorsum of the abdomen pale fuscous, or pale ferruginous, with no appearance of any vittæ; in one specimen the setæ are immaculate, except at the extreme tip; the costal cross-veins are hyaline on their basal  $\frac{2}{3}$ .

Length ♂ 9—13 mill. ♀ 10—13 mill. Exp. ♂ 24—31 mill. ♀ 27—34 mill. Seta ♂ 27—38 mill. ♀ 27—28 mill. Ant. leg ♂ 13 mill. ♀ (same size) 10 mill. Eleven ♂, three ♀. Resembles *Batis vicaria*, Walker, but differs in the coloring of the wing-veins.

The ♂ subimago differs from the ♂ imago in the vittæ of the abdomen being obsolete. The setæ are obscure greenish, immaculate, pilose; the anal processes are immaculate; the wings are slightly tinged with fuscous, and ciliated behind, and the coloring of the veins and cross-veins is not so strongly marked.

The ♀ subimago differs from the ♀ imago in the abdominal joints, 1—6 being of a deep egg-yellow, from the included eggs showing through the integument; the seta is pale, a little fuscous at tip; the wings are subflavescent, subopaque, ciliated behind; the veins yellowish, and the cross-veins also yellowish, except on the disk and tip.

Length ♂ 10 mill.; ♀ 11½ mill. Alar exp. ♂ 29 mill.; ♀ 30 mill. Seta ♂ 17 mill.; ♀ 13 mill. Ant. leg ♂ ♀ 10 mill. One ♂, one ♀.

**PALINGENIA (BÆTIS) INTERPUNCTATA**, Say.—♂ Yellowish. Eyes in the living insect pale greenish yellow, a black longitudinal line dividing them into two equal parts. Ocelli with fuscous orbits; a black spot on each side between the eyes, sometimes indistinct from the vertex being obfuscated; beneath each antenna a black spot, a little elongated transversely, but not angulated, except when viewed obliquely. Prothorax with a basal triangle, and a line on each side black; dorsum of thorax piceous. Abdomen pale obscure greenish; a dorsal line generally wide, sometimes narrow, and the terminal  $\frac{1}{3}$  of each joint piceous; the last two or three joints almost entirely piceous; the dorsal line, when wide, incloses on joints 1—6 or 1—7 a lateral pale spot; venter pale obscure-greenish, with the tips of the segments darker; anal appendages pale, sometimes cloudy at tip; setæ pale greenish, the incisures distinctly but narrowly fuscous, except in one immature specimen. Anterior legs pale greenish yellow, with a medial and terminal band on the femora, the tips of the tibiæ and the tarsal incisures and tips fuscous; four hind legs somewhat paler, but similarly marked, except in a single specimen, where the medial band of the femora is subobsolete, and except also that only the extreme tip of the tibiæ is fuscous. Wings hyaline, clouded with yellowish brown on the costa, especially on the terminal one-third; the veins fine, except the three costal veins, which are coarse; the cross-veins rather coarse, on the costa very coarse; all fuscous, except the basal two-thirds of the three costal veins, which are yellowish; on the middle of the costa, between the third costal vein and that immediately behind it, is a very coarse black streak, about one-half millimetre long. The hind wings are always distinctly tipped with brown.

The ♀ differs from the ♂ as follows: The basal triangle of the prothorax is generally reduced to a black dot; the dorsum of the thorax is luteous. The abdomen and venter are egg-yellow, from the included eggs showing through,

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and the dorsal and terminal line of each abdominal segment is much narrower, the penultimate joints not differing in color from the others, and the last joint being whitish; the ventral joints, instead of being darker, appear paler at tip; the setæ are whitish, almost immaculate. The costa is clouded with yellowish, not darker on the tip: and the veins and cross-veins on the postcosta of the front wings, and on the whole of the hind wings, except the tip, are yellowish hyaline.

Length ♂ 7—7½ mill.; ♀ 5—10 mill. Alar exp. ♂ 18—21 mill.; ♀ 16½—29 mill. Seta ♂ 20—25 mill.; ♀ 14—24 mill. Ant. leg ♂ 10 mill.; ♀ (same size) 6 mill. Eight ♂, three ♀.

The ♂ subimago differs from the ♂ imago in the colors being paler and obscurer; the setæ are immaculate and pilose; the wings are ciliated and tinged with fuscous, or in very immature specimens opaque and tinged with yellow, and the veins and cross-veins colored as in ♀.

The ♀ subimago differs from the ♀ imago in the prothorax being generally fasciate posteriorly with black; the abdomen is generally widely vittate with fuscous, the vitta on each joint inclosing a lateral pale spot as in the normal ♂; the setæ and wings are as in ♂ subimago.

Length ♂ 6—10 mill.; ♀ 6—10 mill. Alar exp. ♂ 17—25 mill.; ♀ 20—30 mill. Seta ♂ 9—15 mill.; ♀ 7—14 mill. Ant. leg ♂ 8½ mill.; ♀ (same size) 8 mill. Five ♂, five ♀. Say states of the imago, that “the stemmata are distant,” which is true of ♀, but not of ♂; and that “the setæ are immaculate,” which is not generally true of ♂. Again he says, that “the abdomen at tip is more or less obviously ferruginous,” which is true of the ♂, but not of the ♀; and in some other respects his description disagrees. This insect is referred by Say to the genus *Batis*, and so is *Palingenia bilineata*.

*PALINGENIA PULCHELLA*, n. sp.—♂ Whitish. Eyes in the living insect pearly whitish, changing to blackish even before death; ocelli ferruginous, their orbits often blackish; seta fuscous at base, pale at tip; all above behind the ocelli ferrugino-piceous, except the meso- and meta-thoracic scutella, which are whitish, and the base of the seventh abdominal joint, and all but the extreme terminal edge of joints 1—6, which are whitish hyaline, with a large subterminal lateral fuscous dot upon each. Setæ whitish with fuscous incisures, alternately narrow and wide on the basal half. Beneath all whitish, except the sternum, which is light ferruginous, especially in front. Anterior legs pale yellowish, with a medial and terminal band on the femora, tips of the tibiae, and the tarsal incisures and tips fuscous; four hind legs whitish, the markings the same but paler, and the medial femoral band sometimes obsolete. Wings hyaline, with a pale brown cloud on the tip of the costa; the veins fine, except on the costa, the cross-veins rather coarser, especially on the costa; all fuscous, except the basal two-thirds of the costal veins, which are yellowish; the oblique cross-vein at the base of the costa is very coarse. In the hind wings the postcostal veins and cross-veins are hyaline.

The ♀ differs from the ♂ as follows: The vertex is whitish, varied with luteous or ferruginous; the thorax is whitish, varied with luteous, and the sternum and pleura whitish. The abdomen and venter are egg-yellow, except where the eggs have been partially extruded; abdominal joints 1—6 marked as in ♂; 7—9 sometimes slightly tinged with ferruginous above, sometimes immaculate. The cloud on the costal tip is paler, and the veins and cross-veins of the hind wings are mostly hyaline.

Length ♂ 6—7 mill.; ♀ 5½—6½ mill. Alar exp. ♂ 15—21 mill.; ♀ 17—22 mill. Seta ♂ 17—21 mill.; ♀ 15—16 mill. Ant. leg ♂ 9½ mill.; ♀ (same size) 5½ mill. Twelve ♂, eight ♀.

The ♂ ♀ subimago, from which I have bred the imago, have the body colored as the imago, but paler and obscurer. The setæ are obscure pale greenish, less distinctly annulate, and scarcely pilose, except at base. The wings are subopaque, clouded with fuscous; the fuscous cross-veins bordered

with fuscous, and the hind edge of the wings ciliated. The hind wings are paler, and tipped with fuscous.

Length ♂ 5—8 mill.; ♀ 6—8 mill. Alar exp. ♂ 18—20 mill.; ♀ 19—23 mill. Seta ♂ 10—13 mill.; ♀ 8—13 mill. Ant. leg ♂  $6\frac{1}{2}$  mill.; ♀ (same size) 6 mill. Ten ♂, seven ♀.

*PALINGENIA TERMINATA*, n. sp.—♂ When alive this insect is generally distinguishable from the above by the eyes being yellowish, not pearly whitish. The dried specimen differs as follows: The color is yellowish. The parts which are ferrugino-piceous in *pulchella* (imago), even immediately after moulting, are almost always ferruginous or luteous; the meso- and meta-thoracic scutella are sometimes tipped with white, but rarely entirely white; the lateral dots of the abdomen are always absent; the sternum is almost always immaculate; the medial band on the four posterior femora is generally obsolete; the cross-veins are scarcely coarser than the veins, giving the wings a paler appearance; and generally there is discoverable on the second costal vein the same short streak found in *flavescens*, which is only seen in a single ♂ *pulchella*. Two somewhat immature specimens are almost entirely whitish, except that the vertex is partly ferruginous, and there is a ferruginous cloud on the tip of the abdomen.

The ♀ is scarcely distinguishable from ♀ *pulchella* but by the yellowish color, the absence of the lateral dots of the abdomen, and the frequency of the streak on the second costal vein.

Length ♂  $6\frac{1}{2}$ —8 mill.; ♀ 8— $8\frac{1}{2}$  mill. Alar exp. ♀ 18— $21\frac{1}{2}$  mill.; ♀ 23—25 mill. Seta ♂ 19—22 mill.; ♀ 18—22 mill. Ant. leg ♂ 10 mill.; ♀ (same size) 7 mill. Twelve ♂, five ♀.

The ♂♀ subimago differ from ♂♀ imago, as in *pulchella*. They are scarcely distinguishable from the subimago of *pulchella*, except by the absence of the lateral abdominal dots.

Length ♂  $6\frac{1}{2}$ —7 mill. ♀  $6\frac{1}{2}$ —8 mill. Alar exp. ♂ 19—20 mill. ♀  $21\frac{1}{2}$ —24 mill. Seta ♂ 12—13 mill. ♀ 15—18 mill. Ant. leg ♂ ♀ (same size)  $5\frac{1}{2}$  mill. Two ♂; two ♀.

#### EPHEMERA.

*EPHEMERA DECORA*? Walker Catal.—♂ Piceous. Seta of antennæ pale at tip. Sternum a little varied with luteous. Abdomen luteous, each segment with a broad lateral dusky vitta, emarginate on its four sides and confluent at its four angles with the adjoining ones, towards the tip of abdomen almost entirely confluent; venter similarly marked; anal processes and setæ pale obscure greenish, the latter regularly incised with fuscous, and the intermediate one slightly the shortest. Anterior legs pale greenish, the femora, base and tip of tibia and tarsal incisures and tips, fuscous; four hind legs pale greenish, with only the tips of the tarsi fuscous. Wings hyaline; veins and cross-veins moderate, subequal, fuscous; the cross-veins irregularly bordered with fuscous, except on the extreme tip and the posterior margin; on the basal disc of the wing, and transversely from the middle of the costa nearly to the hind margin, these borderings become confluent, so as to exhibit a spot and a semi-fascia, both of them irregular in outline; on the costa they are wider, towards the tip of which there is a pale brownish cloud; the hind wings are lightly tipped with fuscous.

The ♀ has a very high and acute carina, divaricate and extending from the occiput to the orbit of the posterior ocellus; in the ♂ this carina is not so obvious. The sternum is paler. The lateral abdominal vittæ are not nearly confluent from joint 2 to joint 6; and on the venter they are reduced to an abbreviated line.

Length ♂ 10 mill. ♀ 13 mill. Alar exp. ♂ 23—25 mill, ♀ 27 mill. Setae ♂ 25 mill. ♀ 15 mill. Interm. seta ♂ 20—21 mill. ♀ 13 mill. Ant. leg ♂ 12 mill. ♀ 6 mill. Two ♂, one ♀.

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The ♀ subimago is of a nearly uniform obscure fuscous color, the abdomen with only a trace of the pale colors of the imago. The legs are obscure greenish, immaculate, the front legs a little the darkest. The three setæ are equal, greenish-fuscous and pilose; and the wings slightly tinged with fuscous and ciliate behind.

Length ♀ 10–11 mill. Alar expanse ♀ 24–26 mill. Setæ (3) ♀ 10 mill. Two ♀; ♂ unknown. This is probably *E. simulans* Walk. Cat. I obtained all my specimens in company on the Desplaines River, near Chicago. The imago differs from Dr. Hagen's diagnosis by the thorax not being "luteous" above and the wings not "yellowish-hyaline."

*EPHEMERA FLAVEOLA*, n. s.—♂ Yellowish. Vertex ferruginous; orbits of ocelli and basal joints of antennæ a little dusky; seta pale. Thorax pale ferruginous. Abdomen with a lateral pale fuscous vitta on joints 3–7 interrupted at the sutures; setæ not quite of equal length, whitish, with the incisures regularly fuscous. Legs yellowish, the anteriors with the terminal half of the femora ferruginous, and the tips of the tibiæ, the first tarsal joint, the incisures of the others and the tarsal tips, fuscous; the hind legs with only the tarsal tips fuscous. Wings hyaline, with a slight yellowish tint on the costa, the veins and cross-veins fine, subequal, hyaline, except the three costal veins and the basal cross-vein which are coarse and yellowish.

The ♀ differs only from the ♂ in the abdomen being egg-yellow wherever it contains eggs; and in the cross-veins of both wings being fuscous, except at the tip and along the posterior margin.

Length ♂  $7\frac{1}{2}$ – $9\frac{1}{2}$  mill. ♀ 9– $10\frac{1}{2}$  mill. Alar exp. ♂ 17–19 mill. ♀ 19–20 mill. Setæ ♂ 20 mill. ♀ 12 mill. Interm. seta ♂ 14 mill. ♀ 10 mill. Ant. leg ♂  $8\frac{1}{2}$  mill. ♀ (same size) 6 mill. Four ♂, three ♀.

The ♂♀ subimago differ from ♂♀ imago only in the setæ being subequal, obscure pale greenish and pilose, and in the wings being subopaque, tinged with dusky, and ciliated behind; in one ♂, but not in ♀, the veins and cross-veins are slightly dusky.

Length ♂ 7–9 mill. ♀  $8\frac{1}{2}$  mill. Alar exp. ♂ 19–20 mill. ♀ 20 mill. Setæ (3) ♂ 9–12 mill. ♀ 12 mill. Two ♂, one ♀.

*EPHEMERELLA*, new genus (= *Leptophlebia*, Westw.?)

Three long and equal caudal setæ; wings four, hind wings wide with several veins; transverse veins rather numerous, absent, except the basal cross-vein, on the basal two-thirds of the costa of front wing, and the hind margin of both wings, where there are many short, isolated veinlets; eyes ♂ simple, contiguous; ocelli three, nearly transverse, contiguous ♂, somewhat remote ♀. First tarsal joint indistinct, except in anterior ♂ tarsus; more than one-half as long as joint 2, except in anterior ♂ tarsus where it is less than one-fourth as long; joints 2–4 subequal in all the ♂♀ legs, 4 rather the shortest.

*EPHEMERELLA EXCRUCIANS*, n. sp.—♂ Yellowish. Eyes in the living insect egg-yellow on their upper three-fourths, pale fuscous on their lower one-fourth; vertex and antennæ ferruginous; seta and orbits of ocelli fuscous. Dorsum of thorax and of abdomen ferruginous, the latter sometimes almost piceous; setæ whitish, with regular fuscous incisures, becoming indistinct at tip. Legs all pale yellow, with the tips of all the tarsi and in the anterior legs the first tarsal joint and the tarsal incisures, cloudy. Wings hyaline, with a slight yellowish tinge on the costa; veins moderate, cross-veins fine except on the costal tip, all hyaline.

The ♀ differs from the ♂ in the veins on the anterior part of the wing being slightly tinged with fuscous.

Length ♂  $5\frac{1}{2}$ – $7\frac{1}{2}$  mill.; ♀  $5\frac{1}{2}$ – $6\frac{1}{2}$  mill. Exp. ♂  $14\frac{1}{2}$ –18 mill.; ♀ 15–19 mill. Setæ ♂ 11–13 mill. ♀ 10– $12\frac{1}{2}$  mill. Ant. leg ♂ 7 mill. ♀ (same size)  $4\frac{1}{2}$  mill. Twelve ♂, five ♀.

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The ♂ ♀ subimago differ only in the usual manner from the imago. One ♂, one ♀.

*EPHEMERELLA CONSIMILIS*, n. s.—♂ Differs from the preceding chiefly in the great elongation and narrowness of the mesothorax, its anterior lobe or præscutum being half as long again as wide, and the whole mesothorax being four or five times as long as wide; whereas in *excrucians* the anterior lobe is scarcely longer than wide, and the whole mesothorax is scarcely three times as long as wide. The sternum is ferruginous, and the legs are immaculate, except the tips of anterior tibia and the first tarsal joint, which are fuscous.

Length ♂ 5 mill. Alar exp. ♂ 14 mill. Seta ♂ about 5 mill. One ♂, which has both the left and the intermediate seta remaining; ♀, unknown.

#### BÆTISCA. New Genus.

Wings four; front wings with numerous cross-veins; costal cross-veins, except the basal one and those on the terminal one-third of costa, scarcely visible, entirely absent on the middle of the costa; terminal veinlets distinct, not branching from the veins, but partly connected with them by cross-veins. Hind wings wide, with numerous veins, and except towards the tip with numerous cross-veins; tip with many isolated veinlets. Eyes ♂ contiguous, simple. Body very robust; middle piece of prosternum deeply and very widely emarginate behind; anterior mesothoracic lobe not nearly half as long as wide, and transversely truncate; mesothoracic scutellum very large, horizontally extended so as to attain the tip of the first abdominal joint. Fifth abdominal joint twice as long as any of the others, which are subequal. Setae three, exterior ones short, middle one rudimental, distinct, exarticulate. Tarsal structure as in *Bætis* subgenus B.

*BÆTISCA* (*BÆTIS*) *OBESA*, Say.—Undescribed imago.—♂ Ferruginous-piceous. Each side of the epistoma with a divergent basal elliptical carina, confluent at its base with the central carina; antennae ferruginous, seta generally pale, sometimes fuscous at base. Sternum paler behind, especially the space between the posterior coxae. Abdomen paler, sometimes quite pale, with the tips of the joints whitish; anal processes pale, sometimes fuscous at tip; setae whitish, with regular fuscous incisures at base, which generally disappear towards the tip; intermediate seta ferruginous, about half a millimeter long. Legs pale greenish-yellow, anterior legs with the knees and the tarsal incisures and tips slightly fuscous; hind legs with only the tarsal tips cloudy. Wings hyaline, the veins fine, except the three costal veins which are rather coarse; the cross-veins so fine as to be invisible to the naked eye except on the costal tip, where they are somewhat coarser, and except also the oblique basal cross-vein, which is particularly coarse; costal veins yellowish, the third vein piceous at its extreme base; a few of the principal veins slightly tinged with fuscous, the rest, as well as the cross-veins, hyaline.

The ♀ only differs from ♂ in the vertex being varied with ferruginous.

Length ♂ 7–8 mill.; ♀ 6–8 mill. Alar exp. ♂ 20–22 mill.; ♀ 22–24 mill. Seta ♂ 6–7 mill.; ♀ 6–7 mill. Ant. leg ♂ 8½ mill.; ♀ (same size,) 4 mill. Twenty ♂, ten ♀.

The subimago, which alone was known to Say, and from which I have obtained the imago, differs from the imago in the colors being darker and obscurer, and in the wings being "dark-brown, with numerous small, transverse, hyaline [spots or abbreviated lines, and a large hyaline,\*] very oblique, semifascia about the middle on the anal half." There is also another large, oblique hyaline semifascia at the costal tip, and, as Say adds, the hind wings, except at tip, have numerous transverse, abbreviated, hyaline lines. The setae are obscure green, with fuscous incisures. One specimen, captured a month before

\* The words included in brackets [ ] are omitted in the reprint of Say's Works.

the main brood appeared, has the hyaline part of the wings much extended, their brown color paler, and the setæ pale.

Length ♀ 7—9 mill. Alar. exp. ♀ 22—25. Seta ♀ 4—5 mill. Four ♀; ♂ unknown.

## CLOE.

♀♀ *Cloe*. Subgenus A. Wings four, cross-veins rather numerous, 50—60 in number. Hind wings with only two long veins and one short one.

CLOE FERRUGINEA, n. sp.—♂ Ferruginous. Eyes in the living insect double, the superior ones peduncled or contracted at their base, and separated above by a fissure; ocelli peduncled, the two hind ones overhung by the upper eyes, so as to be entirely concealed by the shrunken eye in the dried specimen; antennæ with the two basal joints long, each a little fuscous at tip; setæ whitish at base, fuscous at tip, in one instance *vice versa*. Anterior mesothoracic lobe subtruncate, the corners rounded; sternum pale, generally freckled with reddish-brown. Abdomen densely freckled with reddish-brown, occasionally almost piceous; venter pale reddish-white, not so much freckled; anal processes and setæ whitish. Legs pale-yellowish, with the tips of the tibiæ, the tarsal incisions and tips, and in the anterior legs the first tarsal joint, fuscous. Wings hyaline, a little yellowish on the costa; veins and cross-veins moderate, subequal, hyaline; the costal veins yellowish, and a few of the other veins generally tinged with fuscous; a pair of isolated veinlets between the tips of each pair of veins. Hind wings with numerous cross-veins on the two long veins.

Length ♂  $7\frac{1}{2}$ — $9\frac{1}{2}$  mill. Exp. ♂ 15—18 mill. Seta ♂ 15—17 mill. Five ♂; ♀ unknown.

The subimago, from which I have bred the imago, is darker and obscurer; the setæ scarcely pilose except at base; the wings fumose, the cross-veins whitish-hyaline, and bordered with whitish-hyaline, and the postcosta pale; the costal veins and the base of some of the other veins are fuscous, and the costa is fuscous. Hind wings pale. All four wings with dense and long ciliations behind.

Length ♀  $6\frac{1}{2}$  mill. Alar exp. ♀  $17\frac{1}{2}$  mill. Seta ♀ 9 mill. One ♀; like ♂, bred from. In this species the first tarsal joint is entirely obsolete in the four hind legs, but distinct in the ant. ♂ legs, where it is about a quarter as long as joint two, and also in ant. legs of ♀ subimago, where it is about half as long. In two imagos and one subimago, a very small intermediate seta was visible in the recent insect, which disappears in the dried specimen.

♀♀ *Cloe*. Subgenus B.—Four wings; cross-veins sparse, about 14—18 in number. Hind wings with only two veins.

CLOE FLUCTUANS, n. sp.—♀ Brownish white. Vertex sometimes ferruginous, and with a double longitudinal carina; basal joints of antennæ long; seta dusky, sometimes pale at base. Thorax with a double, light-brown vitta, confluent behind. Abdomen above and below generally brownish-white, sometimes varied with brown; in two specimens pale-brown, with the sixth segment brown above and beneath; seta whitish. Legs whitish, with the tips of tarsi cloudy. Wings hyaline, iridescent; veins rather coarse towards their origin, cross-veins fine; the veins generally brown, and occasionally edged with brown towards their origin, towards the postcosta hyaline; the cross-veins always hyaline; space between the first and second vein of the costa hyaline, with 15—18 small, brown spots on its anterior edge, a few of them confluent; behind the second vein a light brown vitta, containing about fourteen round hyaline spots—some of them confluent before or behind with the hyaline part of the wing—with its posterior edge variable and irregular, sometimes presenting six or seven large obtuse teeth. Isolated veinlets, mostly single. Hind wings, with many cross-veins.

Length ♀ 6—7 mill. Alar exp. ♀  $13\frac{1}{2}$ —17 mill. Seta ♀  $10\frac{1}{2}$ —12 mill.  
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Seven ♀; ♂ unknown. Tarsi as in *ferruginea*. Differs from *C. undata*, Pictet, in the setæ not being annulated, in the costal margin being amber brown, not fuscous, and in there being no fuscous cloud on the disk and posterior margin of the front wing.

*CLOE UNICOLOR?* Hagen.—♂ Obscure piceous. Eyes shrivelled, but apparently double; seta of antennæ fuscous. Abdominal seta pale, cloudy at tip. Legs all pale yellowish; tips of tarsi cloudy. Wings hyaline, veins moderate, cross-veins fine, the former sometimes slightly dusky, the latter hyaline; isolated veinlets in pairs. In the hind wings the space between the two veins is subopaque, and there are no cross-veins.

On the vertex ♀ there is a longitudinal dilated stria; the abdomen is bright ferruginous, with the incisures in the living insect pale, and a pale, lateral spot on each segment.

Length ♂  $2\frac{1}{2}$  mill.; ♀ 5 mill. Alar exp. ♂ 9 mill.; ♀ 12—13 mill. Seta ♂ 5 mill.; ♀ 6 mill. One ♂, three ♀. The diagnosis of *unicolor*, Hagen, is very brief.

*CLOE VICINA?* Hagen.—♂ Piceous. Eyes in the living insect, as in *C. ferruginea*, but the lower eye is not attached laterally to the upper eye, as in all other species with double eyes known to me, but at its posterior corner; seta of antennæ fuscous, pale at tip. Joints of abdomen whitish hyaline, with a lateral dot on each, except the four last, which are piceous; venter pale hyaline, the four last joints opaque whitish; setæ whitish, the incisures often fuscous towards the base. Legs pale, except the anterior femur, which is sometimes pale ferruginous; tips of tarsi cloudy. Wings hyaline iridescent; veins moderate, cross-veins very fine, all hyaline; isolated veinlets in pairs. In the hind wings the space between the two veins is subopaque, and there are no cross-veins.

The ♀ differs in the head, thorax, sternum and abdomen being ferruginopiceous, sometimes ferruginous; the venter is reddish white. The anterior femur is always immaculate.

Length ♂ 4—5 mill.; ♀  $3\frac{1}{2}$ — $5\frac{1}{2}$  mill. Alar exp. ♂ 9—11 mill.; ♀ 9—12 mill. Seta ♂  $7\frac{1}{2}$ —10 mill.; ♀ 5—9 mill. Seven ♂, sixteen ♀. Very near *posticata*, Say, but differs in size, and in the wings not being white.

What, I have no doubt, is the subimago of the above, (see below apud *C. dubia*), differs in the colors being obscurer, and the ♂ abdomen dull-whitish-hyaline at base, sometimes obscure greenish. Tarsi sometimes dusky. Wings fumose, the veins rather coarse and dusky, the cross-veins the color of the wing. The cilia are close-set, and about one-half millimetre long. At first sight very like *B. debilis*, subimago.

Length ♂  $3\frac{1}{2}$ —4 mill.; ♀  $3\frac{1}{2}$  mill. Alar exp. ♂ 11 mill.; ♀  $8\frac{1}{2}$ —14 mill. Seta ♂ 5 mill.; ♀ 4 mill. The ♂ ♀ anterior tarsi are short and subequal. Two ♂, three ♀.

♀♀ *Cloe*. Subgenus *C.*—Two wings; cross veins sparse, about 14—18 in number.

*CLOE DUBIA*, n. sp.?—Differs from the preceding in size, and in the total absence of hind wings. The lateral abdominal dots ♂ have generally a hyaline centre, and the ♂ eyes are normal.

The ♀ differs from the ♀ of *vicina* in the head, thorax, sternum and abdomen being pale ferruginous, the head and abdomen occasionally obfuscated. The venter is pale yellowish or greenish; and the anterior femora are always more or less ferruginous.

Length ♂  $2\frac{1}{2}$ —4 mill.; ♀  $2\frac{1}{2}$ —3 mill. Alar exp. ♂ 8— $10\frac{1}{2}$  mill.; ♀ 8— $10\frac{1}{2}$  mill. Seta ♂  $4\frac{1}{2}$ — $5\frac{1}{2}$  mill.; ♀ 3— $4\frac{1}{2}$  mill. Nine ♂, fourteen ♀.

The subimago, from which I have bred numerous imagos, differs from the imago precisely as that of the preceding. The dimensions are similar to those of the imago. Nine ♂, ten ♀. As Dr. Hagen has not stated whether his vi-

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*cina* has any hind wings or not, it is doubtful whether that species be identical with *dubia* or with the preceding.

*CLOE MENDAX*, n. sp.—♂ Pale ferruginous. Seta of antennæ fuscous, pale at tip. Sternum and venter pale greenish hyaline, the latter opaque at tip. Legs pale, tips of tarsi cloudy. Wings hyaline, veins moderate, cross-veins fine, all hyaline; isolated veinlets all single.

The ♀ has sometimes the thorax tinged with green, and is always paler above.

Length ♂ 4 mill.; ♀ 4—5 mill. Alar exp. ♂ 14 mill.; ♀ 14 mill. Seta ♂ deficient; ♀ 9 mill. One ♂; four ♀

The ♂ subimago differs in being of a uniform very pale ferruginous color. The abdominal seta is pale; and the legs are immaculate. The wings are somewhat opaque, and slightly tinged with dusky, as well as their veins and cross-veins, and the cilia are long and dense. In the living insect the lower eyes are blackish, and the upper eyes pale, and there is no intermediate seta visible.

Length ♂ 4 mill. Alar exp. ♂ 13½ mill. Setæ ♂ 8 mill. One ♂; ♀ unknown. This species differs from all the preceding, except *undata*, in the terminal veinlets being single, and not in pairs. Westwood formed the species having the terminal veinlets in pairs, and hind wings with only two veins, into the genus *Brachyphlebia*, which, however, he does not recognise in his Synopsis. His definition would include *C. vicina* and *C. unicolor*, but not *C. undata*. (Intr. II., p. 25.)

#### CÆNIS.

*CÆNIS HILARIS*, Say, (= *amica*, Hagen?)—I possess a single ♂ subimago, which agrees with Dr. Hagen's diagnosis of *amica*, except that the prothorax is not banded with black like the first of his two specimens. Say states that the thoracic bands of his species are also sometimes obsolete. Dr. Hagen suggests that Say's species and his are identical, and it is probably the case, as Say mentions the wings being "ample," and the abdomen being "depressed," which last is an unusual character in Ephemerina, and is conspicuous in my specimen. The basal breadth of the wings is to their length as two to three, and they are finely, but not densely, ciliate, and very slightly tinged with fuscous. The cross-veins are only four or five, very fine and scarcely perceptible, and there are no terminal veinlets.

Length ♂ 3 mill. Alar exp. ♂ 8½ mill. Setæ deficient, except a few joints of each.

#### ODONATA AGRIONINA.

N. B.—It is well known that in the three tribes of Odonata—Agrionina, *Æschnina* and *Libellulina*, with the exception of the subtribe Gomphina, where the colors are generally constant—the ground colors of the body often change much in drying, especially the greens and the blues, though not the yellows; that they differ much in individuals of different degrees of maturity; that they are often quite different in the two sexes, the ♂ frequently affecting blue and the ♀ green,\* except in *Agrion Ramburii*, where it is exactly the re-

\* In *Anax Junius* the ground color of the abdomen of the living ♂, except the first and a small portion of the second segment which are grass green in both sexes as well as the thorax, is invariably a vivid ultramarine blue; in the living ♀ it is invariably obscure pale purple or lilac. Yet Say describes both sexes, of this very common insect, as of the same color. *Æschna constricta* and *clepsydra* follow invariably the general rule in the color of the abdomen only, ♂ blue, ♀ green, thorax green ♂ ♀. In *Libellulina* I have observed in the following species that when the ♂ first appear they are colored exactly like the ♀, but that they afterwards assume, sometimes over their entire bodies, a milky blue tint, (*bleu saupoudre*), which, as we learn from a memoir by M. Schelver, quoted to me by Dr. Hagen, is occasioned by the secretion of a kind of oil soluble in ether and alcohol:—*Platthemis trimaculata*, *Lib. luctuosa*, *Lib. pulchella*, *Mesothemis longipennis* and *Mes. simplicicollis*. In *Libellulina* this oil, which is occasionally seen in ♀ in small quantities, seems to be secreted under the external integument; in *Agrionina* on its surface, when it is known as *pruinoseness* and may be washed off.

verse; and that in Agrionina, even in the same sex, and at the same stage of maturity, and while the insect is still alive, a very great variation of color is often observable. For example, many adult ♀ of *Agr. Ramburii* occur, that are orange instead of blue. In Agrionina the dark markings also are often variable in the same sex, and differ most wonderfully in the two sexes. On the contrary, the coloring of the legs, as is generally the case in most families of Insecta, is in Agrionina, except in very immature individuals, remarkably constant in the same species, does not, so far as my experience extends, vary in the sexes, and varies very considerably in different species, while on the other hand it does not fade or change materially in drying. It fulfils, therefore, if this be correct, all the conditions of a good specific character. Hence, it has occurred to me, that a little more precision might be advantageously introduced, in this tribe, into the nomenclature of the colorization of the leg, and more particularly the femur. Just as in *Gomphina*, on each side of the dorsum of the thorax there exist three normal dark stripes—the dorsal, the antehumeral and the humeral—each of which has its *locus* definitely ascertained; so in the femur of Agrionina there exist three normal dark vittæ, the *locus* of which is susceptible of being accurately determined. That this is so, any one may convince himself by comparing *Lestes unguiculata*, or some other species which has all the three normal femoral vittæ coexisting, with other species of *Lestes* or *Agrion* which have a smaller number of femoral vittæ. He will find that the difference between them is merely that one or more vittæ are obsolete, and that those vittæ which are not obsolete retain the same invariable *locus*.

Supposing the leg, with the knee slightly bent, to be extended horizontally at right angles to the body, and in such a position that the tibia and femur shall both lie in the same vertical plane, the back of the insect being of course supposed to be uppermost; I call that vitta whose *locus* lies underneath, and does not extend beyond the two lateral rows of spines, which are always in Agrionina present on the inferior surface, "the inferior vitta." This has generally by authors been called "the interior." The vitta whose *locus* lies above, with its two edges equi-distant from the two rows of spines beneath, I call "the superior vitta." And the vitta, whose *locus* is on the anterior side of the femur, betwixt the "inferior" and the "superior," I call "the anterior vitta." Strictly speaking, these are, I believe, all the vittæ which exist on the odonatus femur; and there is no such thing in Nature as a *posterior* black vitta on the femora of an Odonate. But just as, for convenience sake, M. de Selys sometimes considers the ground-color of the thorax of *Gomphus* to be *black*, and enumerates its *yellow* stripes,\* which of course changes the *locus* of every stripe, the so-called *yellow* stripes occupying the intervals between the normal *black* ones; so it is sometimes convenient, when the inferior, anterior, and superior vittæ are all confluent, leaving only the posterior part of the femur pale, to consider the femur as being *black* with a posterior *pale* vitta. Dr. Hagen has remarked, that the true ground-color of the thorax in *Gomphus* is pale, because some species occur with the thorax all pale, and none with the thorax all black; and for this reason he seems to object to M. de Selys's nomenclature. There is a wide difference, however, between these two cases. The imaginary pale vittæ on the thorax of *Gomphus* have a different *locus* from the normal black vittæ; while the imaginary posterior pale vitta on the femur of *Agrion* has precisely the same *locus* as a normal posterior dark vitta would have, supposing such a vitta to be possible.

The "anterior" and "superior" vittæ are confounded together by authors under the name of "exterior;" and sometimes, when there is a pale "posterior" vitta, the femur is said to be "pale below"—thus giving rise to a great deal of confusion between the true "inferior" and the "posterior" vitta. In many species the inferior and the anterior are confluent; and it is very fre-

\* See the synoptical tables opposite page 14 of the "Monogr. des Gomphines."



quently the case that the anterior femora possess a confluent inferior and anterior, while the other four femora have merely an inferior. Further variations between different species are caused by the vittæ being abbreviated. As a general rule, in Agrionina, each pair of legs is darker than the pair immediately behind them, when there is any difference; but in *Æschniina* and *Libellulina* the contrary rule seems to prevail. The colorization of the tibiæ and tarsi, as compared with that of the femora, is simple; they have merely an inferior vitta, whose *locus* is rather on the anterior row of spines, and a superior vitta.

Why, if every separate species of *Gomphus* and *Agrion* had been separately created, the great Author of Nature should have thus restricted himself to working upon one pattern only—a phenomenon which has been noticed in many other families of insects, as, for example, in Cicindelidæ, by my friend, Dr. J. L. Le Conte—is to me an insoluble problem. Why do we never find odonates with their legs fasciate, instead of vittate? On Mr. Darwin's theory, the reason becomes at once apparent. In *Macrogomphus? spiniceps* mihi I have recorded a remarkable apparent deviation from the unity of colorization elsewhere observable in the thorax of *Gomphus*; but I am convinced it is only apparent.

Another point in which I have deviated from the nomenclature of *Dr. Hagen* and *M. Selys* is in some of the pieces of the head. The front of the odonatus head—or, as Say calls it, in *æschna* and *libellula*, “the frontal vesicle,” as distinguished from “the vertical vesicle”—is divided into two subequal parts by a transverse suture or stria, below which comes another shorter and generally curvilinear transverse suture, which separates what agreeably to the analogy of other orders I call the epistoma, it being the piece immediately overlying the labrum, with which it is connected by a more or less membranous suture. The authors of the *Monographie* call this last piece “the rhinarium,” and the lower part of what I consider to be the front they call “the nasus,” or sometimes “the epistoma,” confining the term “front” to that part of Say's “frontal vesicle” which lies above their “nasus.” I am by no means certain but what their “nasus” and “rhinarium,” taken together, are the analogues of what in other orders is called the epistoma; but their “nasus” by itself can scarcely be so.

CALOPTERYX MACULATA, Beauvois. (North and South Illinois.)

HETERINA RUPINSULENSIS, n. sp.—♂ Black, with a slight brassy tinge. Head hairy, pale brown in front of a transverse line passing behind the base of the antennæ; labrum with a lateral black tubercle; mandibles and the tip of the labium brown-black; all beneath pale-brown; post-occipital tubercles prominent, acute; antennæ with their first and second joints pale brown; and the third, which is longer than the first and second put together, black; the seta, which is shorter than the third joint, black. Thorax hairy; prothorax with a large triangular posterior lobe; dorsum of thorax with a brown lateral stripe, becoming much wider inside on its terminal half; pleura pale brown, the anterior half of its anterior segment with an abbreviated black stripe pointed above, the posterior half with a rather narrower one, abbreviated above and below, not attaining the spiracle which is black; a short black line above in the suture between the two segments; the posterior segment with a much abbreviated black stripe, the narrowest of the three; sternum pale brown. Abdomen with an obscure yellowish lateral stripe, fading out at the end of the third segment; joints 1–2 hairy, the two or three terminal joints pubescent under the lens; joint 2 brown on its basal two-thirds; 2–7 with an obscure yellowish basal annulus, more obvious on 3–5; a carina on the tip of joint 10, terminating in a spine, with a small spine on each side; joints 8–10 each one-third shorter than the preceding joint; venter black, with a polished longitudinal tubercle on the tip of the last segment, immediately behind the insertion of each lower appendage. Superior ap-  
1862.]

pendages black, pubescent under the lens, as long as the penultimate abdominal joint, regularly curved inwards and downwards from their middle, robust, with no tubercle above at their base, obtuse at their tips, with a broad lamina beneath, semiovally emarginate in its middle, which commences in an oblique truncation at their base and terminates in a square truncation at three quarters of the distance to their tips, the tip of the lamina being as wide as any part of it; about five small acute spines outside opposite the tip of the lamina; no appearance of any pencil of hairs at the base of the lamina, other than the general pubescence of the whole appendage. Inferior appendages, about one-third the length of the superiors, black, slender, cylindrical, with a basal enlargement, curving inwards and upwards so as to touch at their tips, truncate at tip, and attaining the middle of the lamina of the superior ones. Legs black, trochanters and coxæ pale brown; femora brown inferiorly and posteriorly; tibiæ on their basal half brown, except inferiorly. Wings hyaline, not glittering; pterostigma small, pale brown, twice as long as wide, surmounting one and three-quarters cells before, one and a half cells behind; anterior wings with a pale brown, semi-transparent, basal spot, commencing abruptly on the posterior edge of the median space, not extending beyond the arc, except very obscurely along the median space, and gradually fading away on the longitudinal centre of the basal space; posterior wings with a similar spot commencing similarly, extending about two cross-veins beyond the arc with an obscure narrow prolongation along the median vein, and fading away gradually between the costal and sub-costal veins; at their extreme tip a very faint brown cloud, scarcely perceptible; veins and cross-veins of all four wings black, except those in the region covered by the basal spots, and the median vein nearly as far as the nodus, which are pale brown; all the brown cross-veins behind the median vein in both wings distinctly but narrowly bordered with sub-hyaline. Anterior wing with antecubitals 23—24, postcubitals 31. Posterior wing with antecubitals 22—23, postcubitals 28—30.

Length of body ♂ 48 mill. Alar exp. ♂ 59 mill. Length abdomen ♂ 38 mill.; medial breadth  $\frac{2}{3}$  mill. Length of superior pterostigma nearly 1 mill.; of inferior  $\frac{2}{3}$  mill. The quadrangle has 4—6 cross-veins; the basal space 4—5. The postcostal space of the anterior wing has at least three irregular ranks of cells, except at its base. Described from one very mature ♂; ♀ unknown.

Of the twenty-seven described species of *Heterina*, not a single one, except when quite immature, has, like this species, the basal spot of the ♂ anterior wings, other than some shade of sanguineous. Several of them have the basal spot of the ♂ posterior wings brown (*sanguinea*, *rosea*, *mortua*, *macropus* and *tricolor*); and eight others have it either reddish brown or some mixed color (*hebe*, *auripennis*, *caja*, *carnifex*, *proxima*, *simplex* (mature), *cruentata* and *læsa*). It is stated, as one of the characters of the subgenus *Heterina*, that all the four wings of the ♂ have a red basal spot. (*Monographie des Calopterygines*, p. 97.) Now that a species has occurred with no red basal spot at all on any of its wings, it will probably be necessary to modify the subgeneric definition.

Another point in which our insect differs from all other known *Heterina*, is that the basal spot of the anterior ♂ wing starts from the postcostal vein, leaving the entire postcostal space hyaline. In all the twenty-seven described species, this spot, for at least half its length, touches the posterior margin; and in *carnifex*, *proxima*, *cruentata*, *vulnerata*, *moribunda* and *occisa* it touches it for its entire length.

There is a remarkable similarity between *rupinsulensis* and *tricolor*,—a rare species which occurs in the United States,—but they are sufficiently distinguished, not only by the above points, but by *tricolor* being slightly more robust than *Americana*, whereas, *rupinsulensis* is decidedly slenderer on placing the two side by side; by the superior ♂ anal appendages of *rupinsulensis* being unlike those of *tricolor*, as figured and described in the "Monographie Calopt.,"

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(plate xii. fig. 5,) while they bear a striking resemblance to those of *sanguinea*,—a South American species, (figured plate x. fig. 6,)—and, besides several minor points of difference, by the cross-veins in the basal spots being bordered with subhyaline,—a peculiarity which is not noticed as occurring in any other species. No *Helærina* has hitherto, according to Dr. Hagen, been found in a higher latitude, either North or South, than 40°. Rock Island lies in about 41° 30'.

LESTES RECTANGULARIS, Say! L. UNGICULATA, Hagen! L. HAMATA, Hagen.  
L. FORCIPATA, Rambur.

LESTES EURINA? Say.—[Unknown to Dr. Hagen.]—♂ Dark metallic green. Head brown black, varied anteriorly with brown; epistoma obscure greenish; labrum obscure greenish on its terminal margin, dusky at base, except a small obscure greenish triangle on its posterior margin; tips of mandibles brown black; beneath pale greenish. Dorsum of thorax rather pale brown, with a fuscous, sublateral, slightly abbreviated vitta; pleura deep bright yellow, the anterior segment with a wide brown stripe in front, sending off a narrow branch behind and below to the intermediate coxæ; and widened behind and above by two successive sudden dilatations so as to cover the entire width of the segment beneath the wings; the posterior segment with a large inferior brown, elongate-triangular spot, its upper side parallel with the wings, and its apex reaching the back of the posterior coxæ; sternum pale. Abdomen with a blue reflection on joints 2—4, the base and sides of joint 1, and sides of 2, yellowish, 2—7 with a narrow yellowish basal band, interrupted above and widening below, subobsolete in 6—7; joint 10 triangularly emarginate above at tip, the sides of the emargination carinate, yellowish beneath, and with an obscure yellowish lateral basal triangle; the tips of segments 1—8 black, more obviously so beneath, and especially towards the tip of the abdomen. Superior appendages piceous, nearly as long as the penultimate joint of the abdomen, with their tips a little dilated and rounded, regularly curved from their middle inwards and downwards, with ten or twelve small spines on their exterior middle, a long acute spine pointing backwards on their internal base, and on their internal middle a short broad tooth, truncate, with four very small spines on it. Inferior appendages short, yellowish, about one-third the length of the superiors, conical, obtuse, directed obliquely upwards and slightly curved inwards at tip. Legs black, coxæ and trochanters pale, anterior femora with a short basal inferior and superior yellowish vitta, both of which become wider and longer on the intermediate and still more so on the posterior femora; tibiæ all with an anterior yellowish vitta. Wings uniformly flavescent, no darker on costa; veins and cross-veins black; pterostigma brown, surmounting four cells before, three and a half behind. Postcubitals 15—16.

Length ♂ 50 mill. Alar expanse ♂ 64 mill. Length of abdomen ♂ 41 mill. Pterostigma 2½ mill. One ♂ specimen, somewhat immature; ♀ unknown.

\*There is no other described species of North American *Lestes* which has the wings entirely flavescent, and on this account, and because the coloration of the legs and the structure of the anal appendages agree with Say's brief description, it may probably be the true *Eurina*, Say, though he describes the dorsum of the thorax as having "a yellow vitta, behind bifid and divaricated." The markings of the thorax are so variable in *Agriionina* that, by themselves, they cannot be depended on to separate two species otherwise alike.

LESTES INÆQUALIS, n. sp.—♂ Dark metallic green. Head with the region of the ocelli almost black; epistoma pale brown; tips of the labrum and of the mandibles brown black; the rest of the mouth and all beneath yellowish; antennæ black, first and second joints yellowish at tip. Dorsum of thorax livid black, with a slight greenish reflection; a medial and lateral yellowish line; pleura yellowish, with a broad, livid black stripe in front, widened under

the wings; sternum yellowish. Abdomen towards the base with a bluish reflection; the basal half of joint 1 and a narrow interrupted basal band on 2 to about 6, and also on 10, yellowish; a lateral yellowish vitta obsolete from the middle of joint 5 to the tip of joint 8; joint 10 deeply emarginate at tip, and with a yellowish terminal band. Superior appendages a little longer than the last abdominal joint, regularly tapering to their tips inside and outside, curved from their middle inwards and downwards, yellowish at base, brown-black at tip, with seven or eight small black spines externally towards their tip; at their internal base is an acute spine pointing backwards, immediately behind which is a narrow but deep emargination, followed by a fine serration and a very small obtuse tooth, the tooth placed at two-thirds the distance to their tip. Inferior appendages extending one-third of a millimetre beyond the superiors, yellowish and of a flattened conical shape at base, brown-black, slender and cylindrical at tip, straight till they attain the tips of the superiors, when they suddenly curve inwards and upwards, their tips obtuse and approximate; their internal edge, at about one-fourth the distance to their tips, is suddenly contracted, making a conspicuous rectangular tooth. Legs yellowish, femora with an inferior, anterior and superior black vitta; tibiae with an inferior black vitta, on the anterior tibiae an anterior one also confluent with the inferior; tarsi black. Wings hyaline; veins and cross-veins black; pterostigma pale brown, surmounting  $2\frac{1}{2}$ —3 cells. Postcubitals 16.

The ♀ differs from ♂ only in the lateral abdominal vitta being uninterrupted, and in the two last abdominal joints being varied with yellowish, the penultimate containing two small, round, discal spots, transversely placed. The superior ♀ appendages are elongate-conical and acute, three-quarters the length of the last abdominal joint; the inferiors a little shorter, conical, obtuse and directed upwards; and the vulvar laminae are externally serrate under the lens. Postcubitals 15.

Length ♂ 52 mill.; ♀ 51 mill. Alar expanse ♂ 60 mill.; ♀ 62 mill. Abd. ♂ 42 mill.; ♀ 40 mill. Pterostigma ♂ ♀ 2 mill. Differs from all described North American species in the great length of the inferior ♂ appendages, and from all but *grandis* and *Eurina*? in having 15—16 postcubitals. It agrees with *forcipata*, Rambur, in having three distinct femoral vittae.

AGRION IRENE, Hagen. A. RAMBURI, Selys. A. EXSULANS, Hagen, (R. I. and Chicago.) A. PUTRIDUM, Hagen. A. APICALE, Say, (= *imundum*, Hagen.) A. CIVILE, Hagen.

AGRION ———, Hagen MSS., n. sp.—♂ Black, with a slight brassy tinge. Head and thorax villous. Head with two transversely elongated occipital spots, a broad band between the antennae, the epistoma, and also the labrum, all obscure greenish; all below pale greenish. Posterior margin of prothorax rounded: dorsum of the thorax with a broad sublateral blue or obscure greenish stripe: pleura with a short black median line above, between the wings, sometimes dull blue sometimes obscure green, with a strong metallic reflection so as to exhibit, in certain lights, the appearance of a broad yellow stripe before and behind: sternum pale, more or less pruinose. Abdomen vivid blue in the mature living insect, pale greenish brown in immature specimens; on joint 1 a basal quadrangular black spot; on joints 2—7 an obastiform terminal black spot, one millimetre long in 2—5, covering two-thirds of the length in 6 and the entire length in 7; joint 10 widely emarginate at tip, and with a quadrangular laterally emarginate black spot covering its upper surface. Superior appendages robust, short, black, polished, incurved and truncate at tip when viewed from above; when viewed in profile tapering and curved upwards, and with a small pale tubercle attached inside to the base of each. Inferior appendages pale at base, black at tip, slender, acute, a little longer than the superiors, sometimes with a terminal unguiculus. Legs pale, femora and tibiae with an anterior black vitta; tarsi with their tips and incisures black. Wings hyaline, pterostigma black, or when immature pale brown. Postcubitals 9—11.

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The ♀ differs from the ♂ in the thorax being always marked with obscure green, not blue, the pleura exhibiting the same reflections as in one ♂; in the abdomen being more robust and of an obscure green, not blue; and in the obblastiform spots on joints 2—7 being of a decided metallic green and covering the full length of every joint, the acute tip of each spot being partly truncate; joints 8—9 are black above, except a narrow basal line. The pterostigma also is pale-brown, not black. The appendages are pale, short and conical, the superiors rather the longest, the inferiors directed upwards; and there is a long acute spine at the tip of the eighth ventral segment. The whole body beneath, including the legs, is more or less pruinose. Postcubitals 10—11.

Length ♂ 29—30 mill. ♀ 27 mill. Alar expanse ♂ 34—35 mill. ♀ 34 mill. Two ♂, one ♀; one pair taken *in coitu*. Specimens of this insect were sent by me in 1860 to Dr. Hagen, who pronounced it a new species, and will probably name it in his forthcoming Appendix to the Synopsis. It scarcely differs from *Agr. Doubledayi*, Selys, except in the apex of the superior ♂ appendages being not excised. The style of ornamentation is precisely that of *Agr. civile*, and varies similarly in ♂ ♀. It is our commonest species at Rock Island, except perhaps *Agr. Ramburii*.

*AGRION BINOTATUM*. n. s.—♂ Brassy black. Head and thorax villous. Front pale reddish brown, reddish brown, or in the living mature insect purple, fading to reddish brown in death; transverse stria of front except laterally, a transverse line before the anterior ocellus, and another divaricating from the base of the antenna to a point before and behind the posterior ocellus, black; antennæ black, their basal joint the color of the front; all behind the ocelli, as well as the region of the ocelli, black, the occiput with a transverse line, and on each side with a triangular brown spot, both of them subobsolete. Posterior prothoracic lobe rounded; dorsum of thorax colored as the front, with a narrow dorsal black stripe; pleura reddish white, often pruinose, with a broad humeral stripe generally enclosing above a pale spot or short stripe, a short line under the front wing, and a long narrow stripe in the medial suture, stouter above, all black. Abdomen with a yellowish dorsal line on joint 1—4, shorter and narrower in each successive joint; joints 1—4 or 1—6 laterally yellowish, more indistinctly in each successive joint; a conspicuous yellowish basal annulus on joints 3—6, less obvious on 7; joints 9 and 10 blue, except on the lateral margin, 9 with a black medial dot on each side the dorsum; joint 10 triangularly emarginate at tip, with a pale tubercle under each salient angle; venter black. Abdominal appendages black; the superiors short, moderately robust, somewhat tapering, with a large, robust, glabrous tubercle nearly as long as the appendage on their lower inside corner; the inferiors longer, vertically very wide, not tapering, widely emarginate and terminating in two obtuse divaricate teeth, the lower one shorter. Legs black; tibiæ superiorly yellowish. Wings subfumose; pterostigma brown, paler on its margins. Postcubitals 13—17.

The ♀ differs in the coloring being paler, and the markings of the hind part of the head distinct; the spot or stripe enclosed by the humeral black vitta is larger, and often confluent with the pale color behind; the sides of abdominal joints 1—4 or 1—6 are more distinctly yellowish, and joint 9 is only blue at tip, sometimes also with a dorsal and lateral blue spot; no ventral spine. The femora are luteous, blackish only superiorly and towards their tips, and the tibiæ are entirely yellowish, blackish only on their inferior base. Postcubitals 15—18.

Length ♂ 36—38 mill. ♀ 35—37 mill. Expanse ♂ 45—49 mill. ♀ 49—51 mill. Four ♂, five ♀. Occurs on and near Wisconsin log-rafts. Very near *Agr. fumipenne*, Rambur, but differs in the ♂ femora being entirely black, and the abdominal joints 9 and 10 ♂ ♀ partly blue, and also in the shape of the superior ♂ anal appendages. Is related also to the Mexican species *Agr. calidum*, Hagen and *Agr. cupreum*, Hagen.

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## ODONATA (ÆSCHNINA.)

[H]ERPETO GOMPHUS? RUPINSULENSIS, n. s.—♂ Greenish yellow. Head with the vertical vesicle yellow behind, black in front, cariniform, transverse, scarcely emarginate, slightly recurved, rounded off at the ends, not abbreviated; all between this and the front black, except the region of the antennæ, which is a little varied with brown; antennæ black, first joint yellowish at tip; labrum with a fuscous basal dot on each side; tips of mandibles brown; central lobe of labium pale livid blue, black on the terminal margin, the lateral lobes pale; occiput straight, scarcely elevated in the middle, densely ciliated with long black hairs. Dorsum of the thorax with its medial carina brown-black at the first commencement of its bifurcation for one-third of a millimetre, also towards the point where its two branches join the base of the anterior wings; an abbreviated pale brown line in the humeral suture above; pleura with the spiracle edged with brown-black; otherwise the entire thorax is immaculate above and below. Abdomen pale brown, clouded with brown, especially behind the medial suture of the segments, which is brown and glabrous, and with the extreme edges of all the segments brown; earlets of the second segment yellowish, externally margined with pale brown; joint 1 mostly greenish yellow; a basal, glabrous, brown annulus on joints 3—7, with indications of a basal lanceolate pale brown spot, suddenly contracted behind its middle and surrounded by brown shading, on the dorsum of 2—9, tolerably distinct in 7, in 8 becoming very obvious; 8 and 9 laterally as much dilated as in *Gomphus fraternus*, and on the lateral submargin almost greenish yellow; joints 8—10 each about one-third shorter than the preceding; venter pale yellowish green. Abdominal appendages all greenish yellow, with long dense pale hairs; the superiors longer than the 10th but shorter than the 9th abdominal joint, directed rather downwards, very robust, approximate at base, distant at tip about one-half millimetre; viewed from above they are convex outside, concave inside, tapering gradually, and obtuse at tip; viewed laterally, they have an inferior carina, and their tip is squarely truncate, and on their terminal half below are about three irregular rows of small short black teeth; the inferiors touch the superiors at base and are scarcely shorter than they are, exactly attaining the lower angle of their truncated tips; viewed from below they are almost cylindrical, very robust, and much rounded at tip; viewed laterally their inferior edge is slightly curved upwards, and their upper edge is semicircularly emarginate for two-thirds the distance from their base, the other third part being obliquely truncate so as to be almost parallel with the lower edge of the upper appendage; on the base of each lower appendage beneath and covering it for one-third its length is a quadrangular anal process, carinate behind on its three margins, the two processes divaricate and connate at their base. Legs pale yellowish green; the trochanters brown beneath, anteriors very slightly, intermediates and posteriors notably; anterior femora with a broad anterior brown vitta, the four posterior femora much marked with brown beneath, but anteriorly with only a short terminal vitta; tibiæ all with a wide inferior black vitta; anterior and intermediate tarsi black, posterior tarsi black beneath, but above with only their tips and incisures widely black. Wings hyaline, slightly flavescent at base; veins and cross-veins black, except the costal vein which is greenish-yellow anteriorly till a little after it attains the pterostigma; pterostigma pale brown, its internal cross-vein prolonged as usual, surmounting  $4\frac{1}{2}$ —5 cells; membranule small, cinereous, in the posterior wings only extending half way to the anal angle, which is acute and normal. Antecubitals 13—14; postcubitals 9—10. Two discoidal areolet, commencing with two in the front, with three in the hind wings.

Length ♂ 54 mill. Alar expanse ♂ 68 mill. Pterostigma super. 3 mill. infer  $3\frac{1}{2}$  mill. One ♂; ♀ unknown.

[Sept.

This species cannot, with perfect propriety, be arranged under any of the subgenera of the great genus *Gomphus*, established in the *Monographie des Gomphines*. All these subgenera, except *Erpetogomphus*, have the thorax yellow with black stripes, or dark with subobsolete yellow stripes, and that subgenus disagrees with our insect in the vesicle of the vertex being "divided into two tubercles," in "the ♂ 10th abdominal segment being equal to the 9th," and in "the 8th and 9th segments being but little dilated." (*Monogr.*, p. 69.) The posterior femora in *rupinsulensis* are short, with subequal spines about two-thirds millimetre long for their entire length. Its complete measurement will be found, some pages below, at the end of the genus *Gomphus*. By relaxing my unique specimen I have ascertained the interesting facts, that it agrees with *Erpetogomphus* in having no tooth on the second joint of the penis, and that the first genital hooklet (*hamecon*) is two-branched, precisely in the same extraordinary manner as in *Erpetogomphus cophias*. (See *Mon. Gomph.*, Plate IV, Fig. 6.)

One of two things, therefore, must necessarily be done. Either a new subgenus must be founded to receive *rupinsulensis*, or the old subgenus *Erpetogomphus* must be modified so as to comprehend it. Which of the two courses is adopted is a matter of opinion and taste. For my own part I would suggest that *Erpetogomphus* be modified so as to run somewhat as follows: "Last abdominal segment not notably shorter than the penultimate; abdominal appendages with their branches contiguous; the superiors about as long as or a little longer than the last abdominal segment. [In *Erp. designatus* they are considerably longer.] No tooth on the second joint of the penis. Legs short. Posterior legs not extending beyond the middle of the third abdominal segment. Thorax with the normal dark stripes more or less obsolete. Abdomen with dorsal lanceolate spots, sometimes subobsolete." If a great number of species should hereafter be discovered, groups founded upon variations in the coloring may be established, as in the subgenus *Gomphus*.

So far as can be seen, from the very brief diagnosis of a novel Mexican species, *Erpetogomphus boa*, published by M. Selys de Longchamps, in the *Additions au Synopsis des Gomphines* (p. 11), there is considerable similarity between that species and *rupinsulensis*. They differ, however, not only, as is to be presumed, in the subgeneric characters noted above, but in *boa* having the tibiæ entirely brown, and the inferior appendages only two-thirds the length of the superiors. Moreover the abdomen of *boa* is proportionally much shorter, being to the inferior wing as thirty-nine to thirty-five, whereas in our species it is as thirty-eight to thirty-one. No true *Erpetogomphus* has as yet been discovered north of Texas, and all the known species are American.

**MACROGOMPHUS? SPINICEPS**, n. sp.—♀ Pale obscure brownish. Head with the occiput straight, ciliated with black hairs as long as usual; its upper edge slightly bent forwards in the middle; the vesicle of the vertex cariniform, curving backwards in an exact semicircle, the sides of which are laminiform and much elevated, and the middle and the posterior extremities much depressed, the latter not attaining the eyes; between each of these extremities and the eye is a slender acute black thorn, as long as the second joint of the antennæ; antennæ black; front projecting less than is usual in *Gomphus*, and excised less than usual, its angulation about quadrangular, and not in an acute angle as in *Gomphus fraternus* Say, the apex of the angle not rounded off; the basal half of its upper surface is pale brown, glabrous, polished; the other half yellow, opaque, with black hairs; its anterior surface is pale brown, semi-transparent, immaculate; mandibles brown at tip; the rest of the mouth pale brown above, yellowish with long rufous hairs beneath. Prothorax largely and obscurely varied with brown; dorsum of the thorax entirely brown, except a faint pale brown, much abbreviated, oblique line on each side of the central carina, indicating the place where the dorsal stripe has almost  
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united with the antehumeral; dorsal carina brown-black on its extreme upper edge; covering each side of the dorsum, and parallel with that prolongation of the dorsal carina which runs to the base of the anterior wings, are four equidistant brown-black lines, attaining the suture below, but not quite attaining the carina above, where they are connected each with the adjoining one by a semi-circular brown-black line with its convexity upwards, the middle semi-circle appendiculate above; on the left side of the dorsum the third line is bifurcate at half its length, and the fourth line is obsolete; most of these lines are visible to the naked eye, and under the lens they are all very plain, and they convey the impression of being located, not on the exterior surface, but in the interior crust of the thoracic integument; pleura shaded with brownish immediately behind the humeral suture and under the wings, but with no indication of any stripes; spiracle deep black; the rest of the pleura, as well as the sternum, immaculate; antecular and interalar sinus brown, the two scutella, with a small round piece before them and a piece on each side of them, yellowish. Abdomen long, slender, not expanded at tip, brown-black, its dorsum marked with yellowish as follows: Joint 1 with a round basal spot confluent with a terminal band; joint 2, which has its earlets yellowish and subobsolete, pale brown before its medial suture, behind which is a lanceolate spot reaching the tip; 3-7 with a small, obscure, basal triangle, more and more obsolete behind, till in 7 it is scarcely perceptible; 9 and 10 with a basal transverse line, visible only above, which, as in some of the following species, is in reality a membranous prolongation of the preceding joint; laterally 1-2 and 8-9 are yellowish; 9, which is nearly half as long again as 8, and five or six times as long as 10, being more conspicuously yellow; 3-4 have an obscure basal yellowish triangle, with indications of yellowish markings on the succeeding joints; joint 10 is entirely pale brown both dorsally and laterally, except the membranous basal line. Joint 8 is a little dilated towards its tip, as compared with the preceding joints, but 9 is actually much narrower than the other joints at tip, and no wider than they are at base. Abdominal appendages one and a half millimetres long, brown-black, conical, slender, acute, wide apart at base, directed downwards, slightly convergent, paler beneath, pubescent under the lens, surmounting a pale brown semicircular anal process, which is two-fifths their length and is directed downwards. The vulvar lamina is entirely concealed by the sides of abdominal joint 9, but on relaxing the specimen it is found that the entire ventral pipe is apparently truncate a little before the tip of the 8th abdominal joint, leaving the 9th abdominal and ventral joints in reality perfectly approximate, except at their extreme tip—where they, as well as the entire 10th ventral and abdominal joints, are normal—and exposing an enormous vulvar orifice under the tip of the 8th ventral. The vulvar lamina is reduced to a very small and somewhat obscure transverse, short, obsemi-oval piece, forming a prolongation of the lower side of the 8th ventral, to the posterior edge of which piece is attached a smaller, transverse, short, semi-oval piece, slit for its entire length. The average width of the 9th ventral is about three-quarter millimetre, and the anal passage is marked by a dark vitta. By this extraordinary arrangement, as will be observed, almost the whole of the 9th abdominal is converted into a lateral lamina, although externally no such phenomenon is apparent. Legs pale brown; femora shading into brown at their tips, especially anteriorly; tibiae and tarsi brown-black. Wings hyaline, slightly flavescent at base, especially the anteriors; membranule slender and pale dusky; veins and cross-veins, including the costal, all black; pterostigma very long, yellowish brown, surmounted as usual by coarse black veins, surmounting 6-7 cellules, the prolonging vein of its inner side thicker than the adjoining cross-veins, but a very little dislocated in every wing, and also forming an angle of about  $170^{\circ}$ \*

\* I observe this peculiarity also in *Gomphus fluvialis* and *amnicola* mihi, but not in my other four species.



with the inner edge of the pterostigma, and exhibiting a tendency to run parallel with the adjoining cross-veins. Antecubitals 14—15; postcubitals 12—13. Two discoidal areolets, commencing with 2 before, with 3 behind.

Length ♀, 62 mill. Alar exp. ♀, 81 mill. Abdomen ♀, 45 mill. One mature ♀, ♂ unknown.

Besides the somewhat smaller number of antecubitals (14—15, instead of 16—19), the species varies from the characters of *Macrogomphus* only in the 5th antecubital cross-vein being robust, instead of the 7th, the membranule being rather pale dusky than black, the absence of a protuberance on the middle of the occiput, in having only a single subobsolete pale dorsal stripe on the dorsum of the thorax instead of two, and no stripes at all on the pleura instead of two yellow ones, in the abdomen being scarcely annulate with yellow—in which respect it agrees with *parallelogramma* and differs from *annulatus*, the unique specimen of *robustus* having lost its abdomen—and in the femora being normally dilated, and not merely dilated towards their tips. All the femora, as in *Macrogomphus*, are armed with irregular short teeth beneath, not disposed in rows, and the posterior ones are armed on each side towards their tips with a regular row of spines, as usual in ♀ *Gomphus*, and as is said to be the case in *M. annulatus*. The posterior tarsi are about four-fifths the tibiae, the others about three-fifths. It is scarcely necessary, I hope, to add, that the triangles of the wings are all free from cross-veins.

From the most exact measurements I am able to make, abdominal joints 6—10 are respectively  $5\frac{1}{2}$ ,  $4\frac{3}{4}$ ,  $3\frac{3}{4}$ ,  $5\frac{1}{4}$  and 1 millimetres long, 3—6 being the same length, so far as the eye can judge.

There is the same disproportionate elongation of the 9th joint in *Macrogomphus*, which, as is remarked in the *Monographie* (p. 94), “is a unique fact among the Odonata.” In that subgenus joints 3—6 are equal, 7 is a little shorter, 8 is only half as long as 9, 9 is longer than even any one of 3—6, and 10 is scarcely one-sixth of 9. (*Mon.*, p. 87.) Again, of the three Asiatic species at present placed in that subgenus, two only are known in ♀, and in both these two special mention is made of the ♀ vertical vesicle being curved as in our species, and having a small tooth at its extremities, just as is the case in *spiniceps*. (*Macr. parallelogramma* ♀, *Mon.*, p. 80, and compare Plate V, Fig. 5; *Macr. annulatus* ♀, *Mon.*, p. 92.) The front, too, in all three species is said to be obtusely angulated, and but slightly projected; and in *annulatus* the long 9th abdominal joint is described and figured as being tapered at the tip precisely as in *spiniceps*, and is said to be “excavated” beneath, probably just as in our species. Other striking points of resemblance are, the costal not being yellow, the imperfect prolongation of the internal side of the pterostigma, the extreme length of the pterostigma, the large number of antecubitals, and the shortness of the posterior legs, which in *Macrogomphus* are said to attain only the middle of the third abdominal joint, just as is the case in *spiniceps* mihi. Although *Macrogomphus* has hitherto only occurred in Java and Hindostan, and although, as has been already seen, there are several minor characters in the circumscription of that subgenus—chiefly, however, characters drawn from colorization—which do not at all suit *spiniceps*, yet, I think, we can scarcely avoid considering this species as a *Macrogomphus*, or at all events as the American analogue of that most remarkable Asiatic form. The full measurements, which will be found a few pages below, along with those of the ♀ of two Asiatic species, agree closely with those two species, except in the length of the posterior femur, where, I suspect, some error has crept into the figures of the *Monographie*. It will be satisfactory if, on the discovery of the ♂ *spiniceps*, its abdominal appendages should be found to be like those of ♂ *Macrogomphus*.

GOMPHUS SPINOSUS, Selys. (Des Plaines river, near Chicago; not hitherto found north of Georgia.) G. FRATERNUS, Say!

GOMPHUS VASTUS, Hagen MS. ! n. sp.—♂ Greenish yellow. Head with the 1862.]

upper edge of the occiput straight, narrowly bordered with black, and ciliate with long black hairs, its lateral margins behind generally black; vesicle of vertex loftily cariniform or laminiform, black, slightly abbreviated, a little emarginate, almost truncate at its extremities; region of the ocelli and vertex black; antennæ black; basal half of the superior surface of the front black; a broad medial black band on its anterior surface, straight above, below generally extending in two waves to the transverse striae on its anterior submargin, which are unusually deep; epistoma blackish; labrum margined anteriorly and sometimes laterally with black, and with a wide basal black triangle, which is sometimes confluent with the black anterior margin; tips of mandibles, central lobe of labium, and interior margin of its lateral lobes, all black; back of the head black, with two separate and distinct yellow spots behind the eyes on each side. Prothorax black, with the middle of its anterior edge, one small transverse double spot on its disk, one larger lateral round spot, and one short oblique line immediately above the coxæ, all greenish yellow; dorsum of thorax with a double medial black stripe, almost always widened in front, not attaining the anterior margin by one-half to two-thirds millimetre; the dorsal carina yellow, except a small spot in front which is black, and all behind its posterior furcation, which is black and narrowly margined with black; the antealar sinus black in front; a wide antehumeral black stripe abbreviated above, and a humeral black stripe on the suture never confluent above with the antehumeral; pleura with a black oblique line, sometimes interrupted towards its upper end, just before the spiracle which is black, and a narrower line in the suture behind the spiracle, which last line is occasionally subobsolete; sternum pale greenish, sometimes varied with dusky, often with a large obscure dusky spot behind the posterior coxæ. Abdomen black, expanded to an unusual width on segments 7—9, its dorsum marked with greenish yellow as follows: Joint 1 with a large terminal obtriangular spot extending to its base; 2 with a broad vitta, generally bi emarginate laterally; 3—7 with a narrow basal line tapering to a point behind, slightly or not at all abbreviated in 3, more and more abbreviated towards 7, where it reaches to only two-fifths of the joint, and is a little wider than in any of the other joints; earlets on joint 2 yellow, anteriorly black, posteriorly with many minute black teeth; laterally joints 1, 2 and 9 are yellow, except the posterior edge of 2; 3—7 with a basal yellow triangle, extending to the inferior margin; 8 with a transverse basal yellow line on the dorsum, sometimes invisible, which is in reality a membranous prolongation of 7, and also with a large, quadrangular, basal, yellow spot, one-third or one-fourth as long as the joint, which never attains the inferior margin of the segment, though it always attains the basal angle; venter fuscous, sometimes mottled with yellow. Abdominal appendages black; the superiors wide apart at base, twice as long as the last abdominal joint, which is one-quarter the length of the penultimate joint, slender, conical, strongly divaricate, regularly curved downwards for three-fourths their length, when they suddenly curve upwards and taper to a very fine, long, acute point; below at the change in the curvature is a small spine directed downwards; the inferiors are three-fourths as long as the superiors, wide apart at base, more divaricate than the superiors, slender, tapering, obtuse, suddenly curved upwards at three-fourths the distance to their tips, with a deep obtuse stria on their external basal half. Legs black, coxæ generally more or less yellow exteriorly; anterior femora with a broad posterior yellow vitta slightly abbreviated, but never covering less than five-sixths of their length. Wings hyaline, almost always slightly flavescent at base; costal vein anteriorly yellow to the commencement of the pterostigma, occasionally only to the nodus; the other veins and cross-veins black; pterostigma brown, sometimes yellowish brown, surmounting 4—5 cells; membranule cinereous. Antecubitals 14—15; postcubitals 10—13. Two discoidal areolet, commencing generally with three; occasionally with two in the upper wing, but never in the lower wing.

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The ♀ has a short, robust, conical black thorn at each extremity of the vertical vesicle, rising about as high as the ocellus does. The upper edge of the occiput is bent forwards in the middle, so as to appear emarginate when viewed obliquely from above; in one somewhat immature specimen the central lobe of the labium is yellow; in another specimen the tip of the intermediate femur is posteriorly yellow. All my ♀ specimens have, in addition to the prothoracic spots of ♂, a small additional transverse spot, occupying only the middle of the posterior prothoracic lobe. The earlets (*oreillettes*) are subobsolete. The abdominal appendages black, pubescent, half as long again as the last abdominal joint, wide apart at base, cylindrical, slender, very slightly curved downwards, acute, surmounting a transversely semioval anal process, which only extends to one-half their length. Vulvar lamina black, polished, more than half as long as the ninth segment, elongate-conical, curved upwards, contracted in its middle, with a deep, longitudinal suture, its tips bifid and approximate. Antecubitals 13—16; postcubitals 11—13.

Length ♂ 53—55 mill.; ♀ 53—55 mill. Alar expanse ♂ 60—67 mill.; ♀ 63—72 mill. Pterostigma ♂ ♀ about  $3\frac{1}{2}$  mill. Described from eleven ♂, three ♀.

There exist in the United States three distinct, but closely allied species, representing the *Gomphus vulgatissimus* of Europe, the third one of which is now for the first time described. The first is the *G. fraternus* of Say; the second the *G. adelphus* of Selys. What is very remarkable, they are all three of them nearly alike in the shape of the superior ♂ abdominal appendage, and unlike their European prototype in that important character, which is usually different in every different species. In *vulgatissimus* it is much more robust than in *vastus*, and when viewed laterally it is obliquely truncate at tip below, without any inferior thorn. (See Monogr. p. 131 and Plate VII., fig. 6.) In our three species it is as I have described it in *vastus*. As the three resemble each other very closely, it may perhaps be useful to tabulate their principal differences.

	<i>G. fraternus.</i>	<i>G. vastus.</i>	<i>G. adelphus.</i> (From "Monogr.," p. 414.)
Average length	56 millimetres	54 millimetres	43 millimetres
Thorn at each end of ♀ vertical vesicle*	Long, slender, yellowish	Short, robust, black	* * *
Front, anterior surface	Yellow	{ Yellow, banded with black	Yellow?
Back of occiput	{ Yellow, black at the sides	{ Yellow, black at the sides	All black
Spot, behind eyes	{ Three, yellow, often confluent	{ Two, yellow, never confluent	* * *
Posterior prothoracic lobe	Entirely yellow	{ Black ♂, only cen- trally yellow in ♀	* * *
Dorsum of 8th ab- dominal segment	A basal yellow vitta	Black	{ A basal yellow vitta, semiolesole
8th abdominal segment	{ Yellow at base on the lateral margin	{ Yellow at base on the lateral sub- margin	Entirely black
Expanse of 8th ab- dominal segment	$4\frac{1}{2}$ millimetres	7 millimetres	* * *
Width of 8th ventral segment	$2\frac{1}{2}$ millimetres	$3\frac{1}{2}$ millimetres	* * *
Vulvar lamina of ♀	{ Obtuse at tips and curved moderately outward	{ Acute at tips, and curving moderate- ly upwards, tips approximate	♀ unknown
Length of pterostigma	About $3\frac{1}{2}$ millimetres	About $3\frac{1}{2}$ millimetres	2 millimetres

\* I have myself observed this curious character to exist always in ♀ *Gomphus fraternus*, Say, in ♀ *G. fluvialis*, mihi, in ♀ *G. annicola*, mihi, and also in ♀ *Macrogomphus? spiniceps*, mihi, but never in the ♂ of the first three species, of which alone I possess the ♂. In ♀ *G. grasil-  
nellus*, mihi, it is obsolete. It has likewise been described in the "Monographie" as existing in ♀ *Gomphus spinosus*, and, as before stated, in ♀ *Macrogomphus parallelogramma* and in ♀ *M.  
annulatus*; and in the descriptions of the ♂ ♂ of these same three species, no mention is made

Early in the summer of 1860 I sent a single ♀ *vastus* along with a ♂ *fraternus*, to Dr. Hagen, supposing them to be identical. In his reply he kindly pointed out three of the principal distinguishing characters, and informed me that he had received from Maryland another ♀ of the same species, which he had named *vastus*—the ♂ being to this day, I presume, unknown to him. In a subsequent letter he said that "*vastus* was PROBABLY a new species." It will be noticed that *vastus* is not included in the Synopsis. The reason I do not know; but I conjecture, from collating the description of ♀ *Gomphus vulgatissimus*, that until the discovery of ♂ *vastus*, it was difficult or impossible either to separate the American species from its European prototype, or to identify the two species satisfactorily. To Dr. Hagen, therefore, justly belongs the honor of attaching his name to this fine and interesting insect; to me belongs only the labor of describing it from an unusually large number of specimens.

**GOMPHUS GRASLINELLUS**, n. sp.—♂ ♀ Differ from *G. fraternus* only as follows: the posterior prothoracic lobe is black, generally with a central yellow dot; the carina of the dorsum of the thorax is black; the eighth abdominal segment is yellow on the lateral margin for its entire length, and the tibiæ are exteriorly yellow, except at the tip. In the ♂ the sheath (*gaine*) of the penis is conspicuously pruinose; and the superior abdominal appendages have a small inferior tooth very near the tip, and in addition a very large quadrangular one on the middle of their external side, as in the European *G. grasilini*. (Mon. Gomph., Plate viii., fig. 3.) In the ♀ there is no lateral thorn on the carina of the vertex, and the vulvar scales are only one-sixth as long as the ninth ventral segment, and divaricate from their base.

Length ♂ 50—53 mill.; ♀ 51—53. Expanse ♂ 66—69; ♀ 66—70. Pterostigma  $3\frac{1}{2}$ —4 mill. Four ♂, seven ♀. Occurred in Coal Valley Creek, in Rock Island County, and also on the Des Plaines and Chicago rivers in Cook County. Its European representative, *G. grasilini*, has black markings on the front, the carina of the thoracic dorsum yellow, and two yellow vittæ (anterior and posterior?) on the outside of all the thighs, whereas *graslinellus*, like *fraternus*, has only a posterior yellow vitta on the anterior femora.

**GOMPHUS FLUVIALIS**, n. sp.—♂ Obscure greenish yellow. Head with the occiput straight, narrowly margined on its sides before and behind with black, and with long, black ciliations; vertical vesicle black, cariniform, abbreviated, transverse, emarginate, slightly tubercled at each extremity; antennæ, and the whole region of the ocelli to the base of the occiput, black; seta of antennæ generally pale at tip; front sharply and squarely angulated, or as prominent as in *fraternus*, with its upper side basally fasciate with palish brown, the anterior edge of the fascia widely biemarginate; anterior surface of front with its upper half and its two transverse foveæ, generally palish brown, and its inferior corners brown; epistoma clouded with brown; labrum anteriorly margined with brown and with a brown vitta; extreme tips of mandibles, and the terminal processes of the lateral labial lobes, pale brown; back part of the head brown next the occiput. Prothorax brown black, anteriorly and laterally yellow, and uniformly with a double yellow spot immediately before its posterior lobe. Dorsum of the thorax with the dorsal carina, which is not higher than usual, always brown black from its bifurcation backwards, generally in front of the bifurcation brown black except its extreme edge above; a double, central, brown-black, wedge-shaped stripe, not attaining the anterior edge by a third or half millimetre, and narrowly confluent before and behind with the antehumeral, occasionally not confluent before; a wide brown black

of any such appendage. I suspect that I am the first to announce it as a normal, or perhaps only an occasional, ♀ sexual character of the great genus *Gomphus*. At all events no such character is enumerated in the list of the sexual distinctions of that genus in the "Monographie," (p. 11.) Similar sexual appendages on the head are elsewhere in the Class Insecta (genuina), so far as I recollect at present, found not on the ♀ but on the ♂ head, as in the well-known coleopterous *Phanæus carnifex* and many other lamellicorn species.

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antehumeral stripe attaining the anterior edge, and a brown humeral stripe on the suture; pleura pale or yellowish, with a rather narrow brown stripe before the spiracle, which last is edged with black, and a similar one on the suture behind the spiracle, sometimes subobsolete; antealar sinus black in front; sternum pale. Abdomen brown black, with joints 7—9 but slightly dilated beneath, and marked with yellow on the dorsum as follows:—joint one, with a large longitudinal oval spot, confluent laterally and basally with a small spot, and together with the three small spots covering its entire length; two, with a lanceolate spot on its entire length; 3—8, with a narrow cuneiform basal spot about 1—1½ millimetres long, sometimes throwing out behind a narrow line, which is often interrupted before the medial suture of the joint, and never quite attains the tip; joints nine and ten with a narrow basal membranous line; laterally joints one, two and ten are yellow, except behind the earlets, which are yellow, with a few small black thorns on their posterior edge, and except also the tip of joint two; joints 3—6 have a small basal triangular yellow spot, becoming gradually smaller, until in six it is subobsolete, and joints 7—9 are submarginally yellow, the yellow in seven and eight more or less mottled with brown at tip; venter pale yellow towards the tip, where it is visible. Superior abdominal appendages half as long as the ninth joint, which is nearly four times as long as the tenth, black, slender, tapering, conical, approximate at base, divaricate, slightly curved downwards for three-fourths their length, the remaining fourth straight, with an inferior carina much curved outwards, and ascending their sides to about half their length, whence it again curves inwards and is produced to their tips; inferior appendages one-fifth shorter and more robust than the superiors, pubescent, black, pale at their internal base, approximate at base, more widely divaricate than the superiors, scarcely tapering, with the lower surface rounded and the upper flat, and finally, just before they attain their furthest limit, hemispherically excavated above, when the tip turns suddenly and almost squarely upwards for  $\frac{1}{2}$  or  $\frac{1}{3}$  millimetre, and terminates acutely. Legs brown black, coxæ and trochanters yellowish, intermediate trochanters brown beneath; anterior femora yellowish inferiorly and posteriorly; tibiæ and tarsi in the more mature individuals, deep black. Wings hyaline; veins and cross-veins all, including the costa, black; membraule cinereous; pterostigma pale brown, surmounting  $4\frac{1}{2}$ —5½ cells. Antecubitals 12—15; postcubitals 9. Two discoidal areolets, commencing always with three behind, sometimes with three before.

The ♀ differs from the ♂ in the vertical vesicle being strongly tubercled at each end, between which and the eye is a robust, conical, black thorn, rising as high as the ocellus; the dorsal thoracic stripes are in one specimen and on one side only confluent with the anterior margin; the cuneiform dorsal spots of the abdomen are sometimes subobsolete; and the abdomen is marginally yellow for its entire length, with an abbreviated submarginal yellow vitta on joints 3—6, which is sometimes confluent with the yellow margin, sometimes separated from it by a black line. Both the anterior and intermediate femora are yellowish inferiorly and posteriorly, and the posterior femora are entirely yellowish, except a terminal superior and anterior black vitta. The earlets are subobsolete. The ♀ abdominal appendages are more than a third as long as the penultimate abdominal joint, black, slender, tapering, wide apart at base, acute, parallel, directed slightly downwards, twice as long as the semi-circular anal process, which is yellowish, and has two black triangular vittæ above. The vulvar lamina is only one millimetre long, fuscous, and terminates in two rather slender divaricating conical branches; and the venter, when visible, has joints 3—6, and the basal two-thirds of eight fuscous. Occasionally there is a very slight flavescence at the base of all four wings, Antecubitals 13—15; postcubitals 7—11.

Length ♂ 51—55 mill. ♀ 48—56 mill. Alar expanse ♂ 65—67 mill. ♀ 67—75 mill. Pterostigma ♂  $3\frac{1}{2}$ —4 mill. ♀ 4—4½ mill. Expanse of the eighth 1862.]

abdominal segment 3 mill. Described from 3 ♂, 6 ♀, some rather immature, some tolerably mature. As might have been expected the second joint of the penis is toothed, and is about three and a half times as long as the third joint exclusive of the claws. Belongs to the group "pallidus" of the subgenus *Gomphus*, from the six described species of which group it is separated at once, as well as the following, by the black costal vein.

This insect breeds both in the Mississippi River in North Illinois and in the Ohio River in South Illinois, the pupa crawling out on to the banks to assume the imago form. *G. fraternus*, *G. vastus* and *G. amnicola*, mihi, all likewise breed in the Mississippi River, and it is remarkable that in the same spot and on the same day I have seen *fraternus*, *vastus* and *fluvialis* all coming out of the pupa together in considerable numbers. I suspect that most, if not all, *Gomphi* breed in running, not in stagnant, water. This may explain the fact of my being able to describe no less than six new species of the genus, all obtained within a few miles of the City of Rock Island, which lies on the narrow point of land formed by the confluence of Rock River with the Mississippi. The habits of *fluvialis* are very distinct from those of *fraternus* and *vastus*. The two latter haunt the land, often occurring in flocks a mile and more from the river; and from their frequently alighting they are easy to capture. The former makes long excursions to and fro on the surface of the river, scarcely ever approaching the land except for a second, and then never, so far as I have noticed, alighting. Hence it is exceedingly difficult to capture. My specimens were all obtained by taking them just as they came out of the pupa, and allowing them to live as long as they saw fit, which was generally from three to six days. On June 16, 1861, I took a *vastus* with the Phryganeide *macronema zebratum* in its mouth. *Fluvialis* no doubt feeds exclusively on aquatic insects.

In the autumn of 1860, Dr. Hagen most kindly sent me copies of the magnificent *Monographie des Gomphines* and *Monographie des Calopterygines*. With the assistance of the former, I was enabled confidently to announce *fluvialis* as a new and undescribed species in my premium "Essay on Insects injurious to Vegetation in Illinois," p. 341, (printed in the fourth Volume of the Transactions of the Illinois State Agricultural Society,) which was placed in the hands of the Society January 3, 1861. I had previously sent a ♀ of *fluvialis* to Dr. Hagen, not having myself met with the ♂ till 1861, and was much gratified by afterwards receiving a letter from him in reply, dated Feb. 16, 1861, in which he confirmed my opinion by stating positively that "it forms a new species." I have therefore felt perfectly justified in affixing a name to a species, which I was the first to announce as new, and which is now for the first time described in print.

GOMPHUS AMNICOLA, n. s.—♀ Differs from the normal ♀ of the preceding species only in the following particulars:—1st. The ground color is bright deep yellow. 2d. The vertex is yellow behind the vesicle, and there is a longitudinal rectangular ridge on the centre of the vesicle, giving it the appearance of being tri- not bi-tubercled. 3d. The angulation of the front is not acute, but the angle is obtuse rather than square and has its apex much rounded off. 4th. The basal fascia of the front above is not bi-, but tri-emarginate, viz. one very small and deep central and one large and wide lateral emargination. 5th. The anterior frontal fascia is obsolete. 6th. The labrum is anteriorly margined, but not vittate, with black. 7th. The central lobe of the labium is fuscous at tip and the lateral lobes are tipped with fuscous inside. 8th. The dorsal carina of the thorax is unusually high. 9th. The medial, cuneiform thoracic stripe is much slenderer. 10th. The narrow yellow line separating the humeral from the antehumeral stripe is only half as wide as in *fluvialis*, and is interrupted above; and as a consequence of this and the preceding difference, the antehumeral is very much wider. 11th. The first stripe of the pleura is either interrupted or abbreviated above, and the second is

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reduced to a short line above. 12th. The dorsal markings of the abdomen are similar, but very much wider and continuous to the middle of joint 8. 13th. The vulvar lamina terminates in two robust, approximate, conical branches. Antecubitals 13—15; postcubitals 9—11. Two discoidal cellules, commencing with 2 in the front wings, with 3 on the hind wings.

The ♂ differs in the same way, except that the vitta on the dorsum of the abdomen is interrupted at the tips of joints 6 and 7, and is narrower than in ♀. The abdominal appendages are precisely like those of ♂ *fluvialis*, except that the hemispherical excavation at the tip of the lower ones is obsolete. Antecubitals 11—13; postcubitals 9—11.

Length ♂ 47—48 mill. ♀ 48—50 mill. Expanse ♂ 65—67 mill. ♀ 70—73 mill. Pterostigma  $3\frac{1}{2}$ —4 mill. Four ♂, eight ♀.

The following measurements of the six new Gomphi previously described have been taken from single specimens; and for the sake of comparison I have added those of some allied species, for which, except that of *fraternus*, I am indebted to the *Monographie*. The figures represent millimetres.

	Total length	Abdomen.	Post. femur.	Width head.	Sup. wing.	Its width.	Inf. wing.	Its width.	Average Pterostigma.
[H]erpetogomphus? rupin- sulensis ♂, n. sp.	54	38	7	$7\frac{1}{2}$	33	$7\frac{1}{2}$	31	$9\frac{1}{2}$	$3\frac{1}{2}$
Erpetogomphus copias ♂	47	34	6	7	32	$7\frac{1}{2}$	30	9	$3\frac{1}{2}$
Macrogomphus? spiniceps ♀ n. sp.	61	45	7	8	39	$8\frac{1}{2}$	37	10	5
Macrogomphus parallelo- gramma ♀	62	47	$4\frac{1}{2}$ †	$8\frac{1}{2}$	42	**	41	**	4
Macrogomphus annulatus ♀	66	49	**	$8\frac{1}{2}$	40	$8\frac{1}{2}$	38	$9\frac{1}{2}$	5
Gomphus fraternus ♂	53	38	$8\frac{1}{2}$	$7\frac{1}{2}$	32	7	30	$9\frac{1}{2}$	$3\frac{1}{2}$
" vastus ♂ n. sp.	56	$40\frac{1}{2}$	8	$7\frac{1}{2}$	33	$7\frac{1}{2}$	32	$9\frac{1}{2}$	3
" fluvialis ♀ n. sp.	52	38	7	$7\frac{1}{2}$	35	$7\frac{1}{2}$	33	$9\frac{1}{2}$	$4\frac{1}{2}$
" amnicola ♀ "	47	35	7	7	$3\frac{1}{2}$	$7\frac{1}{2}$	33	9	$4\frac{1}{2}$
" pilipes ♀	48	34	$8\frac{1}{2}$	8	$3\frac{1}{2}$	$7\frac{1}{2}$	$33\frac{1}{2}$	10	4 1-12
" grasilinellus ♂ n. sp.	52	36	8	$7\frac{1}{2}$	32	$7\frac{1}{2}$	31	10	$3\frac{1}{2}$
" grasiline ♂	47	33	$7\frac{1}{2}$	7	$3\frac{1}{2}$	$6\frac{1}{2}$	$29\frac{1}{2}$	8	$3\frac{1}{2}$

CORDULEGASTER OBLIQUUS, Say ♀. ANAX JUNIUS, Drury! *ÆSCHNA CLEPSYDRA*, Say ♂ ♀! [♀ undescribed.] *ÆSCHNA CONRICTA*, Say! *ÆSCHNA HEROS*, Fabr. *ÆSCHNA PENTACANTHA*, Ramb. ♂ ♀; [not hitherto found north of Louisiana; ♀ undescribed.]

#### ODONATA (LIBELLULINA.)

*MACROMIA ILLINOIENSIS*, n. sp.—♀ Brown. Head with the vertical vesicle bilobed, the lobes divaricate, each forming an equilateral triangle; antennæ black; front prominent, laterally contracted towards its summit, deeply excavated above, the angulation of the superior with the anterior surface much rounded off except at the sides, above black with violet reflections, with four separate, basal, obtrigonal yellow spots, two outside the excavation, two inside the anterior surface, with its upper half brown and its lower half yellow, the latter enclosing the two usual transverse striæ, which are widely and deeply impressed, but not acute; epistoma and labrum of a paler semi-transparent brown, the latter with a wide obtuse longitudinal carina, and obscurely yellow towards its tip in the middle, its anterior edge brown; tips of the mandibles

† I give this figure just as I find it, but I am pretty sure there is some clerical or typographical error here, and that  $4\frac{1}{2}$  should be replaced by  $7\frac{1}{2}$ . *Macr. robustus* ♂, a species of the same size within a millimetre or two, is said to have its posterior femur  $7\frac{3}{4}$  millimetres long, and it is difficult to see how a Gomphine as large as this, with the posterior femur only  $4\frac{1}{2}$  millimetres long, could have a hind leg extending to the middle of the third abdominal segment, which is given as one of the characters of the subgenus *Macrogomphus*. Unfortunately in the third species of *Macrogomphus* (*annulatus*) the dimensions of the posterior femur are omitted.

black, glabrous; the rest of the mouth pale semi-transparent brown; back part of the head black, polished, without any hair next the eyes. Thorax covered with dense, long, pale brown hair; the space included in the double edge of each posterior bifurcation of the dorsal carina, bright yellow; no indications of any stripes on the dorsum; pleura with a distinct yellow stripe enclosing the spiracle; sternum pale brown. Abdomen inflated at base to the middle of joint three, thence much compressed and carinate above, pubescent, black, except joint one and the basal half of two, which are pale brown; two with a marginal yellow spot on each side underneath at its base, and a yellow medial transverse line, interrupted slightly above, beneath much abbreviated; 3—6 each with an elongate, semi-oval, yellow spot on each side the dorsum, the straight side of the spot on the medial suture, and the spot itself covering two-thirds the distance from the suture to the base of the joint; seven with a dorsal semicircular basal spot extending to the medial suture, and confluent at its extreme tip, with a similar but very much smaller yellow spot immediately behind the suture; laterally three has a lanceolate basal and marginal yellow spot extending two-thirds of its length, and four and eight have a small, obscure, basal, triangular yellow spot; venter black, so far as visible. Abdominal appendages a little longer than the tenth abdominal joint, black, rather slender, depressed, directed downwards, suddenly curving on their inner edge to an acute point, each surmounting a semicircular, black anal process as long as itself. Vulvar lamina black, very small, composed of two very small, approximate, roundish tubercles, from which proceed two robust, widely divaricate, medially inflated branches, convex in front, concave behind, and with a blunt, subbasal tooth on their posterior edge. Legs black; coxæ and trochanters pale brown, except the anterior trochanters, which are distinctly yellow on their inferior surface. Wings hyaline, strongly flavescent at their extreme costal base, and moderately so on their terminal third, the flavescence in the anterior wing extending inwardly along the costa beyond the nodus; a distinct ferruginous stripe between the costal and subcostal veins, extending from the base of each wing nearly to the first cross-vein; veins and cross-veins black, except the upper of the two veins which coalesce to form the costal, which in the lower wing, from a little inside the nodus to the tip of the pterostigma, is yellowish anteriorly; membranule white, cinereous at tip; pterostigma trapezoidal, black. Triangles with one cross-vein, in one posterior wing with two. Antecubitals 18; postcubitals 9—10. Two discoidal areolets, commencing with three, except one anterior wing where it commences with two.

Length ♀ 64 mill. Alar expanse ♀ 100 mill. Hind femur 12 mill.; hind tibia 11 mill. Pterostigma 3 mill. One ♀; ♂ unknown. Abdominal joints 4—6 are equal; seven is about a fifth shorter than six, and 8—10 each about a third shorter than the joint immediately preceding it, ten being about one and a half millimetres long. The hind legs extend to the middle of the fifth abdominal joint. Very distinct in its ornamentation from all the described *N. A.* species, except *pacifica*, Hagen, of which only a fragmentary specimen exists, and sufficiently distinct from that by the greater number of its antecubitals, (eighteen instead of sixteen,) but especially by the coloration of its wings.

*MACROMIA FLAVIPENNIS*, n. sp.—♀ Differs from the preceding as follows:—the front above is entirely yellow, except a broad, fuscous vitta in the excavation. Each side of the dorsum of the thorax there is a yellow stripe. Joint two of abdomen has a subbasal, yellow fascia, extending on the inferior margin to the tip, narrowly interrupted above, and occupying one-half its surface; in joint three the spot is similar to that of the preceding, but longer; 4—7 marked as is seven in the preceding, and eight with a basal, semicircular spot on the dorsum, occupying nearly one-half its length; laterally the small, obscure, basal spot is visible only in eight, instead of 4 and 8. The vulvar lamina is apparently composed of one large central tubercle, and two robust, inflated branches curving upwards. The wings are entirely flavescent, very strongly so on the

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costa; the ferruginous basal stripe, between the costal and subcostal, is only half as long; costal vein in all four wings yellow to its extreme tip; triangles all with one cross-vein. Antecubitals 17—18; postcubitals 10—11; two discoidal areolets, commencing with three in all the wings.

Length ♀ 69 mill. Expanse ♀ 94 mill. Pterostigma 3 mill. Hind femora 12 mill.; hind tibiae 11 mill. One ♀; ♂ unknown. Distinct from all described N. A. species, by the yellow costal veins. The front and abdomen resemble those of *annulata*, Hagen, but the dorsum of the thorax in that species is immaculate, and the pleura has two yellow stripes. Occurred on the Des Plaines River, near Chicago.

*CORDULIA TENEBROSA*? Say.—*C. filosa*, Hagen, and *C. tenebrosa*, Say, are evidently, from the differences in their ♂ abdominal appendages, very distinct species; and of both these species only the ♂ is known. The following ♀ may be referred with some propriety to either, though I rather incline to the opinion that it is *tenebrosa*. Probably some particulars may be mentioned below, which may serve either to identify it with Dr. Hagen's species, or to separate it effectually.

The abdomen is shaped quite differently in ♂ ♀ *Cordulia lateralis*, Burm., the ♂ abdomen having a strong constriction on segment three, after which it tapers to the tip; and the ♀ abdomen having no constriction whatever, but tapering gradually from base to tip, and being much wider and more depressed than the ♂. I presume that the same distinction prevails in other species of the genus, and that the abdominal constriction noticed both in *filosa*, Hagen, and in *tenebrosa*, Say, is merely a ♂ sexual character. Again, the ♀ ♀ of *C. lateralis*, have almost always hyaline wings, but I have a single, immature ♀ specimen, captured at the same time and place with many maturer individuals, with hyaline wings, which has the wings partly fumose; and *C. albicincta*, according to the Synopsis, has the anterior margin of ♀ wings subflavescent, while the ♂ has hyaline wings. The marginal flavescence on the wings of my ♀ ought not, therefore, to afford any reason for considering it distinct from either Dr. Hagen's or Say's ♂, both of which have hyaline wings.

♀ Obscure, brassy green. Vesicle of the vertex obviously punctured, with long, dense, black hairs, truncate-triangular, its tip with an impressed longitudinal indentation extending half way to its base, brown at tip, black with a slight brassy green reflection at base; antennæ black; front coarsely and confluent punctured above, on the upper two-thirds of its anterior surface with very coarse punctures mixed with rugæ, the punctures lower down becoming obsolete; the punctate surfaces bright, brassy green, bordered laterally and anteriorly with a yellow line, the anterior yellow line straight; the rest of the front, the epistoma and the labrum semitransparent obscure greenish; labium yellowish. Dorsum of thorax, with the carina yellowish, otherwise immaculate; pleura somewhat polished, with blue reflections, and with two distinct yellow stripes, one before the spiracle, slightly abbreviated and narrower, another behind the spiracle much abbreviated above, slightly below, and wider; sternum pale greenish brown. Abdomen a little inflated at base above, and tapering regularly to its tip, where it is blackish; glabrous and black below the lateral carina, with a large, obscurely defined, yellowish spot on the second segment beneath, and the basal half of the third segment semitransparent below, so as to appear yellowish; joints eight and nine greenish black below the lateral carina; joint ten triangularly emarginate at its tip for one-half its length. Abdominal appendages long, slender, black, wide apart at base, pilose, opaque, slightly smaller at base, thence cylindrical, till towards the tip they contract and terminate obtusely; viewed laterally, they curve very slightly downwards; viewed from above, they curve slightly inwards for quarter their length, and then divaricate slightly in a straight line; superior anal process very short, semicircular, black, deflexed. Vulvar lamina extending nearly to the tip of joint ten, divaricate with the venter, black, glabrous, polished, its inferior surface a hollow semi-cylinder, with its concavity upwards, rounded at 1862.]

tip and prolonged on each side not far from the tip in a lateral, horizontal, lamina, which at first expands gradually in width towards the base, and finally sweeps round in a regular curve inwards to the tip of joint eight, where the sides of that joint close upon it. Legs black, basal half of the anterior femora, and their trochanters yellowish; the extreme base of the intermediate femora and their trochanters marked with yellowish; all six coxæ pale, obscure green. Wings hyaline, the anteriors flavescent at their extreme base, and on the costa from about the nodus to the pterostigma; the inferiors flavescent at base, especially next the membranule, and on the costa from inside the nodus to the pterostigma; veins and cross-veins black; pterostigma small, black, surmounting not quite one cell; membranule fuscous, whitish at its extreme base. Antecubitals eight, postcubitals six. Discoidal areolets two, commencing always with two.

Length ♀ 60 mill. Alar expanse ♀ 83 mill. Pterostigma ♀  $2\frac{1}{2}$  mill. Abdominal appendages ♀  $3\frac{1}{2}$  mill. One ♀; ♂ unknown. Joints 8—10 of the abdomen are each from one-half to one-third shorter than the joint immediately preceding it, joint ten about one and a quarter mill. long. The only difficulty in referring this insect to Say's ♂, is the yellowish spot which he speaks of behind the two thoracic vittæ; but the existence of such a spot on the thorax is so contrary to the normal style of ornamentation in odonata, that it is probable that it was the spot on the base of the abdomen which he inadvertently referred to. Dr. Hagen's ♂ agrees exactly in the antecubitals and postcubitals, but has only "two obsolete yellow lines" on the pleura, instead of two well developed yellow stripes. Both in Say's ♂ and in Dr. Hagen's ♂, the legs are "black" or "immaculate."

EPITHECA PRINCEPS, Hagen, [occurred on the Des Plaines River.] CORDULIA LATERALIS ♂ ♀ Burm.! [The ♂ has the anal angle of the posterior wings acute, and it cannot therefore be an *Epitheca*.] PANTALA HYMENÆA ♂ ♀ Say! [occurs both in North and South Illinois; not captured North of Texas since Say's time; has the same migratory and social habits as *Libellula quadrimaculata*, Linn., but unlike that species never alights to devour its prey, and is consequently very difficult to capture.] TRAMEA LACERATA, Hagen! [occurs both in North and South Illinois.] CELITHEMIS EPONINA, Drury! CELITHEMIS ELISA, Hagen. [Referred to *Diplx* by Dr. Hagen, but I think erroneously. The pair I possess were given me by my friend Mr. A. Bolter of Chicago, at which place he took them.] PLATHEMIS TRIMACULATA, De Geer! [N. and S. Illinois.] LIBELLULA QUADRIMACULATA, Linn.! LIB. SEMIFASCIATA, Burm., [occurred on the Des Plaines River.] LIB. LUCTUOSA, Burm.! LIB. PULCHELLA, Drury! [N. and S. Illinois.] MESOTHEMIS SIMPLICICOLLIS, Say! MES. CORRUPTA, Hagen! [N. and S. Illinois.] MES. LONGIPENNIS, Burm.! DIPLAX [assimilata, Uhler =] RUBICUNDULA, Say. DIPL. VICINA, Hagen! DIPL. SEMICINCTA, Say. DIPL. AMBIGUA, Rambur. DIPL. INTACTA, Hagen.

I am satisfied that *Diplx assimilata*, Uhler, (No. 1 of the Synopsis, and named *assimilata* for me by Dr. Hagen himself,) is the true *rubicundula*, Say, and that *Diplx* No. 6, (*ambigua*, Rbr.,) is erroneously identified with Say's species. Say describes his *rubicundula* as occurring sometimes with the basal half of the wings flavescent, which is true of No. 1, but untrue of No. 6. No. 6 positively swarms at Rock Island every year about the last of August, and continues till the frosts come; and although I have seen millions of specimens on the wing, and have looked out two seasons for such variations, I never yet saw one with the basal half of the wings even subflavescent. Again, Say gives one and a half inch as the length of his species; now, that is the average length of No. 1, whereas No. 6 averages only about one and a quarter inch, and is constant in size. Mr. Uhler, at the time he published his *assimilata*, had never, as he has informed me, seen any specimens with perfectly hyaline wings. I forwarded such to him last autumn, and I believe he now inclines to think that my view of the subject is correct. The two species are distinguishable at once by No. 1 having both its anterior and intermediate femora posteriorly vittate with yellow.

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low, while No. 6 has a posterior yellow vitta only on its anterior femora. It is unfortunate that Say in his description should have said merely "feet blackish," which decides nothing either one way or the other. Thus by the brevity of the descriptions of the early naturalists, their meaning often becomes an enigma, and we are reduced to guessing and dogmatizing. And yet guessing is not knowing, and faith is not science. There is a profound truth contained in a MS. observation of Dr. Hagen's to me:—"A description of a new species cannot possibly be too long; it is always easy to curtail it, but often impossible to lengthen it."

## RECAPITULATION.

## TERMITINA.

*Termes flavipes*, Köll.

## PSOCINA.

*Psocus venosus*, Burm.

" *contaminatus*, Hagen.

" *novæ-scotiæ*, Walk.

" *lichenatus*, Uhler.

" *purus*, n. sp.

" *semistriatus*, n. sp.

" *perplexus*, "

" *pollutus*, "

" *amabilis*, "

" *geologus*, "

" *abruptus*, Hagen.

" *corruptus*, Hagen.

" *aurantiacus*, Hagen.

—13 sp.

## PERLINA.

*Pteronarcys nobilis*, Hagen.

*Acroneuria abnormis*, Newm.

" *rupinsulensis*, n. sp.

*Perla flavescens*, n. sp.

" *varians*, "

" *decipiens*, "

" *occipitalis*? Pict.

" *producta*, n. sp.

" *fumipennis*, n. sp.

" *elongata*, "

*Chloroperla bilineata*? Say.

" *brunnipennis*, n. sp.

" *nana*, "

—13 sp.

## EPHEMERINA.

*Bætis femorata*, Say, new imago.

" *alternata*, Say, new subimago.

" *arida*, Say, "

" *sicca*, n. sp.

" *debilis*? Walk. Cat., "

*Potamanthus cupidus*, Say, new imago.

" *odonatus*, n. sp.

*Palingenia vittigera*, "

" *limbata*, Pictet.

" *bilineata*, Say.

" *flavescens*, n. sp.

" *interpunctata*, Say, new subimago.

*Palingenia pulchella*, n. sp.

" *terminata*, "

*Ephemera decora*, Walk. Cat.

" *flaveola*, n. sp.

*Ephemerella* (n. g.) *excrucians*, n. sp.

" *consimilis*, "

*Bætisca* (n. g.) *obesa*, Say, new imago.

*Cloe ferruginea*, n. sp.

" *fluctuans*, "

" *unicolor*, Hagen.

" *vicina*, Hagen, new subimago.

" *dubia*, n. sp.

" *mendax*, "

*Cænis hilaris*, Say, new subimago.

—26 sp.

## ODONATA (AGRIONINA).

*Calopteryx maculata*, Beauv.

*Heterina rupinsulensis*, n. sp.

*Lestes rectangularis*, Say.

" *unguiculata*, Hagen.

" *hamata*, Hagen.

" *forcipata*, Rambur.

" *eurina*? Say.

" *inæqualis*, n. sp.

*Agrion irene*, Hagen.

" *ramburii*, Selys.

" *exsulans*, Hagen.

" *putridum*, Hagen.

" *apicale*, Say.

" *civile*, Hagen.

" ——— Hagen, MS., n. sp.

" *binotatum*

—16 sp.

## ODONATA (ÆSCHNINA.)

*Herpetogomphus rupinsulensis*, n. sp.

*Macrogomphus spiniceps*, "

*Gomphus spinosus*, Selys.

" *fraternus*, Say.

" *vastus*, Hagen MS., n. sp.

" *graslinellus*, n. sp.

" *fluvialis*, "

" *amnicola*, "

*Cordulegaster obliquus*, Say.

*Anax junius*, Drury.

*Æschna clepsydra*, Say.

" *constricta*, Say.

*Æschna heros*, Fabr.  
 " *pentacantha*, Ramb.  
 —14 sp.

ODONATA (LIBELLULINA).

*Macromia illinoiensis*, n. sp.  
 " *flavipennis*, n. sp.  
*Epithea princeps*, Hagen.  
*Cordulia tenebrosa*? Say.  
 " *lateralis* Burm.  
*Pantala hymenæa*, Say.  
*Tramea lacerata*, Hagen.  
*Celithemis eponina*, Drury.  
 " *elisa*, Hagen.  
*Plathemis trimaculata*, De G.  
*Libellula quadrimaculata*, Linn.  
 " *semifasciata*, Burm.  
 " *luctuosa*, Burm.  
 " *pulchella*, Drury.  
*Mesothemis simplicicollis*, Say.

*Rock Island, Illinois, July 25, 1862.*

*Mesothemis corrupta*, Hagen.  
 " *longipennis*, Burm.

*Diplax rubicundula*, Say.  
 " *vicina*, Hagen,  
 " *semicincta*, Say.  
 " *ambigua*, Ramb.  
 " *intacta*, Hagen.

*Perithemis domitia*, Drury.  
 —23 sp.

	Species.	New.
Termitina.....	1.....	0
Psocina.....	13.....	6
Perlina.....	13.....	19
Ephemerina.....	26.....	16
Agrionina.....	16.....	4
Æschnina.....	14.....	6
Libellulina.....	23.....	2
	106	43

Remarks on the Species composing the Genus *PEDIOCAETES*, Baird.

BY D. G. ELLIOTT, F. Z. S.

Intending, at no distant period, to publish a monograph of the Tetraoninae, I have been led, by the introduction of an apparently new species of this genus—(lately described by Dr. George Suckley, under the name of *Pedio-caetes Kennicotti*, in the Proceedings of the Academy of Natural Sciences of Philadelphia, 1861)—to investigate its specific value, and compare it with our common Sharp-tailed Grouse. The following are my conclusions:

The bird commonly known as *Tetrao phasianellus*, has heretofore only been found within the limits of the United States, and to this species, Ord, in Guthrie's Geog. 2d American ed., 1815, p. 317, gave the appellation of *Phasianus Columbianus*, basing his description upon the Columbia Pheasant of Lewis & Clark, ii. p. 180. This species then seemed to be the only one of this genus existing in the new world, and as it also appeared to be the one—(as far as the knowledge of American ornithologists extended, none of whom had received any examples from without the limits of the Union)—to which, long before, Linnæus had given the name of *phasianellus*, and which Gmelin, Bonaparte, Audubon and all others had retained; so Prof. Baird, when he instituted the present genus, also gave the same appellation as being the correct one of our well known Sharp-tailed Grouse.

But in 1861 there arrived at the Smithsonian Institution, from Mr. Kennicott, a number of Sharp-tailed Grouse, collected in the Hudson's Bay Company's Territory, from Fort Rae and Big Island, the prevailing colors of which were black and white, with very little, if any, of the brown hues, which constitute the principal marks of our common bird.

These examples, Dr. Suckley, after comparison with specimens, obtained from the west and northwest, very naturally considered distinct species, for they certainly are, and thereupon described them as *new*, as above mentioned.

But now I find that this species from Arctic America, is the one originally described as *Tetrao phasianellus*, the United States species either being considered the "young with ferruginous plumage," vide Richardson in Faun. Bor. Amer., 1831, p. 861, or as a very light colored variety.

Thus Bonaparte in his continuation of Wilson's Ornithology, gives a figure of a specimen in the Philadelphia Academy, which, as he says, "though a

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female(?) and *unusually light colored*, we have had our drawing made, on account of its having been procured in the American territory," while his description is taken "from a handsome male specimen from Arctic America."

The genus *Pediocaetes* therefore is composed of the two following species, with this diagnosis:

General color white and brownish yellow with irregular black-markings. Beneath pure white, the feathers on the breast and flanks with brown U-shaped markings. Throat buff.....*Pediocaetes Columbianus*.

General color white and black, with irregular dark brown markings. Beneath pure white, with V-shaped black marks on the breast and sides, broader and closer than those of its relative. Throat white interspersed with small black marks.....*Pediocaetes phasianellus*.

The species may be more fully described thus:

*PEDIOCAETES COLUMBIANUS* (Ord.) Elliot.

*Tetrao phasianellus*? Ord. Guthrie's Geog., 21 Am. ed., 1815, p. 317.

*Phasianus Columbianus*, do. do.

*Tetrao phasianellus*, Bon. Syn., 1828, p. 127.

Do. " Am. Ornith., vol. iii. 1828, p. 37, pl. xix.

Do. Nuttall, Man. vol. i. 1832, p. 669.

Do. Audub. Ornith. Biog., vol. iv. 1838, p. 569, pl. 382.

Do. " Syn. 1839, p. 205.

Do. " Birds of Amer., vol. v. 1842, p. 110, pl. 298.

Do. Newberry, Cal. & Or. Route. Rep. P. R. R. Surv., vol. vi. iv. 1857, p. 94.

*Tetrao (Centrocercus) phasianellus*. Swain, Faun. Bor. Am., vol. ii. 1831, p. 361.

Do. Bonp. Comptes Rendus, xlv. 1857, p. 428.

*Tetrao urophasianellus*, Doug. Trans. Linn. Societ., vol. xvi. 1829, p. 136.

*Pediocaetes phasianellus*, Baird, vol. ix. P. R. R. R., p. 626.

Head and throat brownish yellow, the front, crown, occiput and cheeks irregularly marked with black or very dark brown; superciliary band whitish; back ferruginous brown, variously spotted with black or brownish yellow; wings brownish grey, with large spots of white on all the coverts; transverse bars on the secondaries, and the outer webs of the primaries which are dark brown, spotted with the same; the tail feathers have the inner web white, outer brownish gray, dotted with darker brown; the central feathers are elongated and same color as the back—under parts are pure white, the feathers on the breast and flanks having a brown U-shaped mark. Bill black; feet brown.

*Hab.*—Northern prairies from Wisconsin to Oregon and Washington territories.

*PEDIOCAETES PHASIANELLUS*, (Linn.) Elliott.

*Tetrao phasianellus*, Linn. Syst. Nat., vol. i. 10 ed., 1758, p. 160.

Do. Forst. Philos. Trans., lxii. 1772, p. 394 and 495.

Do. Gmelin Syst. Nat., vol. i. p. 747.

Do. Lath. Ind. Ornith., vol. ii. p. 635.

*Tetrao urogallus*, var. B., Linn. Syst. Nat., vol. i. ed. 12th, p. 273.

*Tetrao phasianellus*, Bon. Amer. Ornith., vol. iii. 1828, text ♂. Sharp-tailed Grouse. Pennant.

*Pediocaetes Kennicotti*, Suckley, Proc. A. Nat. Sc., 1861.

General color black. Top of head black, a few faint marks of rusty towards the occiput, sides of head black, the feathers tipped with white; those on the side and back of neck tipped with rusty; throat white, spotted with black. The back is also black, the feathers margined with rufous brown; the rump is lighter, caused by the feathers being tipped broadly with grayish; the elongated central feathers of the tail are (in the specimen before me) jet black, irregularly crossed with yellowish white and gray. Wings blackish brown, with large white spots on all the coverts, in addition to the rusty

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margins of the feathers; primaries blackish with white marks on their outer webs. Tail sometimes grayish at the base with white tips, or pure white. Under parts pure white, with a black V-shaped mark near the centre of the feathers on the breast and flanks, gradually growing smaller and fainter, as they approach the abdomen and vent. The white feathers of the legs are hair-like and extend over the toes quite to the nails. Bill black; feet dark brown.

*Habitat*.—Arctic America, plentiful around Hudson's Bay, but never found within the limits of the United States.

Supplementary note to a "Synopsis of the North American Forms of the COLYMBIDÆ and PODICEPIDÆ."

BY ELLIOTT COUES.

Since the publication of my paper on the Loons and Grebes of North America, the Smithsonian Institution has received, from J. Hepburn, Esq., of San Francisco, California, what has long been a great desideratum in its collections, a specimen of *Echmophorus Clarkii* in full plumage. The interest attaching to the elucidation of this hitherto undetermined question in American ornithology induces me to offer the following brief notice of the points in which the nuptial dress differs from the ordinary well known winter plumage. The specimen alluded to, Mr. Hepburn states, was shot in the latter part of April, and is a female.

*ECHEMOPHORUS CLARKII*, Coues.—(Adult female, breeding plumage).—The chrome yellow of the under mandible, and of the tip and cutting edges of the upper, is very bright, and in marked contrast with the quite pure black of the culmen. The bare loreal space is leaden blue. The crown, occiput, and neck behind are very deep grayish black, almost pure black on the occiput, and fading gradually along the neck, into the blackish gray of the back and upper parts generally, which color is scarcely, if at all, deeper than in the average of winter specimens. The white space between the eye and bill is very broad, and remarkably pure. The throat, neck before, and whole under parts are of a beautiful silky white, the line of demarcation of the black and white on the sides of the head and neck being remarkably distinct. *There is a decided occipital crest*; the feathers of that region are about one inch in length, and have the peculiar filiform character common to the crests of birds of this family. This crest, however, on the dried skin lies quite smoothly, and is not very conspicuous except on raising the feathers. *There are no decided colored ruffs*; but the white feathers of the sides of the head posteriorly, and across the throat, are longer and fuller than elsewhere, particularly the former. Although this elongation is hardly noticeable in the dried skin, it is doubtless sufficient to give to the bird when in life something of the appearance presented by most of the species of this family. In other respects the specimen before me does not differ materially from the winter series.

I have always been of opinion that the two birds which I have recently separated generically from *Podiceps* would not possess the conspicuous colored ruffs for which the type of the genus (*P. cristatus*) is so noted. The supposition to that effect, doubtfully set forth in my last paper, is now verified in the case of one of the species of the genus, and I have no doubt that the nuptial plumage of *Echmophorus occidentalis* will be perfectly analogous to that exhibited by the species under consideration.

A specimen of *Podiceps (Proctopus) californicus*, in full summer plumage, has also been received from Mr. Hepburn. It presents the same marked differences from the European *P. auritus* as do all the otherspecimens from North America which have fallen under my observation; and is additional confirmation of the position assumed with regard to the specific distinction of the American and European birds. They are quite distinct species and recognizable in either adult or young plumage.

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## Descriptions of Fossils from the Marshall and Huron Groups of Michigan.\*

BY ALEXANDER WINCHELL.

## CENTRONELLA, Billings.

*CENTRONELLA JULIA*, n. sp.—Shell small, nearly circular, ranging from slightly elongate to transverse, and squarely rounded; both valves with regular lens-like convexity, sometimes with a gentle ridge running the length of the ventral valve, and a slight sinuation near the margin of the dorsal. Ventral valve with a moderate beak, circularly foraminated, turned up at a right angle, covering the beak of its fellow. Area entirely wanting. Shell obsoletely striate concentrically, and having a minutely punctate structure. Apophysary system as follows: A delicate ribbon-like loop originates from the stout blunt crura of each side of the socket valve, having its flat sides at first vertical; the two branches of the loop proceed at first in lines parallel or a little convergent, and then gradually diverge, widening as they proceed, and assuming an inclined position, until, approaching the front of the valve by a regular curvature, the lower edge has become anterior, giving the band an angle of  $30^{\circ}$  with the plane of the shell; approaching the median line the band rapidly widens, and the front margin is drawn forward in a long acumination, while the inner margin is regularly concave, except that near the median line it turns abruptly forward so as to meet that line at an acute angle. The loop thus forms an urceolate figure on its inner margin, and on the outer a somewhat oval one truncated behind and attenuately acuminate before. In the median line where the two branches meet, both are suddenly deflected downwards, forming a double vertical plate, not quite reaching the ventral valve, the upper edge of which, when viewed from the side, is flatly roof-shaped, while the lower edge describes two convexities, the greater, anterior, leaving a notch between them. The surfaces of the loop and median plate are covered with minute obliquely conical pustules, in some places seeming to become spinulose. The casts exhibit on the ventral side a delicate impressed line extending from the beak to the middle, and on the right and left of this a fainter one; on the dorsal side a median impression with two fainter ones on the right, and two on the left—the median terminating rostrally upon a small pyramidal process (filling the beak of this valve) separated by a short slit (made by the socket ridge) from a smaller isolated process on each side.

Length, breadth and thickness of an average specimen: .31 (100), .29 (94) and .15 (48).†

*Locality*.—Grindstone quarries, Pt. aux Barques, in a conglomeritic ferruginous sandstone overlying the gritstones of the Marshall Group. Abundant.

## SPIRIFERA, Sowerby.

*SPIRIFERA SUBATTENUATA*, Hall.—Iowa Rep., p. 504, pl. 10, fig. 3. Comp. Owen Rep. on Iowa, Wis., &c., pl. iii. fig. 9.

Our specimens agree with the figures and descriptions of Hall.

*Locality*.—Light-house Pt. aux Barques, with *Spirifera Huronensis*.

\* For a description of the rocks of these groups see the author's Report on the Geology of the Lower Peninsula of Michigan, 1860; also Silliman's Journal for May, 1862.

Descriptions of 26 species of Cephalopoda from these two groups were published in the number of Silliman's Journal just referred to; and descriptions of most of the Gastropoda and Lamellibranchiata of the present paper were sent for publication on the 1st of April last, since which time further discoveries and investigations have extended my notice of the palæontology of these interesting groups to its present limits, and I have for this reason obtained permission of the editors of Silliman's Journal to offer the whole for publication together, to the Phil. Acad. of Nat. Sciences.

† The measurements in this paper are given in inches. The numbers in parenthesis are the relative measurements—that which is generally greatest being assumed 100.

*SPIRIFERA MEDIALIS* (?) Hall.—Rep. IVth Dist. N. Y., p. 208, fig. 8; 10th Rep. N. Y. Reg., p. 164.

*Locality*.—Light-house, Pt. aux Barques, with *S. Huronensis*.

*SPIRIFERA HURONENSIS*, n. sp.—Shell of medium size, transversely semi-elliptic, with acuminate hinge-extremities; entire hinge-length nearly three times the length of the shell; anterior and antero-lateral borders regularly curved. Ventral valve ventricose, especially towards the beak, which is erect over a high, triangular area, triangularly foraminated to the apex; sinus beginning near the beak, not well defined, round at its margins and bottom; entire surface covered with about forty rounded ribs, of which the lateral half on each side terminate upon the cardinal border, while about four, of the same size as their neighbors, occupy the sinus. Dental plates standing at an angle of 58°. Dorsal valve equally tumid with the ventral; beak incurved over a narrow area; mesial fold indistinct, with three or four ribs; oclussor and pedicle scars lanceolate, deep. Surface of shell with one or two squamous incremental lines.

Length of shell, .49 (100); length of hinge line 1.3 (265); convexity of ventral valve .25 (50).

*Locality*.—Light-house Pt. aux Barques, in a hard, gray, pyritous, coarse, often conglomeritic bed of sandstone two feet thick, intercalated in the argillaceous slates of the Huron group.

*SPIRIFERA PHAROVICINA*, n. sp.—Shell large and ventricose. Ventral valve with a gentle sinuation which extends to the beak; dental plates moderately long, forming an angle of 80°; area very elevated, with a narrow triangular fissure reaching to the apex, which scarcely overhangs the area; surface faintly marked each side of the sinus by rather remote radiating ribs, which, near the margin, are somewhat distinct. Some impressions of areas supposed to belong to this species, are 2.1 long, and .95 high, with a fissure .44 wide at base; deltoidal impression grooved in the direction of the fissure; surface of area flat, slightly incurved at apex and marked by very distinct transverse striæ. Dorsal valve with a low rounded fold, marked (in the cast) by a single small median groove; beak prominent, incurved over a small area.

*Locality*.—Light-house, Pt. aux Barques, with *Rhynchonella Huronensis*, *Sperifera Huronensis*, &c.

This well marked species is known only by imperfect casts.

*SPIRIFERA* (?) *INSOLITA*, n. sp.—Shell large, smooth. Ventral valve with a broad, concave sinus reaching to the beak, and forming at its lateral margins angles with the shell surface; area short and imperfectly bounded, though the beak is rather high; dental plates very long, reaching the middle of the shell or beyond, and forming with each other an angle of 25°, which is the same as the rostral angle of the mesial sinus.

*Locality*.—Light-house, Pt. aux Barques.

This species has the short hinge line of *Brachythyris*, and the smooth surface of *Martinia*—characters which, with the very long and approximate dental plates render it unique among *Spiriferæ*.

RETZIA, King.

*RETZIA POLYPLEURA*, n. sp.—Shell of medium size or rather large, cuneate-oval, tumid. Ventral valve with a prolonged, isolated, nearly erect, perforate beak, which projects one-fourth the valve length beyond the dorsal valve. a swollen umbo, and depressed central and anterior region. Dorsal valve rotund, with a subcuneate rostral margin; beak obtuse, closely appressed against the ventral valve; umbo ventricose; entire valve with a regular cardium-like convexity; median ridge extending one-third the length of the valve, with a lanceolate oclussor impression on each side of it. Surface marked by about forty small rounded radiating ribs. Spires not seen.

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Length, breadth and thickness of a rather small specimen: .70 (100). .58 (83), and .34 (50). Length of dorsal valve .52 (74). Length and breadth of another dorsal valve .69 and .66

*Locality*.—Light-house, Pt. aux Barques with *Rhynchonella Huronensis*, &c.

This species resembles *R. serpentina*, de Kon. (Anim. Foss., 291, pl. xix. 8), but the ventral valve is most ventricose in the umbonal instead of the middle region, and has a nearly erect instead of a straight beak. It differs from *R. vera*, Hall (Iowa Rep. 704, pl. xxvii. 3), in the absence of wings, and in its more erect beak.

#### MERISTA, Suess.

**MERISTA HOUGHTONI**, n. sp.—Shell of medium size, subrotund and subtumid. Ventral valve a little produced at the straight, obtuse foraminated beak; somewhat truncate in its contour, along the cardinal slopes, and very slightly elongate in front across the width of the sinus; regularly convex in all directions from the middle, except along the shallow sinus, which takes its origin near the middle of the valve. Impressions of the divaricator muscles longitudinally striate. Dorsal valve circular; beak scarcely projecting beyond the hinge; ocluser impressions small, spatulate, separated by a rostral septum reaching one-fourth the length of the valve; mesial fold represented by an undulation at the anterior margin. Surface of cast smooth.

Length, breadth and thickness .70 (100), .68 (97) and .36 (51).

*Locality*.—Light-house, Pt. aux Barques, with *Rhynchonella Huronensis*, &c.

#### RYNCHONELLA, Fischer de Waldheim.

**RYNCHONELLA SAGERIANA**, n. sp.—Shell of medium size, somewhat quadrantal in outline, rather tumid. Ventral valve not seen. Dorsal valve in the older specimens with a prominent and inflexed beak, and about 16 obtuse plications, some of the central ones showing a groove on the summit toward the margin, as if preparatory to bifurcation. Mesial fold consisting of two or three plications just perceptibly raised above the others in the vicinity of the anterior margin.

Length, .56 (100); breadth .60 (107); convexity of dorsal valve .23 (41).

*Locality*.—Marshall, in the Marshall sandstone.

**RYNCHONELLA WHITEI**, n. sp.—Shell small, sub-circular. Dorsal valve sub-tumid, with the greatest elevation at one-third the distance from beak to anterior margin; cardinal slopes slightly convex, terminating in subulate spaces which descend from the umbo; lateral and anterior margins circularly rounded. Surface marked by about 17 rounded, moderately elevated ribs. Mesial elevation entirely wanting, or barely perceptible, and embracing about two of the plications. Median septum present, little developed.

Length of dorsal valve .38 (100); breadth .45 (119); convexity .10 (26).

*Locality*.—Marshall.

**RYNCHONELLA HUBBARDI**, n. sp.—Shell small, subquadrantal in outline; cardinal slopes straight, forming a right angle or more; lateral extremities about midway of the shell; anterior border gently curved; the two valves equally convex; ventral valve most tumid near the beak, the dorsal in the middle. Surface marked by 21 small rounded radiating plications. Mesial sinus represented by a broad shallow flattening of the mid-frontal slope of the ventral valve, occupying the two middle-fourths of its width, and corresponding to 8 or 9 plications. No fold perceptible in the dorsal valve, but a shallow depression extends from the beak about one-third the length of the shell, corresponding to the extent of the median partition beneath it. Dental plates of the ventral valve well developed, diverging at an angle of about 30°. Shell thin, fibrous.

Length of a ventral valve .26 (100); breadth .31 (119); convexity, .08 (31).

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*Localities.*—Marshall and the grindstone quarries at Pt. aux Barques, belonging to the Marshall group.

The dorsal valve greatly resembles that of *R. circularis*.

**RHYNCHONELLA MARSHALLENSIS**, n. sp.—Shell of medium size; dorsal valve very ventricose, with the middle region somewhat flattened, and all the margins abruptly deflected—the anterior at nearly right angles; beak prominent, obtuse, incurved; cardinal slopes short, making with each other an angle of about 100°. Surface of valve marked by about 27 medium-sized rounded, radiating plications, two or three of which are implanted on each lateral extremity, some of the plications reaching the beak. A shallow mesial fold rises in about the middle of the valve and embraces seven plications. The mesial septum extends about one-eighth the length of the valve.

Length of the dorsal valve .58 (100); breadth .62 (107; convexity, .30 (52).

*Locality.*—Marshall.

**RHYNCHONELLA CAMERIFERA**, n. sp.—Shell of moderate size, tumid; beak of ventral valve projecting and slightly upturned; cardinal slopes straight, at right angles; sides of the shell rounded; front margin similarly rounded or somewhat straight, not unfrequently produced on one side of the mesial sinus. Dorsal valve nearly circular, a little more convex than the ventral, most convex anterior to the middle, and rather abruptly bent down in front. Ventral valve with a shallow sinus, which extends back about one-fourth the length of the valve, corresponding to the fold in the dorsal valve; most convex between the beak and the middle; dental plates parallel, well developed; teeth at right angles, elongate, growing stouter anteriorly, with handsomely crenulated margins; mesial partition of the dorsal valve, extending nearly one half its length, thickening near the beak, to give space for the excavation of a small chamber within the septum. Shell with 20 or 21 (a variety? with 16) sharp plications, of which three or four are comprised in the mesial sinus; these are crossed by a few squamulose concentric wrinkles; shell structure fibrous.

Length of an average specimen .38 (100); breadth .34 (90); thickness, .19 (50).

*Locality.*—Pt. aux Barques, in a conglomeritic ferruginous sandstone overlying the gritstones of the Marshall group—myriads of casts sometimes forming, with *Centronella Julia*, the whole mass of the rock.

The small chamber in the mesial septum of the dorsal valve is an interesting and unique character. On a similar cameration of the septum of the ventral valve of some *Cyrtia* the genus *Cyrtina* has been founded; and Professor King established his *Camarophoria* on the formation of an arch in the ventral valve by the approximation of the dental plates.

This species has the external appearance of the young of *R. incubescens*, but, amongst thousands, none attain proportions very different from those given above.

**RHYNCHONELLA BARQUENSIS**, n. sp.—Shell small, transversely oval, thin. Ventral valve with a moderately prominent beak and slightly curved cardinal slopes; greatest tumidity near the beak, from which the surface descends in a nearly right plane to the anterior margin, and with little convexity to the right and left margins. Dorsal valve flattish, most inflated in the middle. Mesial fold and sinus small, traceable one fifth or sixth the length of the shell, embracing two or three sharp plications, of which the entire surface of each valve receives about 12 or 13. Dental plates of ventral valve parallel; mesial septum of dorsal valve camerated as in *R. camerifera*.

Length .30 (100); breadth .32 (107); thickness .13 (43).

*Locality.*—Grindstone quarries, Pt. aux Barques, with *R. camerifera*.

**RHYNCHONELLA SUBCIRCULARIS**, n. sp.—Shell small, cuneate-rotund, subtumid.

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Ventral valve unknown. Dorsal valve with a blunt depressed beak, equalling the hinge, a moderately elevated umbo from which the surface slopes with gentle convexity to the lateral and anterior margins, and abruptly, with slight excavation, towards the superior portion of the rounded hinge-margins. Surface marked by about 32 fine rounded plications, which reach from the margin half way to the beak. Mesial fold wanting. Mesial septum extending one-fifth the length of the shell.

Length of dorsal valve .25 (100); breadth .25 (100); convexity .08 (34).

*Locality*.—Grindstone quarries, P. aux Barques, with *R. camerifera*.

This species is a close analogue of *R. radialis*, Phillips, sp. (Geol. Yorks. 223, pl. xii. 40, 41) from the carboniferous limestone of Bolland.

*RHYNCHONELLA HURONENSIS*, n. sp.—Shell of medium size, tumid, transversely oval, or nearly circular, with rounded lateral, and cuneate rostral margins. Ventral valve with a straight beak, flattened in the central region, and rather abruptly inflected around the margin, toward the plane of the valve; mesial sinus beginning with the last third of the shell-length, and consisting of a sudden depression in the antero-marginal slope. Dental lamellæ well developed, very slightly divergent. Dorsal valve with an inconspicuous beak and a mesial fold abruptly elevated and confined to the anterior third of the valve. Median septum reaching two-fifths the length of the valve. Occlusor muscular impressions, semi-elliptic, lying close to the median septum. Shell-structure fibrous. Surface marked with 23 small rounded ribs, of which five occupy the mesial sinus.

Length of the ventral valve .48 (100); breadth .58 (121); convexity .10 (21).

*Locality*.—Light-house, Pt. aux Barques, in a hard pyritous sandstone intercalated in the argillaceous slates of the Huron group.

Var. *precipua* differs from the typical forms in being more flattened on the ventral side, with mesial sinus consisting of an abrupt deflection of nearly the whole anterior margin of the valve, forming a right angle with the plane of the valve; surface with 18 rounded radiating ribs, of which 6 fall in the sinus; dental plates diverging at an angle of 40°.

#### ORTHIS, Dalman.

*ORTHIS VANUXEMI*, Hall (10th Ann. Rep. N. Y. Reg., p. 135).—Shell nearly circular, sub-tumid; hinge-line very short. Dorsal valve a segment of a sphere; beak not surpassing the hinge, slightly incurved; a thick median plate or ridge reaching nearly to the centre of the valve, bisecting the right angle formed by the well developed socket ridges. Ventral valve flat, or slightly concave anteriorly, with a projecting beak; median ridge feeble, extending scarcely to the mid-valve; a barely perceptible trace of the semi-circular divaricator impressions sweeping from the beak to the anterior extremity of the median ridge, in the middle of which space are the two small semi-elliptic occlusor scars; dental plates short and thick; teeth well developed, lying in the hinge-line. One of the casts differs in having one of the occlusor scars half heart-shaped and the dental plates more slender. Surface not fully known; marked by numerous radiating striae which increase by implantation and bifurcation, and produce a crenulated anterior margin. Shell structure finely punctate.

Length .81 (100); breadth .81 (100); thickness .25 (31).

*Locality*.—Light-house, Pt. aux Barques, with *Rhynchonella Huronensis*, &c.

This shell is a little more convex in the dorsal and flatter in the ventral than the figures given by Prof. Hall, but none of its characters differ materially from his description. Compared with *O. Michelinii*, Lev., as described by de Koninck, it is a little more convex dorsally, and presents circular instead of digitate [from the vascular system?] divaricator impressions upon the ventral 1862.]

valve. *O. Vanuxemi* is described from the shales and shaly sandstones of the Hamilton group of New York and Iowa, the lithographic limestones of Missouri, and from the soft sandstones in Eastern Ohio, regarded as Chemung by Prof. Hall.

*ORTHIS CRENISTRIA*? Phillips. (Pal. Foss. Corn. &c., p. 66, pl. 27, fig. 113).—Hinge line equalling greatest width of shell; ventral valve semi-elliptic with shallow constrictions beneath the cardinal extremities; flat, with an umbonal elevation beginning about the middle and rising to a beak which overlooks a large triangular area inclined at an angle of  $45^\circ$  with the shell-plane; dental plates strong, each equalling one-fourth the hinge length, forming with each other an angle of about  $60^\circ$ . Occlusor scars reaching nearly the middle of the shell, closely contiguous, leaving together a ligulate anteriorly acute depression upon the cast. Surface covered by fine radiating striae, interrupted by distinct or obscure concentric wrinkles. In one specimen supposed to belong here, the surface is covered by a set of sharply-cut, twice-dichotomizing striae—the second set reaching half way, and the third one-third the distance to the beak. Dorsal valve hemispherically convex with sharp striae and concentric wrinkles, like the ventral.

Length of shell 1.27 (100); length of hinge line 1.37 (107); length of dental plates .32 (25).

*Locality*.—Light-house, Pt. aux Barques.

I can make no distinction between this species and that described by Phillips, from South Devon. The beak, however, seems to be perfectly symmetrical, and in this it differs from *Streptorhynchus robusta*, Hall, sp., from the coal measures of Iowa, as well as from the Punjab examples of Davidson (Quar. Jour. Geol. Soc. Lond., xviii. p. 30), who identifies the Devon, Iowa and Punjab forms. The Michigan forms differ from all the others in the rugose exterior, giving it sometimes the aspect of *Strophomena rugosa*; but as they at the same time differ among themselves, I am not disposed to hesitate in the identification.

*ORTHIS IOWENSIS*? Hall. (Io. Rep., 488, pl. 2, fig. 4).—Some casts in my possession resemble those of the above species. Ventral valve nearly circular, regularly convex, with deep pit in the beak between the dental plates, which in the cast produces a conical projection. Middle region of cast with three faint rounded ridges radiating from the beak to the anterior margin.

*Locality*.—Light-house, Pt. aux Barques.

#### CHONETES, Fischer.

*CHONETES PULCHELLA*, n. sp.—Shell small, nearly semi-circular; hinge almost equalling the greatest width, rectangular at the extremities, furnished with two or three stout hollow spines on each side of the beak, one projecting from the hinge extremity, and diverging at an angle of about  $22^\circ$  with the hinge line—the second half way to the beak and diverging at an angle of  $45^\circ$ , each of these spines having a length equal to half the hinge line. Ventral valve, exclusive of the flattened hinge angles, spherically convex; internal median ridge extending to the middle of the valve. Surface with about 54 feeble, rounded ribs, often nearly obsolete on the hinge angles; these are crossed by numerous microscopic, concentric striae; the grooves beneath the ribs are acute and bear a few spinous projections near the shell margin. Dorsal valve nearly flat, generally a little concave near the margin, marked like its fellow with radiating striae, and often a few concentric folds. Area very narrow, equally excavated in the two valves. Some specimens exhibit a shorter hinge line, and a flatter ventral valve, elevated only in the umbonal region, with a beak projecting slightly beyond the hinge.

Length .30 (100); breadth .38 (126); convexity of ventral valve .07 (23).

*Localities*.—Hillsdale county at Moscow, N. W.  $\frac{1}{4}$ , N. W.  $\frac{1}{4}$ , Sec. 4, Jefferson,

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and S. W.  $\frac{1}{4}$ , S. W.  $\frac{1}{4}$ , Sec. 26, Allen. These localities are all in the lower part of the Marshall sandstone.

The variety of this species somewhat resembles *C. Michiganensis*, Stevens. (Sill. Jour. [2] xxv. p. 263), but the spines and ribs are much less numerous, not to speak of the alleged direction of the spines in Dr. Stevens' species.

*CHONETES SETIGERA*? Hall. (Geol. Rep. 4th Dist. N. Y., p. 180; 10th Rep. N. Y. Regents, p. 150).—Shell small, semicircular, flattened; hinge line slightly less than greatest width; ventral valve regularly convex, except upon the flattened hinge angles; median ridge feeble; hinge with two (perhaps three) strong diverging spines each side of the beak; denticerous plate with four tooth-like elevations each side of the beak, slightly elongated in a direction at right angles with the cardinal spines. Surface marked by about 80 minute diverging striae, obsolete except near the border, and sometimes one or two distinct concentric wrinkles. Dorsal valve slightly concave, striated nearly to the beak.

Length .25 (100); breadth .36 (145) convexity of ventral valve .04 (16).

*Locality*.—Union, Branch county, in argillaceous shales of the Huron group.

This species differs from the New York specimens of *C. setigera* in the inclination of its spines, and the much greater number of radiating striae.

#### PRODUCTA, Sowerby.

*PRODUCTA CONCENTRICA*, Hall. (Iowa Geol. Rep., p. 517, pl. vii. fig. 3; 10th Rep. N. Y. Reg. p. 180.)—All my specimens of this species from the southern part of the State exhibit, like the Iowa ones, only the inside of the concave valve. On the other hand, fragments of a species supposed to be the same, from the grindstone quarries at Pt. aux Barques, present only the exterior of the convex valve, a circumstance which may throw suspicion on the identification of the two sets of forms.

#### MYALINA, de Koninck.

*MYALINA MICHIGANENSIS*, n. sp.—Shell of medium size, oblique, equivalve, inflated, posteriorly winged, with a straight hinge line. Beaks compressed, acute, incurved, and slightly directed forward, but little elevated above the hinge line; posterior margin very slightly concave below the extremity of the hinge; thence describing a semi-circle or more to the middle of the anterior margin, where a deep incurvation exists, bounded by a small pouch-like expansion which projects a little anterior to the beaks. Anterior umbonal slope somewhat vertical to the shell-plane; the posterior gradual, towards the margin becoming nearly parallel with the same plane. Hinge furnished in the left valve with two small, curved diverging teeth just anterior to the beaks; behind the beaks a narrow ligamental area extends the whole length of the hinge; this area is marked by three longitudinal slightly diverging furrows—the outer parallel with the hinge line and co-extensive with it, the middle reaching the inner border of the ligamental area at two-thirds the distance from the beak to the hinge extremity, the third meeting the same border still nearer the beak. Surface marked by irregular, fine incremental lines, some of which are more deeply impressed.

Greatest dimension of shell from beak to ventral margin along the umbonal slope 1.25 (100); angle included between this line and hinge line  $50^\circ$ ; diameter of shell from umbo to umbo .78 (62); length of hinge .67 (53); angle formed by hinge line and posterior margin  $112^\circ$ — $120^\circ$ ; projection of shell anterior to the beaks, .19 (15).

*Localities*.—Marshall (abundant), Moscow: This interesting species resembles *M. virgula*, de Kon. (An. Foss. 127, pl. vi. 3). It is, however, less oblique, less indented on the posterior border, and more prominent in front of the umbo.

1862.]

*MYALINA IMBRICARIA*, n. sp.—Shell rather small, very oblique, inflated. Beak (of left valve) compressed, acute, incurved, scarcely rising above the hinge; posterior margin straight, making a very obtuse angle with the hinge line; ventral margin regularly curved; anterior, with a rather deep sinus a little above the middle, and a slight projection in front of the umbo. Hinge line straight, equal to the greatest antero-posterior dimension of the shell. Umbo abruptly convex on both sides, but posteriorly blending with the flattened expansion below the hinge. Surface strongly marked by imbricating lamellæ.

Length along the umbonal slope about 1·04 (100); this line forms with the hinge line an angle of 29°; length of hinge line ·70 (67); angle formed with posterior border 53°; projection of anterior margin beyond the beak ·07 (67).

*Locality*.—Moscow, Hillsdale county, in the Marshall sandstone.

This species differs from its analogue *M. lamellosa*, de Kon. (An. Foss. 126, pl. iii. 6) by its sharper posterior angulation, and deep anterior sinus in the margin.

*MYALINA AVICULOIDES*.—Shell small, oblique, with subcentral beaks scarcely rising above the straight hinge line. Right valve unknown; left produced anteriorly just beneath the hinge; anterior margins parallel, forming an angle of about 70° with the hinge line; midumbonal slope forming the same angle, having its anterior declivity convex, its posterior at first convex, then slightly excavated, giving an extended appearance to the posterior margin, but without any perceptible isolation of a posterior wing; ventral margin regularly curved. Surface marked by faint incremental lines.

Length along umbonal slope ·34 (100); length of hinge line ·31 (91); greatest antero-posterior dimension ·32 (94).

*Locality*.—Marshall.

*MYALINA PTERINEÆFORMIS*, n. sp.—Shell small, equivalve, obliquely elongate, with an alate posterior expansion, which is suddenly thickened above to form the basis of the straight elongated hinge line. Beaks subterminal, obtuse, incurved, elevated a little above the hinge; midumbonal slope making an angle of about 35° with the dorsal margin; from the upper portion the declivity is steep to the hinge on the posterior side, while on the anterior side the shell swells out into a sort of pouch, projecting beyond the beak; posterior margin of shell showing a sinuation just below the hinge, from which a regular curve sweeps around to the anterior side. Shell thin, with fine incremental lines.

Length of shell along dorsal margin ·44 (100); length from beak along midumbonal slope ·38 (86); distance from beak to anterior extremity, ·10 (22); to posterior ·34 (78); diameter of shell through umbo ·12 (24).

*Locality*.—Pt. aux Barques, from a friable and ferruginous sandstone overlying the grindstones.

#### PTERINEA, Goldfuss.

*PTERINEA CARDINATA*, n. sp.—Shell small, hinge line extremely elongate, posteriorly terminating in an angle of 40°, separated by a slight sinuation from the body of the shell; ventral margin transversely semi-elliptic; anterior wing short, saccate; anterior margin forming with dorsal line an angle of about 45°. Beak flattened, not elevated above the hinge; umbonal slope terminating at the middle of the ventral border, opposite which is the greatest width of the shell; descent from the umbonal slope to the antero-ventral border very abrupt. Surface of cast showing numerous faint concentric grooves which are most conspicuous in the postumbonal region.

Length of hinge ·65 (100); greatest width of shell ·21 (32); convexity of right valve ·06 (9); length of anterior wing ·06 (9).

*Locality*.—Grindstone quarry, Pt. aux Barques, with *Rhynchonella camerifera*, &c.

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This species differs from *P. elongata*, Goldf. (Petref. Germ. ii. 135, Taf. cxix. 5), in having a much smaller body, and less distinct from the alate extremities.

*MYTILUS*, Linnaeus.

*MYTILUS WHITFIELDIANUS*, n. sp.—Shell small, ventricose, transversely elongate, very oblique, with terminal beaks. Hinge line two-thirds the length of the shell, forming a rounded, very obtuse angle with the somewhat circular posterior border; ventral border slightly arcuate, more rapidly curved beneath the beaks. Greatest width opposite the posterior extremity of the hinge-line. Umbonal ridge elevated, crowded over towards the hinge line, and rendered somewhat angular, more sharply so towards the beak. Surface of shell and cast marked by numerous concentric lamellose lines. One of the best preserved specimens shows distinctly a multitude of minute diverging striae running in all parts of the surface at right angles with the lines of growth.

Length from beak to posterior extremity .59 (100); greatest height .29 (50); length from beak to extremity of hinge line .44 (75); convexity of right valve .12 (20).

*Localities*.—Holland, Ottawa county and Marshall.

*CARDINIA*, Agassiz.

*CARDINIA COMPLANATA*, n. sp.—Shell of moderate size, ovoid, compressed, with sub-central beaks. Ventral border gradually curved to the abruptly turned extremities, from which the outline is nearly straight along the cardinal slopes to the obtuse incurved beaks; line joining extremities equidistant from beaks and ventral margins. Right valve flattened, producing an angular fold along the postero-dorsal declivity near the hinge line. Exterior sculptured by about 20 broad regular furrows parallel with the ventral border. Other characters unknown.

Length 1.2 (100); height .64 (53); length of anterior cardinal slope to extremity of shell .64 (53); of posterior .87 (72); convexity of right valve (perhaps mechanically compressed) .13 (11).

*Locality*.—Union, in Branch county, in blue argillaceous shales of the Huron group.

*CARDINIA EQUIMARGINALIS*, n. sp.—Shell of medium size, tumid, beaks central, anterior and posterior hinge-slopes at right angles with each other, straight, very nearly equal and symmetrical; extremities rounded, situated about midway between beaks and ventral margin, which is regularly arcuate between the extremities; posterior extremity a little more acute than the anterior. Shell tumid, regularly convex, slightly truncate along the antero-cardinal slope. Beak (of cast) marked only by obscure incremental lines and nearly obsolete concentric furrows. Hinge structure unknown.

Length of shell .91 (100); height .86 (94); thickness .50 (55.)

*Locality*.—Marshall.

*Cardinia robusta*, J. de C. Sowerby is a close representative of this species, but is not so high, and is more produced and angulated posteriorly.

*CARDINIA CONCENTRICA*, n. sp.—Shell of medium size, ventricose, transversely elliptic, with subequal extremities and marked ventral enrolment. Beaks appressed, incurved, rising little above the hinge, distant one-fourth the shell-length from the anterior end; umbo and middle of the shell flattened antero-posteriorly; antumbonal ridge inflected towards the hinge, forming above a lunuliform area; dorsal and ventral borders sub-parallel in the adult shell; posterior end obtusely, or at length truncately rounded; anterior end paraboloid. Hinge line straight and rather extended posteriorly. A broad shallow inconspicuous sinus extends from the posterior ventral margin towards the beak. External surface marked, towards the beak, with remote, equidistant, raised, concentric striae and intervening flat belts; towards the margin 1862.]

the striae gradually become sharp ridges, and the intervening belts deep furrows—these characters being especially strong at the anterior end; whole surface marked by faint incremental lines. Greatest convexity of shell considerably below the middle.

Length 1.30 (100); height .55 (42); convexity of left valve .24 (18; whole number of furrows on exterior 14.

*Localities*.—Hillsdale county at Jonesville, and S. E.  $\frac{1}{4}$  S. W.  $\frac{1}{4}$ , Sec. 33, Adams.

Differs from *C. complanata* in its greater relative transverse dimension and its vertical enrolment. It may yet prove to be a *Grammysia*.

#### EDMONDIA, de Koninck.

EDMONDIA BINUMBONATA, n. sp.—Shell of moderate size, rotund-quadrate, very tumid. Hinge line short, posterior to the beaks; posterior margin forming with it a very obtuse angle; anterior slope straight, forming a rounded right angle with the slightly curved ventral border which is nearly parallel with the hinge line, and joins the posterior slope by a regular curve. Beaks depressed and incurved; greatest thickness through the middle of the shell; principal umbonal slope running to the posterior extremity of the ventral border; a subsidiary one running to the anterior extremity; between these the surface is subcylindrical; anterior to them it descends abruptly to the anterior margin, while behind them it sinks at first rather abruptly, and near the posterior border presents a little flattening. Surface (of cast) marked by eight or ten concentric furrows. Anterior lunule excavated.

Distance measured along the principal umbonal slope .85 (100); length from anterior to posterior extremity .85 (100); anterior slope .59 (69); convexity of right valve .24 (28); angle between anterior cardinal slope and principal umbonal line 70°.

*Locality*.—Marshall.

Closely related to *E. scalaris*, McCoy (Brit. Pal. Foss. 502, pl. 3 H, fig. 6), from the carboniferous limestone of Lowick, but the anterior extremity is produced into a rounded angle instead of being truncated.

#### ORTHONOTA, (Conrad), McCoy.

ORTHONOTA RECTIDORSALIS, n. sp.—Shell of moderate size, tumid, elongate transversely with subterminal beaks and gaping extremities. Hinge margin straight, reaching nearly to the posterior extremity of the shell, somewhat elevated; ventral margin straight, and parallel with the dorsal; posterior extremity truncately rounded, making with the dorsal margin an anterior angle of 105°; anterior end slightly gaping two-thirds the width of the shell, rounded abruptly above, gradually below; beak scarcely elevated above the dorsal line, flattened, incurved, with a conspicuous lunule in front; umbonal swelling running to the lower posterior angle. Hinge apparently edentulous and simple; pallial and muscular impressions undiscernible; a deep groove runs from beneath the beak to the anterior extremity, which interrupts the concentric lines shown on the interior of the shell. The cast shows five or six very faint lines diverging from the beak along the superumbonal slope.

Length 1.48 (100); height .44 (30); convexity of right valve .10 (7); length of anterior end .25 (17).

*Locality*.—Moscow, Hillsdale county.

This shell agrees tolerably well with *Orthonota*, as modified by McCoy. The gaping extremities and general outline perhaps indicate affinities with *Solen*.

#### SANGUINOLITES, McCoy.

SANGUINOLITES UNIONIFORMIS, n. sp.—Shell small, compressed, transversely ellipsoidal, with subterminal beaks. Hinge line straight, a little shorter than the shell at both extremities; hinge consisting only of a long, sharp, laminar lateral tooth behind the beak. Anal margin obliquely subtruncate, as

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also the supero-buccal region; ventral border very slightly curved. Beaks subterminal, flat, not projecting beyond the dorsal line. Anterior muscular impression circular, deep, behind which is a clavicular process extending from beneath the beaks, at right angles with the dorsal line, half way across the valve. Cast nearly smooth, but marked by a few concentric undulations. Shell very thin, marked simply with fine incremental lines.

Length .84 (100); height .39 (46); convexity of one valve .11 (13); projection of anterior extremity beyond the beak .12 (14).

*Locality*.—Sec. 29 Moscow, Hillsdale county.

*SANGUINOLITES MARSHALLENSIS*, n. sp.—Shell of medium size, transverse, equivalve, ellipsoidal in outline, with subterminal beaks. Hinge line apparently edentulous, straight, flattened and elevated posteriorly, terminating one fourth the length of the shell from the posterior extremity, at which point is the greatest height of the shell. Posterior extremity a semi-ellipse; anterior subtruncate above, regularly rounded below; a sinus in the ventral border one-third the shell-length from the anterior end, from which a diminishing furrow extends to the flattish, straight, incurved beak. Greatest thickness of shell on the middle line a little nearest to the anterior end. Surface marked by about three remote, deep, concentric grooves, and numerous fine lines of growth.

Length 1.2 (100); greatest height .63 (52); thickness .36 (30); projection of anterior end beyond the beak .09 (7).

*Locality*.—Marshall.

This species seems to be destitute of the elongated posterior escutcheon characteristic of McCoy's *Sanguinolites*, but agrees perfectly with Professor King's modified ideas of *Allorisma*, (Perm. Foss. pp. 162 and 196). Some hesitancy is shown, however, among palæontologists about the adoption of the latter name, which McCoy regards as a synonym of *Sanguinolites*.

*SANGUINOLITES BOREALIS*, n. sp.—Shell rather small, ventricose, transversely elliptic; beak somewhat projecting and incurved, less than one fifth the shell-length from the anterior extremity, with a lunuliform excavation in front of it; dorsal margin straight; ventral margin slightly arcuate; posterior extremity regularly rounded; anterior sharply bent in front of the lunule, from which it slopes with a truncate backward curve to the ventral border; umbonal slope extending diagonally to the infero-posterior margin, somewhat angulated behind the beak, and inflected toward the cardinal region. Surface of shell of northern specimens unknown; cast showing several distinct concentric grooves. Shell of southern specimens thin, marked both with concentric and minute radiating striæ. Greatest height of shell along the perpendicular from the beak; greatest convexity in the middle of the same line.

Length 1.10 (100); breadth .44 (40); thickness of right valve .15 (44).

*Locality*.—Grindstone quarries, Pt. aux Barques above the gritstones, and Moscow, Hillsdale county.

Distinguished from *S. unioniformis* and *S. Marshallensis* by its terminal beaks, greater relative gibbosity, greater length and its posterior attenuation.

#### LEPTODOMUS, McCoy.

*LEPTODOMUS CLAVATUS*, n. sp.—Shell small, tumid, transversely quadrangular, obliquely carinate, concentrically sulcate, with subterminal beaks. Length nearly three times the breadth; ends abruptly rounded, and slightly deflected upwards, creating a discernible concavity along the extended hinge line. Beak (of left valve) broad, flattened, incurved, with anterior and posterior lunettes. Anterior extremity truncate along the anterior umbonal slope; posterior extremity squarely truncated; postumbonal slope diagonally precipitous to the cardinal expansion, which begins behind the beak and widens to the posterior extremity.

Length .62 (100); height .24 (39); convexity of left valve .10 (16).

1862.]

*Locality*.—Union, Branch county, in blue argillaceous shales of the Huron group.

This fossil may be a *Grammysia*, but it is destitute of the oblique furrows considered characteristic of that genus.

It bears a remote resemblance to *Sanguinolites* (*Leptodomus*) *costellatus*, McCoy.

#### CARDIOMORPHA, de Koninck.

*CARDIOMORPHA MODIOLARIS*, n. sp.—Shell rather small, vertically ovate, inflated, equivalve, with very short hinge line, and very symmetrical extremities. Hinge line blending by a regular curvature with the posterior margin; both margins approximately parallel, gradually curved, and connected by the more rapidly curved respiratory border. Beaks scarcely projecting beyond the hinge, obtusely pointed and straight; valve inflated and convex to the pallial border, slightly flattened on the anterior umbonal slope. Surface smooth, with a few coarse concentric folds marking the later growth.

Length from the extremity of the beak over the umbonal slope 1·05 (100); shortest distance from this line to extremity of anterior margin ·34 (32); to posterior margin ·40 (38).

*Localities*.—Section 27, Columbia, Jackson county; Moscow, Hillsdale county, and Marshall and Battle Creek, Calhoun county.

The hinge characters of this species not being known, its generic identity may be questioned. The beak and hinge line do not present the characters of the typical *Cardiomorpha*, but the shell presents strong analogies with *C. livida*, de Kon., (*Anim. Foss.* 106, pl. iii., 4), from which it differs only in being more equilateral and in having its beaks more separated.

*CARDIOMORPHA JULIA*, n. sp.—Shell small, luciniform; beaks moderately produced, small, appressed turned forward, somewhat anterior to the middle of the shell; posterior hinge slope nearly straight, making a very obtuse angle with the posterior margin, which is also nearly straight, and connects by an abrupt curve with the ventral border. Anterior hinge slope making an angle of about 118° with the posterior, uniting by an abrupt curve with the regularly convex ventral border. The hinge has not been fully examined, but a couple of fine sharp laminae are seen proceeding from beneath the beak, along the posterior hinge plate. External surface marked by sharply cut concentric striae, at regular intervals, which increase gradually in width with the growth of the shell.

Length from anterior to posterior angulation ·85 (100); height from beak to ventral margin ·64 (75); radius of curvature of ventral side ·48 (56); bringing the centre of curvature on the postumbonal slope ·17 from the beak; convexity of right valve ·12 (14); number of concentric striae on the measured specimens about 45.

*Localities*.—Battle Creek, Marshall, Moscow. This seems to be a close representative of *C. Puzosiana*, de Kon. (*Anim. Foss.* 104, pl. ii., 8), and only differs in more angulated extremities and more regular striation; though an occasional specimen has more rounded extremities. This species recalls also the forms figured by Prof. Hall, under the names *Lucina? retusa* and *Ungulina* [*Lucina?*] *suborbicularis*, (*Geol. Rep.* 4th Dist., N. Y., pp. 243, 245), from the Portage group. While the Michigan fossil is more transverse than the specimens figured by Prof. Hall, it may yet prove identical.

*CARDIOMORPHA CAPULOIDES*, n. sp.—Shell very small, with a very prominent umbo; body and margin of each valve trumpet shaped, giving it the appearance of a capuloid shell. Beak slightly anterior, turned forward, and in the cast obtuse, with a terminal callosity, as if by the absorption of the shell-substance separating the extremity of an enrolled beak from the body of the mollusc. Body of shell more extended posteriorly; antumbonal slope rather rapid; margin nearly circular or a little ovate. Hinge and external surface unknown; cast smooth, with a few concentric wrinkles of growth.

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Length from extremity of beak over umbo to ventral margin .35; antero-posterior dimension .29; elevation of umbo above plane of valve .20.

*Locality*.—Grindstone quarries, Pt. aux Barques, with *Rhynchonella camerifera*, &c.

None of my specimens of this singular shell are perfect, even as casts; and I should be induced to refer them to *Platyceras*, Conrad, were it not that five would thus be sinistral and six dextral, while at the same time the very campanulate aperture seems to suggest rather *Cardiomorpha* or *Isocardia*.

#### CARDIOPSIS, Meek and Worthen.

**CARDIOPSIS CRENISTRIATA**, n. sp.—Shell of medium size, gibbous; hinge line straight, rather short, joining the posterior margin by a regular curve which proceeds to the ventral side where a more abrupt curvature separates the posterior from the anterior border. Beak prominent, incurved, projecting a little above the hinge line. Surface marked by a set of irregular concentric wrinkles, and a set of fine, regular raised concentric striae, the whole deossated by conspicuous, radiating, unequal, wrinkled ribs, which are fine and somewhat regular on the beak, becoming irregularly crenulated in the middle of the valve, and irregularly flexuous near the pallial border.

Greatest length from the beak to the ventral margin over the umbonal slope .96 (100); angle between this and the hinge margin  $55^{\circ}$ ; convexity of left valve .33 (34).

*Locality*.—Section 27, Columbia, Jackson county.

This fossil differs from *Cardiomorpha radiata*, de Kon., (An. Foss. 109, pl. ii., 6), in being less inflated all around the pallial region, and in being more produced posteriorly, as well as in the characters of the striation. It probably agrees in generic characters. Its closest analogue is *Cardiopsis radiata*, Meek and Worthen, (Proc. Acad. Nat. Sci., Phil., Oct., 1866, and June, 1861), = *Megambonia Lyoni*, Hall, (13th Rep. Reg. N. Y., p. 110), from which it seems to differ only in its striation.

**CARDIOPSIS JEJUNA**, n. sp.—Shell small, somewhat orbicular, nearly equilateral, with a prominent sharp beak slightly turned forward. Hinge line obtusely angulated beneath the beak, extending on each side to a subulate expansion of the (right) valve, between which points the curvature of the pallial margin describes about three-fifths of a circle. Beak projecting above the hinge; umbo excavated on the anterior side; umbonal ridge tumid on the posterior side. Characters of hinge and external surface unknown; surface of cast with a few concentric furrows.

Length .38 (100); height .41 (108); distance from posterior extremity to line drawn over umbonal slope .23 (61); from anterior extremity to same line .20 (53); convexity of right valve .12 (32).

*Locality*.—Railroad cut, three miles north of Napoleon, Jackson county.

**CARDIOPSIS MEGAMBONATA**, n. sp.—Shell very small, ovate, with an elevated, little incurved, nearly central beak, gibbous umbo and regularly rounded margins, of which the ventral is most abruptly so. Slopes from the umbo convex in all directions to the very margin. Anterior and posterior cardinal margins similar and equal. Surface of casts striately ribbed, most distinctly so toward the ventral border, and in some cases marked by rather strong concentric wrinkles toward the pallial margin.

Height from beak to ventral margin .25 (100); length from anterior to posterior margin .23 (92); convexity of left (?) valve .11 (44).

*Locality*.—Grindstone quarries, Pt. aux Barques, with *Rhynchonella camerifera*, &c.

#### NUCULA, Lamarck.

**NUCULA HUBBARDI**, n. sp.—Shell rather large, ovate-triangular, ventricose; beaks three-fifths the shell-length behind the anterior (longer) extremity, 1862.]

prominent, acute, incurved and turned backward; cardinal lines nearly straight, beyond the dental series curving rapidly to the extremities, of which the anterior is broadly rounded; ventral side with a slight general convexity, varied by a broad shallow sinuation in front of the middle, which extends one-third the distance up to the beaks. Pallial line entire; posterior adductor forming a round deep scar. Cardinal angle between the beaks varying from  $115^{\circ}$  to  $125^{\circ}$ ; teeth numerous, in a series not perceptibly interrupted between the beaks, those on the anterior slope posteriorly angulated, those on the posterior slope rather larger; the remoter often transverse to the hinge plate: those nearer the beak angulated forwards; between the beaks the hinge plate is somewhat widened, and the teeth are slender, long and crowded in a scarcely interrupted series. Shell massive, thickened around the smooth ventral margin; external surface marked by numerous unequal lines of growth; casts nearly smooth.

Length of an average specimen 1.45 (100); height .80 (55); convexity of one valve .26 (18); length of posterior end .59 (41); anterior end .96 (66); height of beaks above line connecting extremities .46 (32); number of teeth in posterior series from 12 to 16; in anterior from 30 to 40.

*Localities.*—Marshall, Battle Creek, Moscow, and at nearly every other exposure of the Marshall Sandstone in the southern part of the State. The most abundant fossil in the group, generally occurring in beds ten or twelve inches in thickness.

This species has about the proportions of *Cucullella tenuiarata*, Sandb. (Verstein, 276, Taf. xxix. 4), but specimens of the latter from Kirschweiler. in the cabinet of Dr. Rominger, are more symmetrically furrowed, and possess fewer teeth.

This is, perhaps, the species described by Dr. Stevens as *Leda nuculaformis* (Sill. Jour. [2], xxv. 262), but it is not *Leda*, and the number of teeth is much too great for his description.

Named in honor of Bela Hubbard, Esq., of Detroit, who published in 1840 the first notice on record of the interesting sandstones under consideration, and designated the generic relations of several of the more abundant fossils.

*Var. prolata.* A form which I am inclined to regard as only a variety of the preceding, is very ventricose, and more elongated anteriorly, with a greater number of teeth.

Length 1.46 (100); height .69 (47); convexity of one valve .28 (19); length of posterior end .38 (26); of anterior end 1.06 (72).

*Localities.*—Moscow and Battle Creek.

*NUCULA IOWENSIS.* White and Whitfield (Proc. Bos. Soc. Nat. Hist., Feb. 1862, p. 298).—Shell small, triangularly ovate, ventricose, with prominent incurved, subterminal beaks. Cardinal plate forming an angle of  $95^{\circ}$ , but the dorsal outline of the shell, from the prominence of the beaks, forms an angle of  $80^{\circ}$ . Anterior and posterior slopes truncated; anterior extremity rounded, ventral border semi-elliptic. Long end with about 11 teeth; short end with 6 very inconspicuous ones. Pallial impression entire, connecting the deep adductor scars; anterior scar nearly terminal, lenticular, with a small oval scar above; posterior scar oval, scarcely above the extremity. Shell thickened near the margin.

Length .47 (100); height .40 (85); convexity .26 (55); distance from beak to line joining extremities .27 (57).

*Localities.*—Battle Creek and Sec. 7, Wyoming, Kent county.

These specimens possess a somewhat greater number of teeth than the Iowa ones, according to the author's description. In general form they recall *Cucullea antiqua*, Sow., from the old red sandstone of Felindre (Murch. Sil. Syst., pl. iii. fig. 120).

*NUCULA SECTORALIS*, n. sp.—Shell rather small, ventricose, sectoriform, with nearly central beaks. Anterior cardinal slope straight; posterior, nearly so.

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making with the former an angle of  $88^{\circ}$  to  $91^{\circ}$ ; ventral border sub-circular. Beaks prominent, acute, direct, incurved. Anterior hinge plate with about 17 teeth; posterior with about 13, much smaller. Adductor scars subterminal, profound, roundly oval. Surface of casts perfectly smooth.

Length .86 (100); height .74 (86); thickness .44 (51); distance from beak to line joining extremities .40 (46); length of anterior end .51 (59); of posterior end .35 (41).

*Locality*.—Battle Creek and Grindstone Quarries, Pt. aux Barques.

*NUCULA STELLA*, n. sp.—Shell very small, elliptic-ovate, with subcentral beaks. Anterior cardinal slope arched, posterior nearly straight; extremities rather sharply rounded; ventral side semi-elliptic. Anterior hinge plate with 17 minute, acute teeth; posterior with 5, angulated in both cases towards the beak. Beaks a little attenuated near the extremity, curved inwards and backwards. Pallial line entire, connecting the muscular scars, which are oval, and situated considerably above the middle line of the shell. Shell thin, with delicate concentric striae.

Length .33 (100); height .24 (73); thickness .14 (42); length of anterior end .20 (61); of posterior end .13 (39); distance from beak to line adjoining extremities .14 (42).

*Localities*.—At every outcrop of the formation in the southern part of the State. Also at the Grindstone Quarries, Pt. aux Barques.

This beautiful little shell has affinities with *N. ventricosa*, Hall, (Iowa Rep. 716, pl. 29, fig. 4), from the coal measures of Iowa. It is easily mistaken for the young of *N. Hubbardi*, but is proved distinct by its more rounded sides and fewer teeth, as well as by its occurrence in a region of the State where the larger species is as yet unknown.

#### LEDA, Schumacher.

*LEDA BELLISTRIATA*, Stevens (Sill. Jour. [2], vol. xxv., p. 261).—Shell small, twice as long as high, somewhat ventricose, with sub-central beaks, which are rather prominent, incurved and pointed forward. Anterior cardinal slope slightly convex, posterior concave, with a well defined, long, deep and narrow escutcheon; anterior extremity broadly rounded; posterior attenuate, with a blunt termination. Angle of the cardinal line between the beaks  $130^{\circ}$ . Surface marked by regular sharply-impressed concentric striae, of which 45 may be counted between the ventral margin and a point one-tenth of an inch below the beak, where they become undistinguishable. Striae not visibly extending across the escutcheon.

Length .61 (100); height .34 (56); thickness .18 (29); length of posterior end .38 (62); of anterior end .23 (38); height of beaks above line connecting extremities .17 (28).

*Locality*.—Moscow, Hillsdale county.

I see no means of separating our species from the one described by Stevens from the coal measures of Ohio. Prof. Hall's specimens from Iowa, however, which he has referred to the same species, differ from ours in a broad escutcheon, and the continuation of the striae across it, characters which are stated not to exist in the original specimen.

A rostral extremity of a *Leda*, from Battle Creek, marked and proportioned as above, is .64 long and .59 high, and by the principles of proportion must have belonged to an individual nearly  $1\frac{1}{2}$  inches long.

#### CARDIUM, Bruguière.

*CARDIUM NAPOLEONENSE*, n. sp.—Shell small, truncately triangular, oblique. Beaks elevated above the hinge, prominent, sharp, direct; hinge-line anterior to beak, short and straight, forming a rounded anterior angle with the ventral border, which sweeps by a regular course to the posterior border, which is elongate, truncate at right angles with the hinge-line, and furnished with a  
1862.]

large arched opening beneath the umbo. This truncation makes but a small angle with the midumbonal slope, the arch beneath which is partly closed by the curtain-like deflection of the posterior part of the shell. External surface marked by fine radiating ribs, and a few concentric rugæ in front of the beak and along the anterior terminal expansion.

Height of shell from beak along midumbonal slope to remotest point of ventral border .59 (100); distance from anterior cardinal angle across the shell at right angles with posterior truncation .42 (71); convexity of right valve .15 (25).

*Localities*.—Marshall, Battle Creek, and R. R. Cut, 3 miles North of Napoleon, Jackson county.

#### CONOCARDIUM, Brown.

CONOCARDIUM? BOVIPEDALE, n. sp.—Shell small, very ventricose, truncated along the umbonal slope, or a little posterior thereto, by a plane nearly vertical to the plane of the valves, but a little inclined posteriorly, thus producing a slightly acute plane angle with the external surface. Beak prominent, somewhat enrolled and turned forward; hinge-line anterior, short, convex, joining, by a rounded, obtuse angle, the gently rounded anterior angle, which curves more rapidly in approaching the ventral margin and the truncation. Posterior, truncated side nearly flat, but a little concave, with an arched, maatra-shaped opening under the umbo. Convex surface of shell, with 26 radiating ribs, slightly flattened along their summits, and very fine, sharp, undulating, concentric striæ, most distinct between the anterior angle and the umbo; the truncated surface with obsolete arched striæ. Right valve unknown.

Length along truncating line .30 (100); distance from anterior extremity to truncating plane, at right angles with latter .20 (67); convexity of left valve .12 (40).

*Locality*.—Marshall.

This species belongs to the group of *C. Napoleonense*, but may be easily distinguished by its coarser ribs, greater ventricosity, less flattened marginal regions and nearly mesial truncation.

#### POSIDONOMYA, Brown.

POSIDONOMYA ROMINGERI, n. sp.—Shell of medium size; general outline about two-thirds of an ellipse, the longer axis of which is nearly at right angles with the anterior cardinal slope of the shell, and forms an angle of 75° with the straight hinge-line, and one of 33° with the midumbonal slope; greatest width of shell a little nearer the (regularly curved) ventral border; region behind the beak a little excavated, making the posterior cardinal region appear slightly flattened and produced; beaks elevated above the hinge-line, approximated and slightly turned forward. Surface (of cast) distinctly marked by continuous equidistant and direct concentric striæ. Hinge unknown.

Greatest length of shell (over midumbonal slope) .97 (100); longer axis of the elliptic outline .90 (92); greatest width of shell (at right angles with last measure) .70 (72); thickness of right valve .20 (21); number of striæ in one-tenth of an inch, in the middle of the shell 3½.

*Locality*.—Marshall.

Closely imitates in outline *P. vetusta*, Sow. sp. (Phill. Geol. Yorks. 211, pl. vi. 3), but the beak is less projecting, and the concentric furrows are more numerous and smaller.

POSIDONOMYA WHITEANA, n. sp.—Shell of moderate size, oblique, with an extended, straight, hinge-line, a subalate expansion before, and a rather flattened and extended posterior margin. Beaks little elevated above the hinge, incurved, and slightly turned forward. Umbonal ridge much swollen, situated anterior to the middle of the shell, and making an angle of 66° with the

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straight hinge-line. Surface of cast nearly smooth; pallial line distinct, entire. Surface of shell showing only five irregular lines of growth, without undulations.

Length over umbonal slope  $\cdot 64$  (100); diameter at right angles with this dimension  $\cdot 50$  (77); convexity of left valve  $\cdot 15$  (23).

*Locality*.—Marshall.

Named in honor of C. A. White, M. D., of Burlington, Iowa.

*POSIDONOMYA MESAMBONATA*, n. sp.—Shell small, tumid equimarginal. Beaks prominent, slightly incurved; umbonal slope passing scarcely anterior to the middle of the valve, and nearly at right angles with the short, straight hinge-line; posterior margin slightly curved, scarcely alate, obtusely angulated at its junction with the dorsal side; anterior margin similar to posterior, and connected with it by the semi-circular ventral margin. Entire surface convex, without undulations, and marked only by fine striae of growth.

Length from beak to opposite ventral margin over umbo  $\cdot 50$  (100); width at right angles with this line across the middle (and widest part) of the valve  $\cdot 41$  (82); convexity of right valve  $\cdot 12$  (24).

*Localities*.—Marshall and Moscow.

Almost an exact copy in outline of *P. vetusta*, Sow. (de Kon. Anim. Foss., pl. vi. fig. 1, *a* and *b*, not *c*.) It wants, however, the undulations of that species, and is smaller.

#### SANGUINOLARIA, McCoy.

*SANGUINOLARIA SIMILIS*, n. sp.—Shell rather large, transversely elliptic, rather appressed. Beaks a little anterior to the middle of the shell, flat, obtuse, and little elevated. Hinge-line about one-third the length of the shell, slightly angulated under the beaks; buccal and anal slopes somewhat straight; anterior and posterior margins abruptly rounded; ventral margin regularly curved, except a slight bend in the middle. Longest dimension equidistant between beaks and venter. Pallial impression entire?; anterior muscular scar roundish-oval; posterior obliquely pyriform. A pair of strong internal ridges diverge from beneath the beaks (as in *Tellina*), the anterior passing along the posterior side of the buccal scar, and the posterior along the front margin of the posterior scar, terminating opposite the lower borders of the respective scars. A sharp but shallow groove runs along the anterior of the posterior ridge. Hinge not fully known; a strong triangular cardinal tooth passes a little obliquely forward across the hinge-plate, behind which is a deep pit, while a shallow one bounds the tooth anteriorly; an elongated triangular lateral tooth extends in front of the beak, and apparently another behind the beak. Shell thick; external surface marked by irregular, fine incremental striae, and a few broad shallow furrows.

Length  $2\cdot 0$  (100); height  $1\cdot 11$  (55); convexity of one valve  $\cdot 23$  (11); length of posterior lateral tooth  $\cdot 42$  (21); from beak to anterior extremity  $\cdot 95$  (47); to posterior extremity  $1\cdot 25$  (62).

*Locality*.—Marshall, where it is rather abundant.

*SANGUINOLARIA SEPTENTRIONALIS*, n. sp.—Shell of moderate size, equivalve, quadrately elliptic, subtumid, with sub-central beaks. Hinge line occupying three-fourths the length of the shell, nearly straight. Posterior extremity roundly truncate by a plane inclining towards the beaks; anterior end similarly truncated by a plane parallel with the last; ventral border slightly arcuated, bounded behind by a rounded acute angle, and before by a rounded obtuse angle. Hinge (as shown by casts) consisting of a prominent triangular cardinal tooth, and a lateral one each side—the posterior very slender. Pallial line entire (?); anterior muscular scar small, nearly circular. Clavicular ridges indistinct. Surface of casts showing a few obscure incremental furrows.

Length  $1\cdot 15$  (100); height  $\cdot 73$  (63); convexity of left valve  $\cdot 15$  (13).

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*Locality*.—Gaines, Kent county, from large angular fragments of a purplish-red, friable sandstone, strewn along the region of outcrop of the Marshall sandstone throughout the western part of the State.

*SANGUINOLARIA SECTORALIS*, n. sp.—Shell rather large, subtumid, triangular, with beaks but little in advance of the middle. Anterior and posterior cardinal slopes but slightly curved, the latter the longest; anterior end a broad curve; posterior more produced and more abruptly curved between the extremities. Beak prominent, somewhat depressed, incurved. Greatest thickness of shell in the middle. Muscular pits situated above the middle, oval, profound, connected by the entire pallial impression.

Length 1.18 (100); height .92 (78); thickness .54 (45); length of anterior end .43 (36); of posterior end .75 (63). Length, height and thickness of largest specimen seen are 1.75 (100), 1.30 (74) and .70 (40); length of anterior end .80 (45); of posterior end .94 (53).

*Locality*.—Marshall.

#### SOLENS, LINNÆUS.

*SOLENS SCALPRIFORMIS*, n. sp.—Shell of moderate size, having the hinge line straight, and the ventral regularly curved, and so situated that its chord forms posteriorly, an angle of about 5° with the dorsal margin; extremities abruptly rounded—the anterior one regularly, the posterior truncately. Valves with a slight constriction beneath the subterminal beaks, which corresponds to a strong ridge within, fading away at about half the distance from the dorsal to the ventral margin. Valves but moderately inflated, flatter behind, and a little drawn together anteriorly. Exterior surface marked by incremental lines nearly concentric with the pallial border.

Length of shell 2.05 (100); projection of anterior extremity beyond the beaks .11 (5); greatest width of shell (one-third its length from forward end) .56 (27); width at two-thirds the shell-length from forward end .48 (23), whence it narrows rapidly.

*Localities*.—Marshall and Moscow, abundantly. Also, near Napoleon.

A well marked variation in form has been observed in many specimens, having a straight ventral border and more uniform width.

*SOLENS QUADRANGULARIS*, n. sp.—Shell of medium size, quadrangular; hinge margin straight, somewhat shorter than the ventral margin, which is also straight through the greater part of its length, but is abruptly rounded upwards anteriorly, and a little more gradually rounded posteriorly. Beaks terminal; anterior extremity of shell transversely truncate, posterior obliquely so. Valves rather tumid anteriorly, becoming less so posteriorly; not at all contracted toward the gaping extremities. A constriction appears close to the anterior extremity, which corresponds to a ridge within, narrow and sharp near the beak, but becoming broad and depressed towards the opposite margin. Surface marked by distinct lines of growth running parallel with the ventral and posterior margins.

Greatest length 2.0 (100); width .66 (33); posterior truncation forming with hinge-line an angle of about 64°.

*Locality*.—Marshall.

*SOLENS PRISCUS*, n. sp.—Shell of medium size, slightly arcuate by an inflection of the two extremities toward the ventral side; dorsal and ventral margins nearly parallel; valves but little inflated, giving an oval-lanceolate transverse section; anterior extremity widely gaping, projecting a little beyond the beak, regularly rounded to the ventral side below, and above truncated obliquely backwards to the vicinity of the hinge; posterior extremity obliquely truncate, with the lower angle abruptly rounded. The cast shows the impression of a broad ridge passing from the hinge toward the ventral margin, and is further marked by distinct incremental lines parallel with the pallial border except on the anterior truncation, by which they are intercepted.

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Length about 2.75 (100); width .78 (28); thickness .25 (9); projection of anterior extremity beyond beaks .28 (11); posterior angle formed with hinge line by anterior truncation  $140^{\circ}$ ; anterior angle formed by posterior truncation  $128^{\circ}$ .

*Locality*.—Union, Branch county, in blue argillaceous shales of the Huron group—the “Kidney Iron formation” of Houghton.

But few specimens of this interesting species have been seen, and the best of these is defective at the posterior extremity; and I have determined the total length only from a restoration founded on the incremental lines.

The three foregoing species of *Solen* nearly double the number previously known from the Palæozoic rocks. Messrs. Sandberger have described *S. costatus* from the *Aviculaschiefer* of the *Spiriferensandstein* group in Nassau, which is supposed by them to occupy the horizon of the Marcellus Shale and Hamilton group. *S. pelagicus*, Goldf., and *S. Lustheidi*, d'Arch. and Vern., come also from the Devonian, but they are both doubtful species. The first is referred by d'Orbigny to *Cypricardia*; the latter, judging from specimens in Dr. Rominger's collection from the Eifel, has the valves scarcely gaping anteriorly, and presents much the appearance of a *Solemya*, (see especially *Solemya primavera*, Phil. McCoy, Brit. Pal. Foss. pl. 3F., fig. 3). Lastly, de Koninck has noticed a very imperfect solitary specimen, *S. siliquoides*, from the subcarboniferous limestone of Visé, in Belgium.

#### PUGIUNCULUS, Barrande.

PUGIUNCULUS (?) ACULEATUS, Hall, (13th Rep. N. Y. Reg., p. 107).—Shell small, elongate, tapering, with an obtusely triangular section. Slant height slightly curved on all the sides and angles; sides also more convex in the transverse direction. The two equal sides making with each other an angle of  $102^{\circ}$ , and with the broader side angles of  $39^{\circ}$ . Specimen a cast without any external markings.

Length .43 (100); breadth of sides at aperture .19 (44), .12 (28), .12 (28).

*Locality*.—S. E.  $\frac{1}{2}$  S. W.  $\frac{1}{4}$  Sec. 23., Adams, Hillsdale county.

This form lacks the evidence of striation attributed to *Pugiunculus*, Barrande (*Theca* of English authors) and presents still less agreement with any other known genus. The original specimens were described from Rockford, Indiana.

#### PLEUROTOMARIA, DeFrance.

PSEUROTOMARIA VADOSA, Hall, 10th Rep. N. Y. Reg., p. 108).—Shell globosely conical, with a width equal to its height; whorls about three, rounded on the exterior, somewhat flattened where they come in contact, marked along the middle by a moderately raised carina, on each side of which is a feeble but distinct revolving line, and beyond this another still feebler, and sometimes a third; body whorl occupying about three-fourths of the altitude of the shell, regularly curved on the base, and limited by a neatly rounded umbilicus open to the apex of the shell. Aperture subcircular, but slightly modified by the body whorl; apex quite obtuse; angle of sides  $65^{\circ}$ ; sutural angle about  $90^{\circ}$  on the last whorl. Cast shows the revolving lines on the last whorl, but not on the preceding ones.

Height of shell .44 (100); width .48 (109); height of body whorl .36 (82); diameter of umbilicus (in a cast) .08.

*Locality*.—In a loose fragment from the western part of the State, consisting of an agglomerated, silicious, sintery and somewhat ferruginous mass of fossils, physically resembling some states of the Marshall sandstone. Described here in consequence of its supposed identity with a fossil from beds which appear to be the equivalent of the Marshall sandstone, at Rockford, Ind.

PLEUROTOMARIA WHITEI, n. sp.—Shell with a trochoid spire, straight columellar lip, and prominent carinate whorls. Number of whorls three and a half, rapidly enlarging, raised in the middle of the dorsum in a prominent 1862.]

carina; the sides of which rise vertically from the whorl and form a feebly bilinear crest—a character best seen in specimens with the shell partly worn away; from the base of the carina the surfaces slope with but little curvature, at an angle of  $115^{\circ}$  to  $120^{\circ}$  with each other, and form a well marked sutural angle of about the same value with the contiguous whorl. Apex rather obtuse; angle of sides  $67^{\circ}$ . Aperture roundly quadrangular, produced on the columellar side. Umbilicus remote.

Height of shell .64 (100); width of last whorl .59 (92); height of last whorl .53 (83); width of aperture at right angles with columella .29 (45); greatest width—at an angle of  $45^{\circ}$  with the columella—.42 (66).

*Locality*.—With *P. vadosa*.

Somewhat resembles *P. subconica* from the Trenton limestone, but the whorls are not so closely crowded—being thus more rounded, and forming a much deeper suture.

Named in honor of Mr. A. D. White, an efficient assistant in the geological survey of the State during 1859 and 1860.

*PLEUROTOMARIA HUMILIS*, n. sp.—Shell depressed, conical. Band prominent, revolving close to the linear suture in the upper whorls, central on the body whorl; surface of shell above and below the band but slightly convex on the body whorl, flat on the spire, and making a peripheral angle of  $61^{\circ}$ . Inclination of sides  $109^{\circ}$ . Umbilicus small, and apparently perforate.

Approximate measurements of an imperfect specimen: height .52 (100); width .67 (129); height of last whorl .46 (88); width of umbilicus .09.

*Locality*.—With *P. vadosa*.

Has the general form of *P. crenato-striata*, Sandb., (Verstein. Taf. xxii. 2), but the band is narrower and more prominent. It closely resembles *P. helicinoides*, McCoy, (Synop. Carb. Foss. Irel., pl. 7, f. 6), but is less depressed and formed of fewer whorls.

*PLEUROTOMARIA STELLA*, n. sp.—Shell minute, trochiform, composed of four and a half whorls closely appressed, and forming an apical angle of about  $90^{\circ}$ . Suture linear, inconspicuous—the flat sides of the whorls all lying in the same plane. Body whorl regularly rounded, marked by a raised bilinear band situated a little above the peripheral line, and on the whorls of the spire nearly concealed. The body whorl is ornamented by a line of minute tubercles running close to the suture, and occupying a feeble revolving ridge. No indications can be seen of transverse striae connected with the tubercles. Aperture subcircular, with the columellar lip reflected over the umbilicus. Some sharp irregular incremental lines rise from the umbilical depression, and extend across the body of the shell.

Height .16 (100); width .20 (125); height of body whorl .14 (88); height of aperture .09 (56); width of band at aperture .02 (12); number of tubercles in one-tenth of an inch, 12.

*Locality*.—N. W.  $\frac{1}{4}$ , N. W.  $\frac{1}{4}$ , Sec. 4, Jefferson, Hillsdale county.

*PLEUROTOMARIA EXIGUA*, n. sp.—Shell very small, depressed-turbinate, consisting of three and a half rapidly enlarging convex whorls but slightly appressed and forming a deep suture, with an apical angle of about  $87^{\circ}$ . Base of shell convex, descending into a broad, deep umbilicus, from which rises a set of sharp transverse striae crossing the whorl at right angles, but slightly bent backwards on reaching the band, which is broad and situated a little above the peripheral zone, and marked by incremental lines; above the band similar striae describe an anteaally convex curve to the suture. Aperture circular.

Height of shell .17 (100); diameter .18 (106); height of last whorl .14 (82); width of band .02 (12); number of transverse striae in one-tenth of an inch counted near the aperture above the band is 24.

*Locality*.—N. W.  $\frac{1}{4}$ , N. W.  $\frac{1}{4}$ , Sec. 4, Jefferson, Hillsdale county.

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*PLEUROTOMARIA HURONENSIS*, n. sp.—Shell rather large, depressed-turbinate, consisting of about four very rapidly enlarging whorls. Body whorl flattened from above, moderately convex above; the base a twisted plane bounded on one side by the slope into a large open umbilicus, on the other, by the sharp prominent carina which marks the periphery of the whorl. Surface of the whorl marked by eleven raised plications and intervening broad sulci, of which, counting from the umbilicus, the sixth rests upon the carina, and the eleventh is close to the suture. These are crossed by striæ of growth rising from the umbilicus, stretching far forward upon the base, curving backwards just before reaching the carina, and apparently curving forward again after passing it.

Height of shell 1·00 (100); diameter of base 2·00 (200); transverse diameter of aperture ·92 (92).

*Locality*.—Light-house, Pt. aux Barques, in intercalated sandstones of the Huron group.

This species recalls *Euomphalus carinatus*, Sow., (Murch. Sil. Syst., 616, pl. vi. fig. 10).

#### DENTALIUM, Linnæus.

*DENTALIUM ? BARQUENSE*, n. sp.—Shell small, very gradually tapering, slightly compressed. Surface of cast smooth. Surface of shell unknown—apparently striate or grooved transversely; shell-structure prismatic, the axes of the prisms being normal to the surface of the shell. The shortness of these prisms gives the structure the appearance of miniature mosaic. Diameter of fragment ·06.

*Locality*.—Pt. aux Barques, in a stratum overlying the gritstones.

#### BELLEROPHON, Montfort.

*BELLEROPHON RUGOSUSCULUS*, n. sp.—Shell of moderate size, globoid, very rapidly enlarging; umbilicus rather broad and deep, but not perforate—only one whorl being exposed to view. Transverse section somewhat rhomboidal, with rounded angles, becoming more rounded with age. Keel in the young shell rather prominent, but obtuse, becoming more depressed with age, until finally the dorsal surface is regularly rounded, and the sides have developed some obliquely longitudinal folds winding into the umbilicus. Aperture transversely expanded, subreniform. The entire surface, except the peripheral belt, is marked by direct, longitudinal raised striæ, separated only by a narrow groove; these are crossed by a set of transverse striæ, which, on the umbilical slope are somewhat irregularly waved and more pronounced than on the dorsum; on passing the lateral angle they divide irregularly and result in a set of finer striæ, which are abruptly reflected in approaching the keel, and in the older portion of the shell, gradually disappear before reaching it, while in the young shell they meet upon the keel in an acute angle of about 56°. Cast nearly destitute of ornaments.

Diameter of large specimen ·77 (100); height of last whorl to the middle of the umbilicus ·52 (68); height of aperture ·36 (47); width of aperture ·54 (70); number of longitudinal striæ in one-tenth of an inch 8; number of transverse striæ in one-tenth of an inch, counted on the umbilical slope 6, counted on the keel 12 to 15.

*Localities*.—Marshall and Secs. 19 and 26, Liberty, Jackson county.

The general appearance of this shell is that of *B. decussatus*, Flem., but a careful examination of all the figures and descriptions in my possession, has convinced me that it is a distinct though representative species. Want of space, however, forbids offering the comparisons.

Var. *teniatus*. This well-marked variety (perhaps distinct species) is the form which approaches nearest to Sandberger's *B. decussatus*. It differs from the usual forms of the present species in having a less depressed dorsum and a smaller transverse diameter; a more prominent keel which is bounded by a slight elevation along each margin, and in its finer striæ, especially on the 1862.]

umbilical slope. In a specimen which is .6 (100) across the outer whorl, the height of the aperture is .32 (53), its width .38 (63). The number of longitudinal striae in one-tenth of an inch is about 14, and the number of transverse striae 18.

*Locality*.—Moscow, Hillsdale county.

*BELLEROPHON GALERICULATUS*, n. sp.—Shell small, globose, involute, ecarinate, exumbilicate, longitudinally striate, and deeply notched. Dorsum broadly and regularly rounded, without any evidences of a band, except in approaching the aperture of adult shells, where a rather broad band with ventrally concave incremental lines can be faintly traced. Aperture crescentic, not suddenly expanded, strongly auriculate, with the ears hanging detached from the inner whorl. Notch infundibuliform, deep and broad, obtuse, its sides reaching to the tips of the auriculations. Umbilicus closed, scarcely indented. Dorsal and dorso-lateral surface marked by about 28 longitudinal, sharply raised striae, separated by much wider flutings, and not perceptibly modified by the dorsal band until within half a whorl of the aperture of the adult shell, when the two middle striae become slightly raised and enlarged, and the entire set simultaneously die away. Between these striae and the umbilical point similar striae diverge spirally and irregular until intercepted by the former set, or by each other. Cast smooth, perforately umbilicate.

Average diameter of adult .47 (100); height of last whorl at the aperture .26 (55); height of aperture .18 (38); showing the inner whorl impressed into the outer .08 (17); width of aperture .35 (74); depth of notch .22 (47); width of peripheral belt at notch .06 (13); separating distance between tip of auriculations and inner whorl .10 (21); number of striae in one-tenth of an inch 10, and this is the same in young and old specimens. Diameter of largest specimen seen .53.

*Localities*.—Marshall, Battle Creek, and nearly all other Southern outcrops of the Marshall Sandstone.

This shell bears a close resemblance to *B. Urei*, of authors, but seems to differ in essential points, as follows:—From *B. Urei*, de Kon. (An. Foss. 356, xxx. 4) in being only half the size, having the dorsal belt elevated instead of compressed, in its very deep notch, less proportional width and distinct auriculations; from McCoy's *B. Urei* (Brit. Pal. Foss., 554) in having the striae much narrower than the intervening grooves and not at all modified by the dorsal band, and in having the width of the aperture less than the diameter of the shell. Prof. Phillips' figures differ in the absence of auriculations, and in the lateral striae. To Fleming's original description I have not access.

*BELLEROPHON CYRTOLITES*, Hall (13th Rep. N. Y. Reg., p. 107).—Shell sub-cuneiform, laterally somewhat appressed; whorls very rapidly enlarging, but slightly embracing; transverse section subcordate, broadest near the umbilicus; dorsum strongly but obtusely carinated; dorso-lateral slope nearly flat, sometimes slightly concave near the peripheral belt; sides regularly rounded, as well as the umbilical slope; umbilicus moderate, exposing only the last volution; notch deep, pointed, moderately broad. Entire surface of shell ornamented with fine, sharply raised transverse striae, which curve backwards upon the side, and meet upon the dorsum in an angle of about 60°. The umbilical region and the sides are equally marked by fine longitudinal striae, which disappear in the vicinity of the keel.

The largest specimen seen measures across the outer whorl .41 (100); height of aperture .23 (56); transverse diameter of aperture .19 (46), with about 13 longitudinal and 13 transverse striae in one-tenth of an inch, counted on the dorso-lateral slope near the aperture. Another specimen with shell better preserved has 10 transverse striae in the same distance.

*Locality*.—Moscow, Hillsdale county.

The side view and section of this species are not unlike those of *B. com-*

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*pressus*, Sandb. (Verstein, Taf. xxii. 6.) = *B. striatus*, Sow. My specimens have the transverse section and external markings of the latter, but they are less capuliform (See Murch. Sil. Syst., 604, iii. 12e).

*BELLEROPHON NAUTILOIDES*, n. sp.—Shell involute, scarcely umbilicate, longitudinally striate and deeply notched. Dorsum regularly rounded, sometimes slightly raised along the peripheral band; sides less convex than the dorsum, bending into a small shallow umbilicus, not disclosing previous whorls. Aperture crescentic, width about equal to its height, strongly auriculate. Notch deep, but obtuse, broad, infundibuliform, with its margins reaching to the tips of the auriculations. Exterior surface longitudinally striate, with fine sharp raised lines marking the sides as well as the dorsum. Cast smooth, perforately umbilicate, exposing two whorls.

Diameter of large specimen .50 (100); height of whorl at aperture .31 (62); depth of impression of inner whorl into outer .09 (18); height of aperture .22 (44); width of aperture .27 (54); separating distance between tip of auriculation and inner whorl .10 (20); depth of notch .17 (34).

*Locality*.—Moscow, Battle Creek, Marshall, and near Grandville, Kent county.

*BELLEROPHON MICHIGANENSIS*, n. sp.—Shell globose, carinate, involute, scarcely umbilicate, longitudinally and transversely striate. Dorsum obtusely angulated by the peripheral band, which is slightly raised, and more distinctly relieved by a furrow which runs along each margin. Dorso-lateral surfaces regularly convex, bending (in the cast) abruptly into a small perforate umbilicus. Aperture suddenly and widely expanded, broadly auriculate, and with a broad, rather shallow notch. Exterior of shell not seen; casts generally nearly smooth or faintly marked by longitudinal striæ, sometimes distinctly marked by two sets of striæ, the longitudinal consisting of 8 to 12 prominent raised lines on each side of the band, with one or two small intervening striæ, which gradually attain the size of the larger, these being crossed by finer, less regular transverse striæ, broadly curved anteriorly on the sides and suddenly bent backwards on the dorsum.

Diameter of last whorl (of cast) .23 (100); height of aperture .14 (61); diameter of aperture .35 (152); diameter of whorl .08 (35) back from the aperture .25 (109); diameter of next inner whorl where it touches the lip .17 (74); width of band close to aperture .07 (30); depth of notch .04 (17).

*Localities*.—Battle Creek, and the vicinity of Grandville, Kent county.

The characteristic of this species when compared with *B. galericulatus* is its great width in relation to its height, its much greater expansion of aperture, and its transverse striæ. The existence of a carina distinguishes it from *B. lineolatus*, Hall, from Rockford (13th Ann. Rep. Reg., N. Y., 107).

*BELLEROPHON BARQUENSIS*, n. sp.—Shell small, globose, involute, rapidly enlarging, dorsally depressed; umbilicus small, but deep; dorsum broadly convex, with a distinct raised band; sides sharply rounded into the umbilicus; aperture crescentic, expanded, with a deep broad constriction behind it; notch deep and narrow. Surface marked by fine, regular, longitudinal lines, which cover the band as well as the other parts.

Diameter .48 (100); transverse diameter of aperture .54 (112); height of aperture to middle of umbilicus .27 (56).

*Locality*.—Pt. aux Barques, above the gritstones.

Most nearly resembles *B. Michiganensis*, but the apertural construction and single set of striæ render it easily distinguishable.

*BELLEROPHON LINEOLATUS*, Hall (13th Rep. N. Y. Reg., p. 107).—An imperfect specimen agreeing fully with Hall's description.

*Locality*.—Holland, Ottawa county.

#### GONIATITES, de Haan.

*GONIATITES ROMINGERI*, n. sp.—Shell of moderate size, globoid, exumbilicate. 1862.]

Dorsum broad, regularly rounded; sides gently rounded with only a slight depression near the umbilical center. Septa approximate, thickened at the line of junction with the shell, producing furrows along the septum-lines of the cast. Lobes and saddles strongly pronounced. Dorsal lobe clavate linguiform, with a long cuspidate acumination reaching as far back as the preceding dorsal saddle; dorsal saddle linguiform, obtuse, unsymmetrical, indented on the dorsal side by the broadest part of the dorsal lobe, passing the point of the following lateral lobe; first lateral lobe profound, rather narrow, extending as far back as the dorsal, sublinguiform, acute; lateral saddle deep, very broad, somewhat regularly arched to the umbilical point, extending nearly as far forward as the dorsal saddle. Exterior unknown; surface of cast smooth.

Diameter of cast of last whorl .84 (100); axial diameter .38 (46); greatest transverse diameter of tube .42 (50); distance from axial diameter to dorsum .47 (56); length of dorsal lobe .21 (25); of dorsal saddle .19 (22); of lateral lobe .20 (24).

*Locality*.—Marshall.

This well-marked species resembles *G. rotatorius*, de Kon. and *G. Ixion*, Hall, in the plan of its septa; but, besides its smaller size, its transverse diameter is proportionally much greater, being to the whorl diameter as 1 : 2 instead of 1 : 3; and the diameter through the points of the lateral lobes is as 1 : 2½, while in *G. rotatorius* it is as 1 : 4. The sides of the new species are also more convex.

Named in honor of its discoverer, Dr. C. Rominger, of Ann Arbor.

*GONIATITES WHITEI*, n. sp.—Shell very small, with surfaces regularly convex, a small deep umbilicus and sinuous apertural constrictions. Dorsum rather abruptly rounded, the curvature gradually diminishing on the sides, which are a little appressed; umbilical boundary rather sharply defined. Apertural constrictions separated about 80° from each other, forming a broad, shallow, ventral sinus across the dorsum, and a broader and shallower one on each side. Surface of shell faintly marked by lines parallel with the apertural constrictions, and in some cases by indications of fine crowded revolving striae. Lobes and saddles strongly pronounced. Dorsal lobe truncately infundibuliform, minutely bi-denticulate, with the minute circular siphon issuing from between the denticulations; first lateral lobe acute, infundibuliform, separated from the dorsal by a deep parabolic saddle; second lateral lobe, which is separated from the first by a broadly parabolic saddle, is broadly infundibuliform, with its right angled apex resting on the brink of the umbilical pit.

Diameter .35 (100); thickness or transverse diameter .21 (60).

*Locality*.—Union, Branch county, in blue argillaceous shales of the Huron group.

Named in honor of A. D. White, Esq., its discover.

#### NAUTILUS, Linnæus. TREMATODISCUS, Meek & Worthen.

*NAUTILUS (TREMATODISCUS) STRIGATUS*, n. sp.—Shell of medium size; dorsum flattened, broad, equal to the greatest transverse diameter, bounded by a prominent angle on each side; lateral surface making a right angle with the dorsal, curving rapidly into the deep broad umbilicus; dorso-ventral diameter of shell equal to one-half the transverse. Surface marked by deep cut longitudinal flutings, of which about nine occupy the latero-umbilical region, and six, less remote, occupy the space on each side from the dorso-lateral angle half way to the middle line of the dorsum, thus leaving a middle belt along the dorsum equal to one-half its width, destitute of longitudinal grooves. The dorsal grooves nearer the midline become successively fainter, but the last one is well marked. In the bottom of each of these furrows are about three very fine longitudinal striae. These two sets are crossed by fine, sharp, rather regular raised striae, which curve gently backwards on the sides, while on the dorsal surface they are deflected, at first gradually, then very

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rapidly backward, forming along the middle belt a very deep, broad sinus. Septa regularly concave. Young shell less angular in transverse section.

Diameter of whorl (wholly septate) 2.4 (100); width of dorsum .92 (39); dorso-ventral dimension .53 (22); number of transverse striae in one-tenth of an inch, counted on the dorso-lateral angle, about nine.

*Locality*.—Marshall.

The young shell of this species may be distinguished from the young of *N. striatulus*, from the same group, by the presence of the transverse striae.

*NAUTILUS (TREMATODISCUS) ALTIDORSALIS*, n. sp.—Shell rather large; section quadrilateral, presenting an acute angle on the dorsum, a very obtuse one on the ventrum, and an angle of about 80° on each side, about two-thirds the distance from the dorsum to the ventrum; sides of section but slightly curved; middle line of dorsum not seen. Septa with shallow concavity, somewhat irregular—a shallow sinus occupying the lateral carina, and another the dorsal, with a slight forward swell on the dorso-lateral slope, and another in the umbilical cavity—a very unusual arrangement of the sinuses, since the forward sinuations are thus brought upon those points nearest the central line of the shell. Surface marked by about 8 broad longitudinal grooves on the umbilical slope, and a large number on the dorso-lateral. Each of these grooves contains about 18 very fine, wavy, raised striae. Both sets are crossed by fine, somewhat irregular, transverse striae, nearly direct, though slightly sinuated ventrally on the umbilical slope.

Diameter of (completed) whorl wholly septate 2.1 (100); dorso-ventral diameter of shell .67 (32); transverse diameter .78 (37); angle between plane of whorl and dorso-lateral slope 48°; between plane of whorl and umbilical slope 55°; longitudinal grooves in one-tenth of an inch 1½; longitudinal striae in same distance 30; transverse striae in same distance, counted on lateral carina, 8.

*Locality*.—Marshall.

This species, at first view, resembles *N. strigatus*, but is very distinct. Even small fragments may be distinguished by the numerous very fine striae in the grooves.

#### ORTHO CERAS, Breynius.

*ORTHO CERAS MULTICINCTUM*, n. sp.—Shell small, very gradually tapering; section circular; siphon central (?); surface marked by numerous small, acute, transverse annuli, with intervening sharp grooves; septa with shallow convexity. Number of annuli in one-tenth of an inch 7.

*Localities*.—Marshall and Holland.

A close analogue of *O. cinctum*, de Kon. (An. Foss. 512, xliii. 6, xlv. 5, xlvii. 3), if it is not identical with it. The only perceptible distinction consists in its smaller size and more acute annuli and grooves. *O. cinctum* is said to occur in the Silurian, Devonian and Carboniferous systems. A species with such tenacity of life may have had a great geographical range.

*ORTHO CERAS GRACILIUS*, n. sp.—Shell with an apical angle of 3½°, a circular section and central siphon. Cast smooth; interseptal space .04 where the diameter is .9.

*Locality*.—Union, Branch county, in argillaceous shales of the Huron group.

#### CYTHERE, Müller.

*CYTHERE CRASSIMARGINATA*, n. sp.—Carapace minute, ventricose, regularly oval, microscopically wrinkled-scribulate; hinge-line impressed, and hinge-margin a little hollowed; valves margined by a smooth bead, which projects slightly beyond the general surface, behind which is a small groove; cast smooth, but margined by a raised band terminating near the hinge anteriorly and posteriorly.

Length .08; breadth .05.

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*Localities*.—In the Marshall Sandstone, at Battle Creek, Liberty (Jackson county), Moscow, near Napoleon and at the Gritstone Quarries, at Pt. aux Barques, with *Rhynchonella camerifera*.

Besides the species already enumerated from the Marshall group there yet remain a few too imperfect for adequate description, or belonging to classes not yet investigated. Among these are *Lepidodendron* and *Neuropteris*?; a coralline structure, encrusting, foliaceous or branching, with minute, short, crowded polygonal cells .0088 of an inch in diameter, without visible lamellæ, but with some indications of transverse floors; some undetermined Lamellibranchs; two sorts of Chiton-like scales; two or three Nautili, of which one is nodulous; and sundry remains of spines, teeth and bones of fishes.

University of Michigan, July 1, 1862.

### Synopsis of the CARANGOIDS of the Eastern Coast of North America.

BY THEODORE GILL.

In the preparation of the "Catalogue of the Fishes of the Eastern Coast of North America," I trusted almost wholly to previous naturalists for that portion relating to the species of Scombroids and the allied groups. Drs. Dekay, Holbrook and Girard having each introduced supposed new forms, it was to be presumed that they had studied the species in their various stages. My attention having been since attracted especially to the Carangoids, it has been discovered that the nomenclature of several was quite erroneous and that some genera and species had been founded on young individuals of previously named forms. The preoperculum in early youth, as far as known, is armed with three stout spines at the angle and smaller ones above and below, the spinous dorsal is always developed at that period, and teeth are also present. At a later period the spines of the preoperculum are absorbed in the margin, while in some types the first dorsal becomes atrophied and is, in several, represented by free and simple projecting spines, and at a still later period the teeth are likewise lost. A single species of one such type (*Trachynotus*) has served at different stages of growth as a representative of three different genera, characterized by the condition of the spinous dorsal and the dentition.

The following table will enable the student to distinguish the several groups. Although the genus *Pomatomus* Lac. (*Temnodon* Cuv.), is here retained in the family, I am not certain that it truly belongs to it.

The object of the present article is to correct the nomenclature of several species, as well as to draw attention to the imperfection of our information regarding several others, especially the species of the subfamily of *Centronotinae*. No one will deny that it is for the interest of science that the nomenclature of the genera and species of animals shall be settled as soon as possible, and it is hoped that the present communication will contribute to that desirable end as far as the American species of Carangoids are concerned. Much, however, yet remains to be done. Although I have seen all the species enumerated, with one exception,\* specimens, from the eastern coast, of several are not represented in the collection of the Smithsonian Institution. Those desired species are the following:—*Decapterus punctatus*, *Carangus fallax*, *Blepharichthys crinitus*, *Trachynotus glaucus*, *Naucrates ductor*, *Zonichthys fasciatus* (young), and *H. boscii*. It is hoped that such deficiencies may be soon remedied.

\* *Halatractus boscii*.



- I. Lateral line behind straight and even with the axis.
- A. Lateral line more or less protected by larger plates.... CARANGINÆ.
  - B. Body oblong or elongated; spinous dorsal developed.
    - C. Body perfectly fusiform; snout above axis,
      - 1. Spurious dorsal (1) and anal (1) finlets..... Decapterus.
      - 2. Spurious finlets none..... Trachuropus.
    - CC. Body unequally developed with regard to axis, the dorso-rostral outline being disproportionately decurved.
      - α. Head moderate; suborbital bones moderately elevated (= eye); teeth of jaws enlarged in outer row.
        - Body subfusiform; canine teeth none in front of lower jaw..... Paratractus.
        - Body oblong; canine teeth (2) in front of lower jaw..... Carangus.
      - β. Head small; suborbital bones very low; teeth of jaws villiform..... Carangops.
  - BB. Body rhomboid; spinous dorsal rudimentary in adult..... Blepharichthys.
- AA. Lateral line unarmed.
- B. Body exceedingly compressed and elevated; profile very oblique or subvertical..... VOMERINÆ.
  - α. Body oblong; abdominal outline very convex in youth; dorsal and anal fins nearly uniform.... Vomer.
    - β. Body obliquely elevated, pentagonal; dorsal and anal fins falciform.
      - 1. Ventral fins very short..... Selene.
      - 2. Ventral fins very long..... Argyriosus.
  - BB. Body much compressed, with the inferior outline trenchant; profile oblique and rectilinear; anus behind ventral fins..... CHLOROSCOMBERINÆ.  
Chloroscombrus.
- BBB. Body less compressed, with the abdomen transversely convex. Anus submedian or posterior.
- α. Abdomen considerably shorter than the anal fin, which nearly equals the second dorsal..... TRACHYNOTINÆ.  
Trachynotus.
  - β. Abdomen nearly equal to the anal fin, which is much shorter than the second dorsal..... CENTRONOTINÆ.  
Spinous dorsal represented by short and free spines in adult..... Naucrates.
  - Spinous dorsal well developed.
    - Head high..... Zonichthys.
    - Head oblong..... Halatractus.
- II. Lateral line behind scarcely straight or even with the axis, but rather above..... POMATOMINÆ.

## CARANGINÆ (Bon.) Gill.

## Genus DECAPTERUS Bleeker.

## DECAPTERUS PUNCTATUS Gill.

Scomber hippos *Mitchill* (nec Linn.).*Caranx punctatus* *Agassiz, Cuv. et Val.*

This species appears to be a very rare and occasional straggler to the Northern  
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Seas. No individuals from the United States are in the collection of the Smithsonian Institution. It has only been noticed on our coast as a straggler to New York.

### Genus TRACHUROPS Gill.

#### TRACHUROPS CRUMENOPHTHALMUS Gill.

*Scomber crumenophthalmus* Bloch.

" *balantiophthalmus* Bloch, Schneider.

" *plumieri* Bloch.

*Caranx crumenophthalmus* Lacépède.

" *daubentonii* Lacépède.

" *plumieri* Cuv. et Val.

" *macrophthalmus* Agassiz.

A single specimen of this species was found at Beesley's Point, New Jersey, among a school of blue fish (*Pomatomus saltatrix*), by Prof. Baird.

The specific name and the reference of the African and American forms to one species is given solely on the authority of Günther, no specimens of the foreign forms being at present accessible to me. The Pacific representative or Red Sea representative appears to be distinguished by its more slender body and shorter head.

### Genus PARATRACTUS Gill.

This genus embraces three of the species known which have been referred to *Caranx*. Besides the type, the *Caranx fusus*, of Geoffroy,\* and the *Trachurus boops*, of Girard,† belong to it.

#### PARATRACTUS PISQUETUS Gill.

*Caranx pisquetos* Cuv. et Val.

" *chrysos* Dekay (nec *Scomber chrysos*, Mit.)

" *hippos* Holbrook (nec *Scomber hippos*, Linn.)

*Trachurus squamosus* Gronov., post.

*Carangus chrysos* Girard.

" *hippos* Gill.

This species was first considered by Dekay to be identical with the *Scomber chrysos*, of Mitchill, whose specific name was consequently adopted. He has been followed in this identification by all subsequent writers. Such an identification is evidently erroneous, as Mitchill expressly describes his species as having the "length six inches and a half; depth two." The height is therefore contained three times and a sixth ( $3\frac{1}{6}$ ) in the length,‡ proportions which are fully corroborated by the figure. It is probable that authors have been misled by the radial formula of Mitchill, which gives a larger number of rays than is usually found in the species to which it really belongs.

Holbrook has also identified this species with the *Scomber hippos*, of Linnæus.§ This reference is likewise evidently erroneous, as Linnæus especially attributes two larger teeth in the front of the jaw, while in the present species such teeth are not developed.

The name given by Cuvier and Valenciennes being the first properly applicable to the species, it must be adopted.

\* Geoffroy St. Hilaire, in Description de Egypte; Histoire Naturelle, pl. 24, fig. 3, (1809—13.)

† Girard, Surveys and Explorations for a Railroad Route to the Pacific, vol. x. Fishes, p. 108 (1859.)

‡ The height of *Caranx pisquetus* is contained  $3\frac{1}{6}$ — $3\frac{1}{2}$  times in the length; this species is, therefore, much more slender than Mitchill's fish.

§ Holbrook erroneously considers the present species to be also identical with the *Caranx chrysos* of Cuvier and Valenciennes.

The *Paratractus pisquetus* is the most common of the tribe at the North, and is found along the whole Eastern Coast as far north as Massachusetts.

### Genus CARANGUS Girard.

#### *Caranx* Bleeker.

I have adopted Girard's name for this genus in the "Catalogue of the Fishes of the Eastern Coast," but afterwards, in deference to Bleeker, would have accepted in its place the name of *Caranx*, as applied by that gentleman. I now feel compelled to return to my original position and retain the name of *Carangus* for the present, while that of *Caranx* is preserved for the *Caranx speciosus* of Lacépède.\* Less confusion, I believe, will result from this circumscription than from any other, and appears to be fully justified by circumstances.

Lacépède first applied the name of *Caranx* to a group which he distinguished from *Scomber* on account of the absence of the dorsal and anal finlets. He has in the preliminary remarks acknowledged that he adopted the name from Commerson, and has observed that the appellation was derived from the Greek *καρπ*, and given in allusion to the prominent head.† Of the genus thus derived from Commerson only one species seems to have been known to that naturalist. That species is the *Scomber speciosus* of Linnæus, or the *Caranx speciosus* of Lacépède. The idea conveyed by the name of *Caranx* is well associated with the fish. As the name of *Caranx* was therefore first framed for that species by Commerson, and as Lacépède, by virtue of his preliminary remarks, adopted the genus as Commerson's, the name must be retained for that natural genus, of which the *Caranx speciosus* is a representative. Bleeker's name of *Gnathanodon* applied to it, appropriate as it is, must be then considered as a synonym.

The genus to which Bleeker applied the name of *Caranx* being thus deprived of that name, the one latinised by Girard from the designation which Cuvier had conferred on it as a group may be adopted.‡

The genus as now limited will only embrace three species found on the eastern coast of the United States. Those species are distinguished by the following relative characters:—

- |   |                    |
|---|--------------------|
| I. Body rather oblong, with the snout very convex; dorsal spines seven; pectoral fins with a distinct spot.....   | <i>C. hippos.</i>  |
| II. Body convex above and with the front less obliquely decurved; dorsal spines eight; pectoral fins not spotted. |                    |
| α. Breast scaly. Opercular spot obsolete .....  | <i>C. fallax.</i>  |
| β. Breast naked. Opercular spot distinct.....   | <i>C. chrysos.</i> |

#### CARANGUS FALLAX Girard.

*Guara tereba* *Marcgrave.*

*Caranx fallax* *Cuv. et Val.*

*Caranx richardii* *Holbrook.*

*Caranx hippos* *Günther*, (nec *Scomber hippos* *Linn.*; nec *Caranx hippos* *Holbrook*).

\* The *Caranx speciosus* is the type of the genus *Gnathanodon*, of Bleeker.

† Nous leur avons conservé le nom générique de *Caranx*, qui leur a été donné par Commerson, et qui vient du mot Grec *καρπ* lequel signifie tête. Ce voyageur les a nommés ainsi à cause de l'épave de prominence que présente leur tête, de la force de cette partie, de l'éclat dont elle brille, et d'ailleurs pour annoncer la sorte de puissance et de domination que plusieurs osseux de ce genre exercent sur un grand nombre de poissons qui fréquentent les rivages.

‡ It is probable that Rafinesque has framed a name for this genus, as Lacépède placed its type as the first of an anonymous subgenus, and in accordance with his system, that confounder of nomenclature has doubtless conferred on it a generic name. I am unable at present to examine his early works.

The only evidence of the existence of this species on the eastern coast is a figure of a fish, taken near Charleston, executed by Mr. Richard, a Zoological artist. The fish itself was afterwards lost, but not until after the figure had been completed from it. On the authority of this figure, Dr. Holbrook has considered the species as undescribed, supposing it to be distinguishable from the "*Caranx fallax*" by the want of the "dark color of the anterior rays of the second dorsal fin." Even if the color of that fin was as light as represented in the figure, it would not indicate a specific difference from that species, and consequently the name must be referred, for the present at least, to such species with which it agrees, according to the figure, by its scaly breast and absence of an opercular spot. Dr. Günther\* has referred the name to the synonymy of *Carangus chrysos* (*Caranx carangus*), but as it disagrees with that species in the same respect as it agrees with *C. fallax*, the accuracy of that reference is very questionable. My personal knowledge of the artist by whom the figure was made induces me to confide in the correctness of his drawing.

CARANGUS HIPPOS Gill.

*Caranx erythrurus* Lac.

*Caranx carangus* pt. Cuv. et Val.

" *defensor* Dekay.

*Carangus defensor* Girard.

This species is well distinguished among its relations by its straighter back, the more obliquely convex profile, the seven spines of the dorsal fin, and the spot on the inferior portion of the pectoral fin. The first notice that can be positively referred to this species alone is the description and figure by Dekay of the *Caranx defensor*. There can, however, be little doubt that Linnæus had it in view in his *Scomber hippos*.

The *Carangus defensor* is found along the eastern coast from New York southwards.

The brief notice given by Linnæus of the *Scomber hippos*,† sent to him by Garden from Charleston, South Carolina, is more applicable to this species than to any other found on the coast. It has nevertheless been referred to three others, the *Decapterus punctatus*, *Carangus fallax* and the *Paratractus piquetus* of the present memoir.

The reference to the two large front teeth of the jaw at once excludes the *Paratractus*.

The notice of the opercular spot forbids the reference of the name to the *Caranx fallax*.

With regard to its application to the *Caranx carangus*, or the *C. defensor*, there is more uncertainty. The Linnæan diagnosis contains no allusion to a pectoral spot, a character so prominent that it should scarcely have been left unnoticed if it had existed, but as the number of dorsal spines, as given by Linnæus, corresponds with the number found in *Carangus defensor*, the name of *Carangus hippos* is, therefore, accepted as the proper name for the present species.

CARANGUS CHRYSOS Gill.

*Scomber carangus* Bloch.

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\* Günther, Catalogue of the Acanthopterygian Fishes, vol. ii. p. 448.

† The description left by Linnæus is the following:—

*S. hippos* pinnulis unitis, operculis postice macula nigra.

22  
B. 7. D. 7, 22. P. 22. V. 6. A. —. C. 30.  
40

*Habitat* in Carolina, Dr. Garden.

Dentes unica serie; anticis 2 majoribus. Linea lateralis in medio valde declinata, postice carinata subspinosa. P. dorsalis posterior rubra. Ventralis analisque luteæ. Spinæ ante. Analem remotæ.

*Caranx carangus* Lac.

*Scomber chrysos* Mitchell (nec *Caranx chrysos* Dekay et al.).

*Caranx carangus* Cuv. et Val.

“*antillarum* Bennett (fide Günther).

*Trachurus cordyla* Gronov. (fide Günther).

*Carangus esculentus* Girard.

The *Scomber carangus*, of Bloch, is identical with the *Scomber chrysos*, of Mitchell, as is readily seen on the examination of his figure. The length of *Scomber chrysos* is said to be “six inches and a half; depth two;” the height would thus be contained three times and a sixth in the length, proportions which are corroborated, or represented as at least equally great, by the figure accompanying Mitchell’s memoir. The only species living on the coast of the more temperate United States which exhibit those proportions are the *Caranx carangus*, of Cuv. et Val., and the *Caranx fallax*, of Cuv. et Val.

There is said to be “a black spot frequently at the edge of the gill cover;” this portion of the description thus excludes the *Caranx fallax*.

Mitchell further adds that there are “no zones, stripes, or spots any where about him;” the opercular spot is, of course, to be excepted. This denial of other spots additionally excludes the more oblong *Caranx defensor*, of Dekay, which has a distinct pectoral blotch.

The only plausible objection that can be urged against the preceding identification is the number of rays in the second dorsal, which is said to be “24” (= I. 23), while in the *Caranx carangus* that number is exceptional, but as it is possibly occasionally found, the objection on that score may even be untenable.\* It is in any case certain that no species, except the *Caranx pisquetos*, of Cuv. et Val., has normally the number of rays assigned to the dorsal fin of the *Scomber chrysos*,† and it is equally evident that those latter two are not identical when the difference of form and the number of anal rays is taken into consideration. As the description and figure of the *Scomber chrysos* are therefore most applicable to the *Caranx carangus*, of Cuvier,‡ the two species must be considered as referrible to one species, for which the name of *Carangus chrysos* may be accepted.

Two Virginian specimens of *Carangus hippos* are in the Smithsonian collection, one of which was presented by Commodore Farragut, and the other by Dr. Jeffries, both having been obtained at Norfolk. It has also been observed at New York and South Carolina.

#### Genus CARANGOPS Gill.§

#### CARANGOPS FALCATUS Gill.

*Caranx falcatus* Holbrook.

\* I have myself counted the dorsal rays of twenty individuals of the *Caranx carangus* and have found twenty soft rays in twelve specimens, twenty-one in seven, and twenty-two in a single one. No other scientific ichthyologist has assigned a larger number than the last to the species, and it is possible that the number given by Mitchell may be due to a typographical error, or that he has counted the last double ray as two.

† To those who may discover that Holbrook attributes twenty-three soft rays to the dorsal fin of *Caranx defensor*, I need simply refer to Holbrook’s own figure, which represents twenty, and to Dekay’s description which assigns the same number, which I have likewise verified on the two in the Smithsonian collection, besides others seen elsewhere. That number seems indeed to be almost constant. It is quite possible that Mitchell, who was by no means exempt from errors, may have made a similar mistake.

‡ The *Caranx fallax*, with the operculum spotless, has not yet been ascertained to have wandered further north than Charleston.

§ When proposing this name I was perfectly well aware that an extinct genus of fishes had been called *Carangopsis* by Agassiz, but I applied the name of *Carangops* to the present genus as the two appeared to me to be quite distinct enough to prevent confusion.

*Carangus falcatus* Girard, Gill.

*Caranx amblyrhynchus* pt. Günther.

This species has been considered by Günther as identical with the *Carangops amblyrhynchus* (*Caranx amblyrhynchus* Cuv. et Val.), of the Brazilian Coast, but if the proportions of the two forms are constant, such cannot be the case. The *Carangops amblyrhynchus* is described and figured by Cuvier and Valenciennes as a higher fish with a larger head. The height of that fish is contained two times and two-thirds in the total length, or about twice (fide figure) in the length to the base of the external caudal rays, while in *C. falcatus* the height is rather less than a third of the length, or a line twice the height would cease some distance before the end of the vertical fins. Thus even if the caudal fin of *C. amblyrhynchus* is unequal—which is denied by the figure and not noticed in the description—the *C. falcatus* is distinguishable from it.

Only known in the United States as an inhabitant of Charleston.

#### Genus BLEPHARICHTHYS Gill.

*Blepharis* Cuvier.

The name of *Blepharis* cannot be retained for this group of Carangoids as it had previously been bestowed on a valid genus of plants by Jussieu.

#### BLEPHARICHTHYS CRINITUS Gill.

*Zeus crinitus* Akerly.

*Blepharis major* Cuv. et Val.

“ sutor Cuv. et Val.

“ crinitus Dekay.

This species is rare along the eastern coast, no specimens from that coast being in the Smithsonian collection. It has hitherto been seen at New York.

#### Subfamily VOMERINÆ Gill.

##### Genus VOMER Cuv.

*Platysomus Swainson.*

##### VOMER SETIPINNIS Ayres.

Silver-fish Funnell.

Rhomboida Brown.

Poisson lune Desmarchais.

*Zeus setipinnis* Mitchill.

*Vomer brownii* Cuv. et Val.

*Platysomus brownii* Swains.

“ spixii Swains.

“ micropteryx Swains.

*Argyreus setipinnis* Gthr.

Young.

*Argyreus unimaculatus* Batcheler.

“ vomer (young? an spec nov.?) Gthr.

The young of this species has the abdomen much curved and extended downwards, and a spot at the commencement of the lateral line. This discovery, made last winter and communicated to several American ichthyologists, has been recently confirmed by the independent observations of M. Poey.

The number of dorsal rays is almost always twenty-one or two; the variety B with twenty-five rays, noticed by Dr. Günther, is therefore a distinct species, and may be named *Vomer dorsalis*.

#### Genus SELENE Lacépède, Brevoort.

##### SELENE ARGENTEA Lacépède.

*Selene argentea* Lac., Cuvier (1817). Stark (1818). Brevoort 1851-53). Gill. (1861). Poey (1861).

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*Zeus geometricus* *Mitchill* (1818).

*Argyreiosus vomer* *Agassiz* (1828, Syn. excl.) *Cuvier* (1829). *Cuv. et Val.* (1833). *Günther* (1860) desc. excl.

*Selene argentata* *Mindling* (1832).

*Argyreiosus triacanthus* *Swainson* (1839).

" *mauriceii* *Swainson* (1839).

" *spixii* *Castlenau*.

This species which has been so singularly unfortunate in its nomenclature was first identified in nature by Mr. Brevoort, who published an excellent description and figure of it eleven years ago, which should have presented further confusion; it has nevertheless been overlooked, and the species has been since by one author described as new, and by another been referred to the *Argyriosus vomer*. It has been only noticed on the eastern coast at New York.

#### Genus ARGYRIOSUS Lacépède.

##### ARGYRIOSUS VOMER Lac.

*Zeus vomer* *Linn.*

" *niger* *Bloch.*

" *rostratus* *Mitchill.*

*Argyriosus setifer* *Swainson.*

Found along the entire eastern coast south of Cape Cod.

##### ARGYRIOSUS CAPILLARIS Dekay.

*Zeus capillaris* *Mitchill.*

*Argyreiosus mitchilli* *Dekay.*

This species is readily distinguished by the filamentous prolongation of the third, as well as second, dorsal spine. Its range appears to be co-extensive with the foregoing.

#### Subfamily CHLOROSCOMBRINÆ Gill.

##### Genus CHLOROSCOMBRUS, Girard.

*Micropteryx* *Agassiz* (nec *Zeller*).

##### CHLOROSCOMBRUS CHRYSURUS, Gill.

*Scomber chrysurus* *Linn.*

*Scomber chloris* *Bloch.*

*Micropteryx cosmopolita* *Agassiz.*

*Seriola cosmopolita* *Cuv. et Val.*

*Scomber latus* *Gronov.*

*Chloroscombrus cosmopolita* *Girard.*

*Chloroscombrus caribbaeus* *Girard.*

This species differs considerably in the vertical extension of the body with age, it being much higher when young than when fully grown.

#### Subfamily TRACHYNOTINÆ Gill.

##### TRACHYNOTUS (Lac.) Cuv.

*Trachinotus* *Lac.*, (*Trachynotus ovatus*).

*Caesiomorus* *Lac.*, (*Trachynotus bailloni*).

*Acanthinion* *Lac.*, (*Trachynotus ovatus*).

*Baillonus Rafinesque* (*Trachynotus bailloni*)\*.

*Bothrolæmus Holbrook.*

*Doliodon* *Girard.*

\* *Rafinesque Analyse de la Nature*. This work is not at present accessible, but the name *Baillonus* was doubtless introduced for the *Caesiomorus bailloni* of Lacépède.

Cantor\* and Bleeker† first noticed the changes the species of this genus undergo with age, while Günther, applying this knowledge to the re-arrangement of the entire genus, has reduced the twenty-two species of that genus admitted by Cuvier and Valenciennes to ten, and even of that number, two could not be distinguished by the descriptions published, and were considered doubtful. Ten of the specific names of Cuvier and Valenciennes have been referred to one species (*Trachynotus ovatus* Gthr.), but it is possible that two species may hereafter be recognized among them.

The four species and three genera of Trachynotinæ admitted among the fishes of the Eastern coast of the United States, are reducible to two species of a single genus, but as a genuine species must be added to the list, three species are again to be distinguished which may be recognized by the following characters.

- I. Body rhomboid, very elevated, about twice as long as high.  
     D. VI. I. 18-21. A. II. I. 16-19..... T. OVATUS.  
 II. Body oblong, 3 to 3½ times as long as high.  
     α. Sides with four blackish linear bands. D. VI. I. 19. A.  
         II. I. 17..... T. GLAUCUS.  
     β. Sides uniform, silvery. D. V-VI. I. 24-26. A. II. I.  
         21-24..... T. CAROLINUS.

TRACHYNOTUS OVATUS Günther.

*Gasterosteus ovatus* Linn.

*Centronotus ovalis* Lac.

*Chaetodon rhomboides* Bloch.

*Acanthinion rhomboides* Lac.

The Spinous Dory Mitchill.

*Zeus spinosus* Mitchill.

*Trachinotus rhomboides* Cuv. et Val.

“ *fuscus* Cuv. et Val.

“ *teraia* Cuv. et Val.

“ *spinosus* Cuv. et Val.

*Lichia spinosa* Baird.

*Doliodon spinosus* Girard.

This species is less common along the eastern coast than the *Trachynotus carolinus*.

The synonymy above given includes only the names bestowed on the American specimens,‡ as it is not yet quite evident that the American and Asiatic forms belong to the same species.

TRACHYNOTUS GLAUCUS Cuv. et Val.

*Chaetodon glaucus* Bloch.

*Acanthinion glaucum* Lac.

*Trachinotus glaucus* Cuv. et Val.

The species has been recently introduced into the Fauna of the United States by Dr. Holbrook, by whom it was discovered at Charleston, South Carolina. The latter is the only State in the Union along whose coast its occurrence has yet been commemorated by a naturalist.

TRACHYNOTUS CAROLINUS Gill.

*Gasterosteus carolinus* Linn.

*Centronotus carolinus* Lac.

*Trachinotus pampanus* Cuv. et Val.

\* Cantor, Catalogue of Malayan Fishes, p. 121, 1850.

† Bleeker, Verhandelingen van het Bataviaasch Genootschap deel xxiv. Bydrage tot de Kennis der Makreelachtige Visschen, p. 48, 1852.

‡ The habitat of the *Gasterosteus ovatus* has not been mentioned by Linnæus.



*Trachinotus argenteus* Cuv. et Val., Gill.

*Trachinotus cupreus* Cuv. et Val.

*Lichia carolina* Dekay.

*Bothrolaemus pampanus* Holb., Gill.

*Doliodon carolinus* Girard, Gill.

In the "General Remarks" on this species, Dr. Holbrook, referring to Dekay's name for this species (*Lichia carolina*), has remarked that the absence of teeth forbids its reference to the genus *Lichia*; "nor can his specific name be retained, as that of Cuvier and Valenciennes has the right of priority; unless, indeed, it could be satisfactorily proved that our *crevalle* is identical with the *Gasterosteus carolinus* of Linnæus, and this cannot be done, as that animal must be a *caranx*, it having a carina along its tail. Yet it is almost certain that the *crevalle* of Dr. Garden, which Linnæus quotes as a *synonym*, is the animal now under consideration; for the name *crevalle* or *caralli* was commonly applied to this fish, even in the time of Garden, as I have been informed by his contemporaries, and if we consider the great estimation in which this fish is held by epicures, and the price it commands in market above all others, it is not probable that its name has been changed."\*

Linnæus gives the following description of his *Gasterosteus carolinus*.

GASTEROSTEUS CAROLINUS, spinis dorsalibus 8, analibus 3,

8 3

D. — 26. P. 18, V. 5. A. — (= 27-3 = III. 24). C. 27.

8 27

Corpus oblongo-ovatum. Linea lateralis recta ad caudam subcarinata. P. D. and A. falcata. Cauda bifurca. Habitat in Carolina ubi *Crevalle* dicitur.

It is scarcely necessary to argue that this description can not be applied to any Carangine fish of the American or any other coast, as the existence of free spines instead of a dorsal fin,† straight course of the lateral line, its want of armature‡ and the radial formula at once render evident.

In all respects in which it thus differs from the Caranginæ, it agrees with the *Trachynotus pampanus* of Cuvier,§ and more or less disagrees with any other known species. These characters as well as the immediate approximation of the species to one admitted to be a *Trachynotus* (*G. ovatus*) and the popular name and habitat assigned to it, render it certain that the *Gasterosteus carolinus* is the *Trachynotus pampanus* C. V., and the *Bothrolaemus pampanus* of Holbrook, and that the species must be consequently called *Trachynotus carolinus*.

Blindly confiding in the accuracy and knowledge of my predecessors, and neglecting to question Nature herself, I have in the Catalogue of the Fishes of this coast, admitted the four nominal species distributed among the genera by implication admitted by them. The characters of the several genera and

\* Holbrook, Ichthyology of South Carolina, p. 84, 1855.

† This character is of course implied by the reference of the species to the genus *Gasterosteus*.

‡ Linnæus knew two species of the genus *Caranx* as understood by Cuvier. Of one of these (*Caranx trachurus*) the lateral line was said to be mailed (*Linea lateralis lorica-ta*) and of the other (*Caranx hippos*), carinated and subspinose (*Linea lateralis carinata, subspinosa*). The curvature of each was also noticed. The phrase "*subcarinata*," was therefore evidently not intended to describe the lateral line of a *Caranx*, but to indicate the distinctness of the line of the species to which the name of *Gasterosteus carolinus* is here referred.

§ I have found the same large number of dorsal and anal rays as that noticed by Linnæus. (D. — 26. A. — = D. VII. I. 26. A. II. I. 24), although such a number is of rare occurrence.

species, as understood from the examination alone of the literature of the science, are indicated in the following synopsis.

I. Teeth developed.

- α. Spinous dorsal developed..... *Doliodon*.  
 β. Spinous dorsal replaced by free spines..... *Trachynotus*.

II. Teeth of jaws and pharyngeal bones absent. Dorsal spines

- free..... *Bothrolæmus*.

The two species of *Doliodon* were distinguished by their height and the number of rays, and are really distinct. One of them, however, also appeared under two other genera. The differences above signalized are the result of age.

When extremely young, the preoperculum is armed at the angle with three large spines, and smaller ones above and below. The spinous dorsal is developed as a perfect fin, and teeth are present on the jaws and palatine arch. In this stage the species has never been described by previous naturalists, and consequently has received no name as the corresponding stage of *Naucrates*\* has.

At an early period, the preopercular spines are absorbed in the substance of the preoperculum and disappear. The spinous dorsal and the teeth are still retained. In this condition it remains for some time; the spinous dorsal, however, gradually losing its relative size, while the soft vertical fins increase. In this stage the species belongs to the genus *Doliodon* of Girard.†

At a later period, the membrane connecting the dorsal spines has become obsolete, and the species then represents the genus *Trachynotus* as understood by Cuvier and Valenciennes and others.

Finally, in old age the teeth of the jaws, palate and pharyngeal bones have fallen out, and the lobes of the dorsal, anal and caudal fins attained their greatest extension and become pointed. This final stage has been made known by Holbrook under the new generic name of *Bothrolæmus*.

The various differences in the development of the soft fins and the dentition were correctly appreciated by Günther, and the several names have been referred to the synonymy of the species to which all belong.

It is a rather singular coincidence that Linnæus has found the same number of rays in his *Gasterosteus saltatrix* which is the *Pomatomus saltatrix* of the present article, as in the *G. ovatus*, and this identity of the radial formulae has induced Schneider to unite the two species which belong to at least different subfamilies.‡

Subfamily CENTRONOTINÆ Gill.

Genus NAUCRATES (Raf.) Cuv.

*Seriola* sp. Cuv. et Val.

*Nauclerus* Cuv. et Val.

NAUCRATES DUCTOR (Raf.)

Adult.

*Gasterosteus ductor* Linn.

*Gasterosteus antecessor*, Daldorf.

*Scomber ductor* Bloch.

" *koelreuteri* Bloch.

*Centronotus conductor* Lacépède.

*Naucrates fanfarus* Raf.

" *ductor* Cuv. et Val.

\* The genus *Nauclerus* corresponding to this stage of *Naucrates* was proposed by Cuvier, and has been unreservedly adopted by every succeeding naturalist.

† The corresponding stage of *Naucrates* has been observed by Cuvier and Valenciennes, and made known under the names of *Seriola dussumieri* and *S. succincta*. These species have been adopted by their successors.

‡ See *Histoire Naturelle des Poissons*, tome ix. p. 229.

*Naucrates noveboracensis* Cuv. et Val.

“ *indicus* Cuv. et Val.

“ *koelreuteri* Cuv. et Val.

“ *ductor* Swainson.

“ *cyanophrys* Swains.

“ *serratus* Swains.

*Thynnus pompilus* Gronov. (Gray ed.)

Young with dorsal spines connected.

*Seriola dussumieri* Cuv. et Val.

“ *succincta* Cuv. et Val.

Young with spinous dorsal fin and preopercular spines.

*Nauclerus compressus* Cuv. et Val.

“ *abbreviatus* Cuv. et Val.

“ *brachycentrus* Cuv. et Val.

“ *triacanthus* Cuv. et Val.

“ *annularis* Cuv. et Val.

“ *leucurus* Cuv. et Val.

The above synonymy has been given on the authority of Dr. Günther as far as the union of the forms described under the generic name of *Naucrates* are concerned; the *Seriola* and *Naucleri* added to it are young fishes of this genus, and if all the forms referred to *Naucrates* belong to one species, the *Seriola* and *Naucleri* are doubtless the young of that single species. Much doubt is however entertained as to the correctness of this union of so many species. If aught may be judged from the examination of single specimens, the species of the Mediterranean sea differs from a Pacific one\* of nearly the same size, by the higher body, the shorter head, the smaller eye, the ecarinate forehead, and especially the breadth of the lingual band of teeth, which is about three times as broad and extends farther forwards than in the Pacific specimen.† The vomerine patch is also wider and shorter, as well as blunt behind, and the tongue is shorter. Differences like these cannot in this case be well attributed to age or condition, and are apparently specific. But as Cuvier and Valenciennes have not made use of these characters, but distinguished their species on the most trivial grounds, and as Günther, with much better opportunities than those enjoyed by me, has considered them all identical, I provisionally accept his synonymy, until we may better know the value of the character referred to. There can at least be scarcely any doubt that there is only one *Naucrates* on the eastern coast of America, as the difference of color on account of which the *N. noveboracensis* has been distinguished from *N. ductor*, is, as Cuvier and Valenciennes have themselves suggested, the result of alteration by liquor.‡

No specimen of *Naucrates* from the United States is in the Smithsonian collection.

#### Genus ZONICHTHYS (Swainson).§

*SERIOLA* CUV. (nec Gaertner).

The name *Zonichthys* was proposed by Swainson for the *Scomber fasciatus*

\* One from Honolulu, one of the Sandwich Islands, sent to the Smithsonian Institution by the Rev. W. H. Pease. It is rather shorter than the European one.

† By analogy, the Sandwich Island specimen being smaller, the height of the body should be greater, and the teeth more developed than in the European one.

‡ The Mediterranean specimen of *Naucrates ductor* from the Bonaparte collection, received from the Academy of Natural Sciences, has the same yellow color as the nominal *N. noveboracensis*.

§ This genus does not embrace the *Seriola gigas* of Gunther (nec Poey) which is distinguished by the eight dorsal spines, shorter second dorsal fin and subrhomboidal patch of vomerine teeth. It may be called *Naucratopsis gigas*. Another allied genus is the *Elogatis* of Bennett, which is also the *Seriolichthys* of Bleeker, *Decaptes* of Poey, and finally *Irex* of Valenciennes.

of Bloch, and as that of *Seriola* had been previously accepted for a genus of plants, the former may be retained for the homonymous genus of Ichthyology. Like so many other genera proposed in the miserable work of Swainson, the *Zonichthys* of that author is founded on one of Bloch's figures, and is simply the result of a misapprehension.

The species of *Zonichthys* appear to be subject to considerable variations. The bands become less distinct, or even obsolete with age, the ventrals are abbreviated, and the height seems to even decrease. The validity of the *Zonichthys boscii* and *Z. carolinensis* is therefore not quite certain. The former has not been seen by me. The following synopsis displays the apparent differences of the several species :

- I. Head rather higher than long, with the profile boldly de-  
curved..... *Z. fasciatus*.  
II. Head longer than high..... *HALATRACTUS*.  
    a. D. VII. I. 31. A. II. I. 20. Body efasciate..... *Z. boscii*.  
    β. D. VII. I. 32-34. A. II. I. 19-20. Body with 6 bands,  
        3 ascending on dorsal and 2 on anal... .. *Z. zonatus*.  
    γ. D. VII. I. 36, 37. A. II. I. 19-20. Body efasciate.. *Z. caroliniensis*.

#### *ZONICHTHYS FASCIATUS*, Swainson.

*Scomber fasciatus* Bloch.

*Seriola fasciata* Cuv. et Val.

I have never seen a specimen of this species, unless a large one, without bands, may be an aged form of it.

The *Zonichthys fasciatus* is probably the only species of the United States which truly belongs to this genus. The other species referred to it are distinguished by the subfusiform shape and the elongation of the head and doubtless belong to another genus which may be called *Halatractus*, the type of which may be found in the *Zonichthys zonatus*, a congener of *Seriola dumerilii*.

#### *HALATRACTUS* Gill.

##### *HALATRACTUS BOSCH* Gill.

*Seriola boscii* Cuv. et Val.

Some of the specimens of *Zonichthys* in the Smithsonian collection appear to be referrible to this species, which was first discovered at Charleston by the naturalist to whom it has been dedicated.

##### *HALATRACTUS ZONATUS* Gill.

*Scomber zonatus* Mitchell.

*Seriola zonata* Cuv. et Val.

*Seriola leiarchus* Cuv. et Val.

Günther appears to be correct in his union of the *Seriola zonata* and *S. leiarchus* of the *Histoire Naturelle des Poissons*. The species ranges from New York southwards. A specimen between six and seven inches long, the tips of whose ventral fins cover the anus appears to represent a younger stage of this species. It was obtained at Charleston.

##### *HALATRACTUS CAROLINENSIS* Gill.

*Seriola carolinensis* Holbrook.

*Seriola zonata* Günther.

This species appears to differ from the foregoing by the less height of the body and the more numerous rays of the second dorsal and anal fins, as well perhaps as by the color. The latter, however, is perhaps due to age.

[Sept.

Subfamily *POMATOMINÆ* Gill.Genus *POMATOMUS*, Lacépède.*Gonenion Raf.**Temnodon Cuv. et Val.**POMATOMUS SALTATRIX* Gill.*Gasterosteus saltatrix Linn.**Scomber saltator Bloch.**Cheilodipterus heptacanthus Lac.**Pomatomus skib Lac.**Gonenion serra Raf.**Scomber plumbeus Mitchill.**Temnodon heptacanthus Quoy and Gaimard.**Temnodon saltator Cuv. et Val.*

This species is very abundant along the entire eastern coast of the United States.

Description of a new generic type of **MORMYROIDS** and Note on  
the arrangement of the genus.

BY THEODORE GILL.

The Mormyroids now known appear to be distributable among two sub-families and eight genera which may be briefly distinguished by the following characters :

- I. Dorsal very long, commencing in front of ventrals. Anal very short.  
     Vomer covered by anterior processes of palatine bones.  
     Cerebellum entirely concealed above..... *MORMYRINÆ*.  
     Muzzle tubuliform..... *Mormyrus*.  
     Muzzle obtuse..... *Mormyrodes*.
- II. Dorsal commencing more or less behind the ventrals.  
     Anal oblong or elongated. Vomer uncovered. Cerebellum and quadrigeminal bodies more or less exposed..... *PETROCEPHALINÆ*.  
     A. Mouth considerably in advance of the eyes.  
         1. Anal rather shorter than dorsal..... *Isichthys*.  
         2. Anal less than twice as long as dorsal (D. 17-26.  
             A. 25-50).  
             a. Lower jaw without flap or barbel. Upper jaw longer..... *Marcusenius*.  
                 Lower jaw prominent..... *Mormyrops*.  
             β. Lower jaw with a conical flap or barbel..... *Gnathonemus*.  
         3. Anal three times as long as dorsal. Palatal teeth pisiform..... *Hyperopisus*.  
     AA. Snout produced. Mouth under eyes..... *Petrocephalus*.

*MORMYRINÆ* Gill.*MORMYRUS* Linn.*Scrophicephalus Sw.**Mormyrus caschive Hass.**MORMYRODES* Gill.*Mormyrodes hasselquistii* = *Mormyrus hasselquistii Geoffroy*.*PETROCEPHALINÆ* Gill.*ISICHTHYS* Gill.*Isichthys henryi Gill.*

1862.]

## MARCUSENIUS Gill.

*Marcusenius anguilloides* = *Mormyrus anguilloides* Linn.

## MORMYROPS Müller.

*Mormyrops cyprinoides* = *Mormyrus cyprinoides* Linn. (nec Geoffroy.)

## GNATHONEMUS Gill.

*Gnathonemus petersii* = *Mormyrus petersii* Günther.

## HYPEROPISUS Gill.

*Hyperopisus dorsalis* = *Mormyrus dorsalis* Geoffroy.

## PETROCEPHALUS Marcusen.

*Petrocephalus bane* = *Mormyrus bane* Val.

## ISICHTHYS Gill.

Body anguilliform, with the height subequal as far as the caudal peduncle, which is abruptly attenuated. Scales rather small. Head oblong, about twice as long as high. Snout scarcely projecting, and convex. Mouth transverse; the periphery of each jaw convex in front. Teeth compressed and with emarginated summits. Eyes small, considerably behind the vertical from the mouth. Nostrils simple, small, two in a longitudinal line in front of each eye. Dorsal fin elongated, nearly equalling half the total length, separable from the back at the base of the membrane between the rays. Anal fin rather shorter than the dorsal, coterminous with it and constructed at its base like the dorsal.

This genus is at once distinguished from all others of the family by the elongation and comparative proportions of the dorsal and anal fins. The peculiarity of the dorsal and anal fins recalls to mind the nearly similar character found in some of the Balistoidæ, a coincidence which is the more noticeable as the Mormyroids have also the upper maxillary bones united like the Plectognathi.

## ISICHTHYS HENRY Gill.

The greatest height equals a tenth (10) of the length (*exclusive of the caudal fin*), and that at the ventrals an eleventh (·09) of the same; the latter is nearly two times and a half as great as the height behind the vertical fins (·03½). The head to the margin of the operculum forms almost a seventh (14) of the length, and is twice as great as the height, or two times and a half as great as that of the eye (·05½). The eye is contained about ten times in the head's length. The interorbital area rather exceeds a fifth (·03) of the same length, while the length of the snout equals a fourth (·03½).

The dorsal fin commences considerably before the end of the anterior half of the length (·45), and its own length equals half of the total (·50). The greatest height equals that at the pupil (·05½); its posterior portion appears to have been lower. The anal fin commences nearly even with the second half of the length (51) or under the seventh or eighth dorsal ray, and is coterminous with the latter fin; its height at the middle exceeds that of the dorsal (06½) and at its produced and rounded posterior angle is still greater (·08). The pectoral fin equals an eleventh of the length (·09); the ventrals are inserted near the end of the third tenth of the length (·38) and each one equals two-thirds of the pectoral (·06).

The scales are small, there being about 135 along the lateral line; the 38th to 41st is on the vertical from the ventral fin; the 50th to 53d from the origin of the dorsal, and the 64th to 67th from the anal. At the vertical of the origin of the dorsal fin, there are twenty-six rows of scales, of which ten are above the lateral line, and at that of the anal, twenty-one rows, of which nine are above.

[Sept.

D. I. 43. A. I. 41., P. 9. V. 5.

The color is dark reddish or chocolate brown.

A single specimen, for which there is no indication of locality, is in the Smithsonian Institution, and formed part of the collection of the former National Institute of the city of Washington. It is in rather poor condition, the caudal fin having been entirely lost. The length of the remaining portion is seven inches. I am disposed to believe that it was sent from Liberia.

I dedicate the species to my friend Prof. Henry, of the Smithsonian Institution, to whom I have been so much indebted for the privileges of studying the rich collections of the Institution, and especially of investigating the class to which the present species belongs.

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On the Synonymy and Systematic Position of the Genus *ETELIS* of  
Cuvier and Valenciennes.

BY THEODORE GILL.

In the second volume of the "Histoire Naturelle des Poissons," Cuvier and Valenciennes have distributed among two primary sections those species of their family of Percoids, which have ventral fins with five rays and inserted beneath the pectoral, and which have seven branchiostegal rays. Those sections are distinguished by the condition of the dorsal fin; the first having two dorsals, or a dorsal emarginated to its base; the second having a single dorsal.

In the section distinguished by the division of the dorsal fin, and in that subsection whose representatives have canine teeth mingled with others, Cuvier and Valenciennes have placed a generic type which they have technically characterized by the scarcely apparent dentelure of the preoperculum, the single opercular point, and the contiguous dorsals, and which was distinguished from *Lucioperca* (recte *Stizostedion*, Raf.) by the wholly villiform teeth of the palate, and the presence of two\* opercular spines. The *Etelis* is, however, not at all related to *Stizostedion*, but, as will be hereafter shown, belongs to a different family. It is a fish distinguished by its slender and elegant symmetrical form, the deeply-forked caudal, whose lobes are elongated, and acute, and especially by the remarkably large size of the eyes. The first dorsal of this fish is stated by Cuvier and Valenciennes to terminate at the base of the second. Only one species has been referred to the genus. That species is the *Etelis carbunculus*, of Cuvier and Valenciennes, and has been found in the archipelago of the Seychelles and at the Isle of France.

In the second section of the same division of Percoids, characterized by the single dorsal fin, and in the subsection distinguished by the possession of canine teeth, Cuvier and Valenciennes have placed the genus *Serranus*. To that group of the genus for which they have accepted Bloch's name *Anthias*, they have referred a species which they have named *Serranus oculatus*, and which is distinguished from all others of that section by the comparatively slight connection between the spinous and soft portions of the dorsal. This fish is likewise remarkable for its slender symmetrical shape, a deeply-forked caudal fin with prolonged and acute lobes, and also especially for its very large eyes. Of the dorsal fins it is simply said that the spines diminish in length from the third to the tenth, which is the last and the lowest.

On a comparison of the two fishes thus enumerated, it is found that they agree in all respects. The *Etelis carbunculus* and the *Serranus oculatus* have the same form of the head and body, the same form and structure of the fins, the same armature of the bones of the head, and the same large eyes, and the same dentition. There is no generic distinction between them whatever,

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\* *Etelis* has two opercular spines and not one as previously stated.

and their reference to two genera belonging to different sections is simply the result of a difference of interpretation of the same fact in the two cases, on account of their examination from isolated points of view. The dorsal has such a form that in one case it appeared to the learned French naturalists to be double, and in the other to be rather a single one. On the most casual examination of the plates of the *Etelis carbunculus* (pl. xviii.), and the *Serranus oculatus* (pl. xxxii.), it is evident that there is the closest external resemblance, which applies to the form of the dorsal fin as well as to every other feature of the external organization.

Deceived by the imposing authority of the great ichthyologists by whom the two species referred to were described, and by Dr. Günther's acceptance of the same opinion, after an examination of specimens of each, I had supposed that some generic difference must exist between those two species, which had not been rendered sufficiently clear by the authors. I had long noticed the great resemblance of the two species, but was willing to believe that they might belong to distinct genera as the squamation of *Etelis* was so represented as to remind one of a Holocentroid fish. I had only casually seen the *Serranus oculatus* in the infancy of my ichthyological studies, and the remembrance was not sufficiently vivid to enable me to certainly identify that species generically with the *Etelis carbunculus*. The recent reception at the Smithsonian Institution of a fine specimen from my esteemed correspondent, Prof. Poey, at once assured a certainty of the close affinity of the two species so often named.

My attention was further at once arrested by characteristics which previous observers had failed to express, and which rendered it certain that instead of being a *Serranus*, or even an *Anthias*, it was rather related to the *Lutjaninae*, and especially to the genus *Platyinius*, and that it consequently belonged to a different family.

The learned Troschel, in a most valuable and suggestive article in the "Archiv für Naturgeschichte,"\* has first pointed out the true characters which distinguish the family of Sparoids as a natural group. Although I shall have occasion to dissent from the views of that naturalist respecting the limits of the family, eliminating some of the forms that have been referred to it, while I would combine others that have been distributed among different ones, it is with much pleasure that I add that the latter modifications are the consequence of, and naturally flow from the results of the investigations of Troschel, if we assign less value than he did to the dentition, and that the former are caused by the different views that have originated respecting the character of families since the period at which that ichthyologist wrote.

*Etelis* then is proclaimed to be a Sparoid on account of the reception of the maxillary bones beneath the preorbital bones, the existence of a dorsal groove in which the fin is folded, the presence of pointed axillar scales, and the acutely pointed pectoral and caudal fins.† By all these characters it is distinguished from *Serranus* and *Anthias* as well as the other Percoids. On account of all these characters it equally agrees with the family of Sparoids, and to that family it consequently must be referred. The artificial nature of that classification, which would place the *Lutjaninae* in a distinct family from *Dentex*, and the allied genera, or which would equally separate the *Lutjaninae* and the *Hoplopagrinae*, and which at the same time would refer *Lutjaninae* to the vicinity of *Serraninae* on account of the presence of palatine teeth, is too evident to be commented upon, especially after I shall have added that there

\*Dr. F. H. Troschel "Ueber die Begrenzung der Familie der Sparoiden," in Archiv für Naturgeschichte, 15er Jahrgang, 1er band, pp. 382—386, taf. viii.

† The scales are more like those of *Sillago* than any others represented by Troschel, but the concentric striæ in front of the nucleus are obsolete, and consequently have more of a Sparoid character.



is one genus (*Prionodes*, Jenyns) which appears to resemble in almost every respect the Serrani, notwithstanding its total destitution of palatal teeth.

I now proceed to give the synonymy and description of the genus *Etelis*.

Genus ETELIS Cuv. et Val.

*Etelis* Cuv. et Val., Histoire Naturelle des Poissons, tome ii. p. 127, 1828.

*Elastoma Swainson*, Natural History of Fishes, Reptiles, and Amphibians, vol. ii., pp. 168, 202, 1839.

*Hesperanthias Lowe*, Fishes of Maderia, 1843.

*Macrops Duméril*, Ichthyologie Analytique, p. 279, 1856.

*Serranus (Anthias)* sp. Cuv. et Val., Temm. et Schlegel, Rich., Poey.

*Centropristes* sp. Müll. et Troschel.

*Anthias* sp. Günther.

Body moderately compressed, slender, elongated and subfusiform, highest at the ventral fins; thence regularly attenuated to the caudal peduncle, which is slender and slightly constricted. Back in front of dorsal fin broad and flattened towards the occiput.

6  
Scales rather large, (circa 50—) disposed in regular longitudinal rows,  
14

parallel with the lateral line. Each scale is about as high as wide, angulated behind, with the nucleus at the terminal third, before which the surface is polished, while there is a marginal muricated band. The radiating grooves are few (7-10), and the concentric striæ form very acute angle with the lateral edges, and are almost parallel with them.

Lateral line parallel with the dorsal outline, the sigmoidal curve being very slight.

Head compressed, oblong-conoid, flattened between the orbits, and with the snout gradually decurved to the symphysis. Forehead naked. Opercular bones and cheeks and covered with moderate scales. Preoperculum with a rather narrow naked limb, vertical behind, and very finely serrated. Operculum behind terminated by two acute spines separated by an oblique emargination. Preorbital bones naked, low and oblong or elongated.

Eyes very large and circular.

Nostrils on each side, double, approximated, with nearly simple margins.

Mouth rather large, with the cleft moderately oblique. Intermaxillary bones with short, posterior processes and little protractile. Supramaxillary bones terminating nearly under the centre of the pupil, covered on their exposed portions with scales. Dentary low and bent inwards beneath.

Teeth in a villiform band on each jaw, with a row of much larger distant ones in the upper jaw, and with a canine one each side in front; in the lower also, an external rim of rather larger ones, and with a small canine on each side in front, closing before the one in the upper jaw, and with a larger one farther backwards. Teeth of the vomer and palatine bones in a villiform band; that of the former angulated at the middle.

Branchiostegal rays seven.

Dorsal fin with the spinous portion with ten spines rapidly decreasing from the third, and with the first abbreviated; soft portion oblong, and nearly uniform in height, much lower than the highest spines, and much higher than the tenth or last one. Dorsal groove very conspicuous.

Anal fin smaller than the soft portion of the dorsal to which it is symmetrically opposed, with three moderate graduated spines, and with eight rays, the last of which are slightly prolonged.

Caudal fin deeply-forked, and with acute lobes, the upper of which is longest; the outer and basal portions of each lobe are scaly.

Pectoral fins moderate, acutely prolonged from the upperward rays.

1862.]

Ventral fins beneath the pectoral, acutely angulated and with small pointed axillar scales.

This genus is decidedly more nearly allied to *Platyinius*\* than to *Ocyurus*,† though the form of the body is perhaps more like that of the latter. It agrees with *Platyinius* in the general form of the head, in dentition, and in the armature of the opercular bones, but is distinguished from it by the slender form, the larger scales, the rapid decrease backwards of the dorsal spines, and in a minute degree by the rather larger eyes and mouth as well as the scaly supramaxillars.

Having demonstrated that there is no generic difference between *Etelis carbunculus* and *Serranus oculatus*, it follows that any name subsequently framed for the latter under the belief that it was the representative of a peculiar species must be suppressed.

Eleven years after the two species were first made known, William Swainson published the Natural History of Fishes, Amphibians and Reptiles or Monocardian animals," for the arrangement of which, a series of fantastic ideas was taken as the guiding principles of classification. Among the numerous genera or "subgenera" proposed by this author were one named *Elastoma*, based on the *Serranus oculatus*, and another called *Uriphæton* for which the *Serranus placton* of Cuvier and Valenciennes was taken as the type. Swainson in the "Synopsis of the natural arrangement of Fishes," regarded *Etelis* as one of the genera forming the cabalistic number of the second subfamily (*Serraninæ*) of Percoids, and by a happy accident approximated *Elastoma* and *Etelis* to which *Uriphæton* was added as a third subgenus. But he who might be seldom right, did not retain this fortunate juxtaposition of the first two types, but in the "general arrangement" interposed *Uriphæton* between *Elastoma* and *Etelis*, comparing the latter with *Uriphæton* and denying any palatal teeth to this representative of a family chiefly distinguished by the presence of teeth on the "vomer and palate." Swainson did not find this negation in the only work from which he could have derived his knowledge of this genus, and as in so many other cases, this error was the result of simple carelessness.

Some time afterwards, Mr. Lowe, an author as fortunate in his combinations as Mr. Swainson was unfortunate, proposed for the *Serranus oculatus* the new generic name *Hesperanthias*.

Still more recently, the elder Dumeril, in his compilation of Ichthyology added still another synonym, giving to the same genus the name of *Macrops*.

Finally Dr. Günther, although acquainted with both the *Etelis carbunculus* and *Serranus oculatus*, did not perceive their affinity and preserved the respective places assigned to them by their early describers.

#### ETELIS CARBUNCULUS Cuv. et Val.

*Etelis carbunculus* Cuv. et Val., Histoire Naturelle des Poissons, tome ii. p. 127, pl. 18.

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\* Some time after the above article was completed, I had the pleasure to find that M. Poey, by independent observations, had also perceived the close affinity of *Elastoma*, (*Etelis*) and *Platyinius*. In a letter which probably reached me at about the same time or little after one announcing my own results, was received by Poey, that gentleman writes as follows: "En mettant de l'ordre mes squelettes des poissons, je me suis aperçu que le crane de mes vorax (gen. *Platyinius*, Gill), est identique avec celui de l'*Elastoma oculatum*; tout-à-fait plat entre les deux yeux, et le bord orbitaire supérieur fortement strié en travers, &c." The other features shared in common, have also been noticed—"les memes dents (canines petites, &c.) prepercule dentele, quoique plus fortement dans le vorax, une épine plate à l'opercule, corps élance (moins dans le vorax) lobe supérieur caudal plus allongé (moins dans le vorax). D. X. 11. A. III. 8, dernier rayon, des nageoires verticales medianes prolongé, couleur générale rouge, l'oeil grand, &c."

*Platyinius* Gill, Proc. Acad. N. S., Philad. Type *Mesoprion vorax* Poey.

† *Ocyurus* Gill, Proc. Acad. N. S. Philad. Type *Mesoprion chrysurus* C. V.

*Etelis carbunculus* *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. i. p. 79.

6  
D. X. 11. A. III. 8. Scales 50—\* (Günther.)  
14

The color is a brilliant red in life, with shining golden lines along each row of scales.

*Habitat*.—Seychelles and Isle of France (Cuv. et Val., Günther).

ETELIS OCULATUS Gill ex Cuv. et Val.

*Serranus oculatus* *Cuv. et Val.* Histoire Naturelle des Poissons, tome ii. p. 266, pl. 32. *Ramon de la Sagra*.

*Hesperanthias oculatus*, *Lowe*.

*Centropristis oculatus* *Müller and Troschel*.

*Macrops (aculeatus)* *Duméril*. Ichthyologie Analytique, p. 279.

*Anthias oculatus* *Günther*. Catalogue of the Acanthopterygian Fishes, &c. vol. ii. p. 92.

6  
D. X. 11. A. III. 8. Scales 50—51—  
14

Upper half of body rose, lower half straw yellow.

*Habitat*.—Caribbean sea.

To this species Messrs. *Lowe*† and *Günther* have referred a representative of this genus found at Maderia, and *Temminck* and *Schlegel*‡ another discovered at Japan. I do not think that it is at all certain that those specimens belong to the present species, and cannot, therefore, decisively refer them to the synonymy.

ETELIS CORUSCANS, Val.‡

*Etelis coruscans* *Val.*, Comptes Rendus, tome liv. p. 1166, June 9, 1862.

Body longer, head shorter, teeth smaller, dorsal spines shorter and caudal longer than in *E. carbunculus*.

*Habitat*.—Isle of Bourbon.

After an interval of a third of a century, *Valenciennes*, again returning to the genus *Etelis*, has added a supposed new species, only distinguished from the *E. carbunculus* by the comparative characters here cited. He has failed to recognize the affinity of *E. oculatus*.

### Description of a new Genus and Species of PHOLADIDÆ.

BY GEO. W. TRYON, JR.

Subfamily JOUANNETINÆ, Tryon, 1862.

DIPLOTHYRA, Tryon.

Shell with a double accessory valve; the principal plate placed directly over the umbones, with a smaller anterior one adjoining.

This genus is allied to *Martesia*; but differs in the double or divided dorsal valve.

\* *Cuvier* and *Valenciennes* assign about sixty scales to the lateral line and seventeen or eighteen rows to the insertion of the ventrals. The former number includes the small caudal scales.

† *Hesperanthias oculatus* *Lowe*. Fishes of Maderia. This work is at present inaccessible to me.

‡ *Serranus oculatus* *Temm. et Schl.* Fauna Japonica, Pisces, p. 5.

§ The *Comptes Rendus* containing the diagnosis of *E. coruscans* was received after the transmission of the above article to the Academy.

1862.]

*D. Smithii*, Tryon.



Testâ brevi, ovatâ, in medio obliquè divisâ, anticè acutè striatâ, posticè paulo striatâ vel lævigatâ; laminâ umbonali ovatâ, posticè subtruncatâ, anticè rotundatâ, laminâ anteriori parvâ, anticè subacuminatâ.

Shell short, ovate, divided in the middle by an oblique impressed line, posterior to which the surface is covered with growth lines only, but anteriorly it is finely and sharply transversely sculptured, and obsoletely radiately ribbed in some specimens.

The umbonal plates are generally much distorted, so that no particular form can be traced throughout all the specimens, though the more perfect approach to that depicted in the magnified figure above.

Length .6; height and breadth .4 inch.

Collections of Acad. Nat. Sci., Smithsonian Institution, Sanderson Smith, New York; Hugh Cumming, London; Geo. W. Tryon, Jr.

*Habitat*.—Tottenville, Staten Island, burrowing in oyster shells.

Mr. Smith, to whom I am indebted for the opportunity of examining numerous individuals of this curious species, gives the following interesting information in relation to them:

"The shells were all dead, and I have found as yet no positive evidence of the oysters being imported ones, although from the great number of southern oysters planted in Prince's Bay and the neighborhood, there is a considerable probability of this. The large number of oyster shells which have been bored from the inside, and consequently after the death of the oyster, suffices to show that the shell is now, or very recently has been living here, as it is hardly likely that so many large dead shells would have been accidentally brought with the living ones. I have hitherto found them only in one lot of thirty or forty loads of shells, of which I cannot ascertain the exact source. They are by no means scarce, and several hundred specimens must have been obtained by myself and others."

From the condition of the dried animal matter contained in some of the specimens, I quite agree with Mr. Smith's conjecture that the species is probably still living at the locality mentioned. In many cases where this species has bored from the outside of the oyster shell, penetrating entirely through its ordinary surface, the oyster has protected itself from contact by depositing a layer of nacre between itself and the exposed portion of the intruder.

#### DACTYLINA (GITOCESTRUM) *Chiloensis*, King.

To the synonymy of this species must be added *Pholas* (DACTYLINA) *retifer*. Mörch. Mal. Blatt. vii. p. 177, Dec. 1860.

*Description*.—T. elongato-cylindræa fere clausa, antice rotundato subproducta, postice elongata planata læviuscula; costæ 25 parum prominentes longitudinalibus validioribus decussatæ, intersectionibus squamiferis; costæ subæquales, quarta antica parvula; interstitia costarum lirulis planis 4-5; costæ anticæ et lirulæ intermediæ validiores, fasciæ interna excavatæ; lamina dorsalis reflexa unde late umbilicata; cellulæ dorsales ad num. 12 inæquales.

Long 104, alt. 33 mill. Realejo, valva solitaria dextra fracta."

The intermediate flat ribs or lirulæ mentioned above and considered by Mörch to be a distinctive character, are very apparent at the anterior end of most perfect and fresh valves of *Chiloensis*, and they are frequently marked internally by corresponding sulcæ; as the shell grows to maturity these riblets become obsolete, or are replaced by a single intermediate squamiferous small rib.

There is no regularity in the number of radiating costæ on the surface, though they do generally average twenty-five in number; but in some valves they become evanescent posteriorly sooner than in others. The dorsal cellules number in different specimens before me from 12 to 15.

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It will be seen that Mörch describes his species from a single valve, and in the course of his remarks upon its distinctive characters, he refers to the figures of *Chiloensis* in Philippi Abbild. The examination of a few specimens would have satisfied him of the entire identity of his shell with *Chiloensis*.

**Notes on American Fresh Water SHELLS, with descriptions of two new Species.**

BY GEO. W. TYRON, JR.

VIVIPARIDÆ, H. & A. Adams.

VIVIPARA, Montfort, 1810.

The following sub-genera of *Vivipara* inhabit the United States :

**TULOTOMA**, Haldeman. Shell heavy and nodulous, opercle corneous and concentric; animal with the habit of *Anculosa*.

Example. *V. magnifica*, Conrad.  
*V. bimonilifera*, Lea.

**MELANTHO**, Bowdich, 1822. Shell oval, solid, sub-umbilicate or entirely covered. Whorls smooth, aperture oval. Color uniform.

Examples. *V. ponderosa*, *decisa*, etc.

**HALDEMANIA**, Tryon, 1862. Shell subcarinate, operculum with a paucispiral nucleus, the accretions becoming concentric with age.

Example. *V. subcarinata*, Say.

There are several species of typical *Viviparæ* inhabiting our Western waters, all of which are entirely distinct from European species.

*V. lineata*, Valenc. (sp.)

*Paludina lineata*. Valenciennes. Rec. d'Obs. de Zool. par Humboldt et Bonpland, ii. p. 253, 1833.—Küster, Martini and Chemn. Conch. Cab. Monog. of *Paludina*, p. 10, 19, t. 2, f. 6—9; t. 4, f. 4. 1852.

" *vivipara*, Say, in Nicholson's Encyc. 3d. (American) Edit. t. 2, f. 5, 1819. Haldeman, Monog. p. 17, t. 6.

This shell differs from the *vivipara* of Europe in possessing four spiral red bands, whilst the latter has but three. An examination of hundreds of specimens from various portions of the Western States, and from Europe has convinced me that the difference is permanent.

*V. intertexta*, Say.

This shell has occasionally, distinct red revolving bands, four in number. I have a number of specimens from Davenport, Iowa, (Prof. Sheldon); and Mr. Binney has one from Rock River, Illinois; they differ from the New Orleans specimens in the umbilicus being more open.

*V. subpurpurea*, Say.

*V. Texana*, Tryon.



*T. solidâ*, conicâ, pallide virente; spirâ elongatâ, suturâ valde impressâ, apice obtusâ; anfractibus senis, paulo-convexis, aperturâ suborbiculatâ, parvâ, 2—5 totius altitudinis æquante.

Length  $1\frac{1}{2}$  inch, breadth  $\frac{3}{4}$  inch. First five whorls of the spire equal in length to the aperture.

*Hab.*—Texas.

Coll. Acad. Nat. Sci. Coll. G. W. Tryon, Jr.

Shell solid, narrowly conic, consisting of six whorls, which are somewhat flattened around their upper portion; sutures well impressed. Aperture suborbicular, equalling 2-5ths of the length

of the shell. Umbilicus covered. Epidermis light green with faint red revolving bands.

This shell most resembles *V. subpurpurea*, but is easily distinguished by having six whorls, which are much narrower than in that species. The spire is almost double the length of that of *subpurpurea*, and the epidermis is lighter in color.

*V. subsolidata*, Anthony. Proc. Acad. Nat. Sci. p. 71, 1860.

Through the kindness of Prof. D. S. Sheldon, of Davenport, Iowa, I have received a number of specimens of this shell and of *V. integra*, Say, from the Mississippi River at that place. The latter reaches the size of *subsolidata*, which it much resembles, but it is easy to separate them by the following distinctive characters:

*V. subsolidata*.

Spire *longer* than the aperture, consisting of *seven* whorls, acuminate.

Body whorl *subangulated* near the middle, the angle being quite conspicuous in half-grown shells.

*V. integra*.

Spire *shorter* than the aperture, consisting of *six* or occasionally six and a half whorls. Body scarcely angulated, being almost regularly convex. Shell much more ventricose than *subsolidata*.

*V. ponderosa*, Say.

May be readily distinguished from *V. integra* by its shorter spire, much more ventricose form, and by the body whorl being almost flat in the centre, so that its lateral sides for some distance are almost parallel. The shoulder of the whorls is also more prominent than in either of the other specimens.

#### AMNICOLIDÆ, Tryon, 1862.

AMNICOLA, Gould and Haldeman.

There are two very distinct groups of shells included by authors in this genus; in the first, which may be considered typical, the shells are globose, with a short spire of three or four whorls; the second I propose to separate as a subgenus, which may be thus characterized:

Subgenus POMATIOPSIS, Tryon, 1862.

Shell elongate, the spire (of about six whorls) much exceeding the length of the aperture.

Example. *A. lapidaria*, Say.

*A. depressa*, Tryon.

*T.* orbiculatâ, subhyalinâ; anfractibus quarternis, convexis; ultimo magno, 5—6 totius longitudinis æquantē, angustē umbilicatâ. Aperturâ semi-circulari; labio interne appresso. Suturâ impressâ. Long. 4 mill. Lat. 4 mill.

(Figure magnified  $2\frac{1}{2}$  times.)

*Hab.*—Mississippi River at Davenport, Iowa. Prof. Sheldon. Coll. Acad. Nat. Sci., Smithsonian Inst., and of Prof. D. S. Sheldon, Isaac Lea, J. G. Anthony, and Geo. W. Tryon, Jr.

Shell subhyaline, rather solid, orbicular; spire depressed, consisting of nearly four whorls; apex acute, suture profoundly impressed. Body whorl very convex, equalling 5-6ths the total length of the shell, narrowly umbilicate. Aperture semi-circular, the inner lip being nearly straight.

The only shell which this resembles is *V. subglobosa*, Say, which is, however, double the size of *A. depressa*, with a rather more exerted spire, and more concave inner lip.

[Sept.

## Monograph of the Family TEREDIDÆ.

BY GEORGE W. TRYON, JR.

The following is the third and concluding paper of a series,\* designed to comprehend all that is at present known, regarding the curious group of shells included in Blainville's Order Pholadacea:—

In the preparation of these papers much difficulty has arisen from the number of species which have been described (sometimes inadequately) but not figured, and from the conflicting views of European naturalists regarding the validity of many species. There is no good reason why the Pholadacea should not be searched for, and distributed very generally in public and private cabinets, yet such is not the case, and every conchologist who studies the order labors under the disadvantage of being unable to examine and compare specimens, of a large number of the species. Greatly as the number of species have been increased by modern research, it is evident, from the general diffusion of the order throughout the world, and from the incompleteness of our researches in those regions, which appear most to abound in them, and also from the number of new species in one of the families discovered recently in England alone, that the number at present known must be indeed a very small proportion of those which future investigations will probably reveal to us.

If these pages shall direct attention to the collection and study of the Pholadacea, and furnish an approximate idea of the amount of the previous labors of conchologists, they will have answered their purpose. Should *matériel* be placed at my disposal for a more perfect study of these shells, a complete illustrated monograph will be published at some future time. To further this end, collectors are earnestly requested to send to me (in exchange), specimens from all duly authenticated localities, together with such facts in relation to them as may come to their knowledge, and such assistance will be fitly acknowledged in the proposed publication.

Sellius was the first naturalist who studied the species of *Teredo*, and his work on their natural history is a model of accuracy in most particulars, going far in advance of all other treatises on the subject which appeared for many years afterwards.

So little did Linnæus and his immediate followers know of the species of *Teredo*, that they included a number of species under the name of *T. navalis*, which is published with such a general description as will suit all the species now known, or hereafter to be added to the genus! Lamarck did not add much to our knowledge of these shells, and Dr. Gray has merely given us at two widely-extended periods, lists of the species, one or two descriptions, and some interesting and important investigations regarding the shell of *Kuphus arenarius*. Conchology is deeply indebted to the following naturalists for a large portion of our knowledge of the family: Blainville, who published a number of new species in the "Dict. des Sciences Naturelles." Deshayes, who has given us extended anatomical descriptions in the Mollusca of the Scientific Exploration of Algiers. Fischer, a Monograph of the family in "Journ. Couch., 2 ser., vol. i." Turton, for several new species. And more especially to Mr. Gwyn Jeffreys for his accurate diagnoses of new British species, and to Mr. Hanley for the splendid descriptions which he has published in the "History of British Mollusca."

I have endeavored, as far as possible, in the present paper to separate the species by distinctive characters, but their value is seriously impaired in this family by the fact that, unlike the Pholadidæ, the specific distinctions are not

\* "Synopsis of the Recent Species of Gastrochænidæ, a Family of Acephalous Mollusca."—Proc. Acad. Nat. Sc., Dec., 1861.

"On the Classification and Synonymy of the Recent Species of Pholadidæ."—Proc. Acad. Nat. Sc., April, 1862.

always founded on the shell, but sometimes, where the shells of two species are undistinguishable from each other, their tubes or pallets may afford considerable differences. The pallets alone as will be seen indicate two distinct genera, where the valves do not differ. Hence it is necessary, in many cases, for a certain determination of the species, that the valves, tube, and pallets shall each be examined, and it is needless to expatiate on the confusion which would arise from the accidental commingling of the tubes or pallets of one species with the valves of another; and this confusion is more apt to occur when, as is not unfrequently the case, several species are found inhabiting the same piece of wood, and being broken in their extraction, the pallets and valves fall out indiscriminately intermingled.

Another difficulty in the study of the Teredidæ is the great variation of the individuals in size, proportions, and markings, making an accurate diagnosis a simple impossibility, and compelling us to rely on a *general accordance* with descriptions in the most material points. Mr. Hanley remarks that "there is one fact with regard to the shipworms, which has rendered their investigation peculiarly laborious, namely, that no reliance can be placed upon the relative proportions of their several parts for specific definition. If we take at random about fifty valves of *Norvagia*, for instance, we shall find that in some the oblique decussated striæ occupy twice the space of the succeeding strip, in others this is reversed, in many these are both contracted, and a large posterior smooth area is exhibited; in others again almost the entire surface is occupied by the two former, to the great diminution of the hinder portion. Hence it is absolutely necessary to examine very numerous examples in order to elicit the real and permanent specific characters, and the valves alone are rarely adequate for the determination of the species."

Dr. Gray proposed, in 1851, to consider the Teredines a subfamily of PHOLADIDÆ, but Mr. P. P. Carpenter has separated them under the name of TEREDIDÆ, with great propriety, as they undoubtedly exhibit sufficient differences from the Pholades, and from all other Mollusca, to be entitled to the position of a family.

I have already given (in Proc. A. N. S., April, 1862) a sketch of the division of TEREDIDÆ into three subfamilies, which it will be necessary to reproduce here:—

#### Family TEREDIDÆ.

Animal elongate, subcylindrical, siphons united nearly to the end, their extremities armed with two shelly styles; (Pallets.) foot long and narrow, protruded through the united mantle lobes, which are thickened in front. Gills long; mouth with palpi. Shell, when present, globular, tripartite, included with the animal in a more or less cylindrical testaceous tube, the siphonal end of which is divided into two by a longitudinal partition.

Subfamily 1. TEREDINÆ. Valves present, free, contained in the tube, which is irregularly cylindrical, sometimes much contorted. Perforating timber.

Subfamily 2. TEREDININÆ. Valves with an accessory anterior dorsal plate, their margins prolonged into a shelly tube when adult.\* Tube frequently concamerated; siphonal extremity often truncate, and the opening contracted by a six-lobed internal margin (*fossil*).

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\* Dr. Gray supposes the fossil genus TEREDINA to be more closely connected with PHOLADINÆ than with TEREDINÆ, from the fact that the shell has an accessory dorsal plate, and is external to the tube. It must be confessed that the genus is curiously related to all three families; the external position of the valves, and the lobed end of the tube, exhibiting an approach to the GASTROCHELINIDÆ. I have concluded to place it for the present in TEREDINÆ, in a position where it may indicate a transition from the free and perfect valves of TEREDO, through its less important valves eventually becoming merely a portion of the tube, to the KUPHUS, where the valves are entirely wanting, or are replaced by the cleft shelly plate which closes the lower end.



Subfamily 3. KUPHINÆ. Without valves. Tube clavately cylindrical, sunk horizontally in sand. Never penetrating timber.

*Synopsis of Genera.*

Subfamily TEREDINÆ.

Tubes elongate, nearly cylindrical, increasing slowly in diameter, solitary; pallets simple; valves generally nearly as broad as their length.....Genus TEREDO, Linn.

Tubes club-shaped, much contorted, growing together in masses, and increasing rapidly in diameter; pallets simple; valves narrow and elongate.....Genus UPEROTIS, Guettard.

Tubes elongate, increasing slowly in diameter, solitary; pallets compound, the blade penniform, composed of a number of jointed setæ; valves nearly as broad as their length.....Genus XYLOTRYA, Leach.

Subfamily TEREDINIDÆ.

(Fossil.)

Subfamily KUPHINÆ.

Tubes penetrating sand, somewhat irregular, very large, "pierced around the base with small scattered perforations; and inclosed by two overlapping convex septa, arising from the sides and completely closing the ends" (Gray)....Genus KUPHUS, Guettard.

*Index to Species of TEREDIDÆ.*

- Bruma delle Navi*, Vallisnieri, = *Teredo Norvagica*, Spengler.  
*dell' Oceano*, Vallisnieri, = *Teredo megotara*, Hanley.  
*Cuphus arenarius*, Gray, = *Kuphus arenarius*, Linn.  
*Dentalium navis*, Linn. = *Teredo navalis*, Linn.  
*Fistulana corniformis*, Lam. = *Teredo Norvagica*, Spengler.  
*gregaria*, Blainv. = *Uperotis clava*, Gmelin.  
*gregata*, Lam. = *Uperotis clava*, Gmelin.  
*Furcella gigantea*, Gray, = *Kuphus arenarius*, Linn.  
*Guetera clava*, Gray, = *Uperotis clava*, Gmel.  
*corniformis*, Gray, = *Teredo Norvagica*, Spengler.  
*Kuphus arenarius*, Linn.  
*Leptana arenaria*, Gray, = *Kuphus arenarius*, Linn.  
*Pholas Teredo*, Müll. = *Teredo nana*, Turton.  
*Septaria arenaria*, Lam. = *Kuphus arenarius*, Linn.  
*gigantea*, Chenu, = *Kuphus arenarius*, Linn.  
*Mediterranea*, Matheron, = *Teredo Norvagica*, Spengler.  
*Serpula anguina*, b. Gmelin, = *Kuphus arenarius*, Linn.  
*gigantea*, Schröter, = *Kuphus arenarius*, Linn.  
*polythalamia*, Linn. = *Kuphus arenarius*, Linn.  
*retorta*, Mawe, = *Uperotis clava*, Gmelin.  
*Teredo*, Da Costa, = *Teredo Norvagica*, Spengler.  
*Solen arenarius*, Rumphius, = *Kuphus arenarius*, Linn.  
*corrugatus*, Klein, = *Kuphus arenarius*, Linn.  
*Teredo arenaria*, Gray, = *Kuphus arenarius*, Linn.  
*Teredo Batavus*, Spengler, = *Teredo navalis*, Linn.  
*Teredo bipalmulata*, Chiaje, = *Xylotrya minima*, Blainv.  
" Lam. = *Xylotrya palmulata*, Lam.  
" Thompson, = *Xylotrya fimbriata*, Jeffreys.  
*bipartita*, Jeffreys.

- Teredo Bruguierii*, Chiaje, = *Teredo Norvagica*, Spengler.  
*campanulata*, Desh. = *Xylotrya Stutchburyi*, Leach.  
*carinata*, Leach; = *Xylotrya bipennata*, Turton.  
*clava*, Gmel. = *Uperotis clava*, Gmel.  
*corniformis*, Gray, = *Teredo Norvagica*, Spengler.  
*denticulata*, Gray, = *Teredo nana*, Turton,  
*Deshaii*, Quatref. = *Teredo Norvagica*, Spengler.  
*dilatata*, Stimpson.  
*divaricata*, Desh.  
*elongata*, Quatref.  
*excavata*, Lukis.  
*fatalis*, Quatref. = *Teredo Norvagica*, Spengler.  
*fusticulis*, Jeffreys.  
*gigantea*, Home, = *Kuphus arenarius*, Linn.  
*gregata*, Desh. = *Uperotis clava*, Gmel.  
*malleolus*, Turton.  
*marina*, Sellius, = *Teredo navalis*, Linn.  
*Mediterranea*, Catlow, = *Teredo Norvagica*, Spengler.  
*megotara*, Hanley.  
*minima*, Blainv. = *Xylotrya minima*, Blainville.  
*nana*, Turton.  
 " (part.) Gray, = *Teredo megotara*, Hanley.  
*navalis*, Brit. Authors, = *Teredo Norvagica*, Spengler.  
 " Home, = *Xylotrya bipennata*, Turton.  
 " Linn.  
 " Möller, = *Teredo nana*, Turton.  
 " Spengler, = *Xylotrya Stutchburyi*, Leach.  
*navium*, Sellius, = *Teredo Norvagica*, Spengler.  
*nigra*, Blainv. = *Teredo Norvagica*, Spengler.  
*Norvagica*, Thompson, = *Teredo Norvagica*, Spengler.  
*Norvagica*, Spengler.  
 " var. Jeffreys, = *Teredo divaricata*, Desh.  
*nucivorus*, Spengler, = *Uperotis clava*, Gmel.  
*Oceani*, Sellius, = *Teredo megotara*, Hanley.  
*palmulata*, Leach, = *Xylotrya pennatifera*, Blainv.  
 " Lam. = *Xylotrya palmulata*, Lam.  
 " Philippi, = *Xylotrya minima*, Blainv.  
*pedicellata*, Quatref.  
*pennatifera*, Blainv. = *Xylotrya pennatifera*, Blainv.  
*Petitii*, Recluz, = *Teredo elongata*, Quatref.  
*Philippii*, Gray, = *Xylotrya minima*, Blainv.  
*Senegalensis*, Blainv.  
 " Fischer, *Teredo elongata*, Quatref.  
 " Laurent, = *Teredo Norvagica*, Spengler.  
*serratus*, Desh. = *Xylotrya minima*, Blainv.  
*spatha*, Jeffreys.  
*Stutchburyi*, Leach, = *Xylotrya Stutchburyi*, Leach.  
*subericola*, Macgillivray.  
*thoracites*, Gould.  
*truncata*, Quatref.  
*utriculus*, Gmel. = *Teredo Norvagica*, Spengler.  
*vulgaris*, Lam. = *Teredo navalis*, Linn.  
*Uperotis clava*, Gmel.  
 " *corniformis*, Adams, = *Teredo Norvagica*, Spengler.  
*Xylotrya bipalmulata*, Lam. = *Xylotrya palmulata*, Lam.  
*bipennata*, Turton.  
 " *carinata*, Gray, = *Xylotrya bipennata*, Turton.

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- Xylotrya fimbriata*, Jeffreys.  
*cucullata*, Norman.  
*minima*, Blainv.  
*palmulata*, Hanley, = *Xylotrya fimbriata*, Jeffreys.  
 " Lam.  
*pennatifera*, Blainv.  
*Philippii*, Adams, = *Xylotrya minima*, Blainv.  
*Stutchburyi*, Leach.

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- Pholadina*, (part.) Milne-Edwards, Conch., p. 203.
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- Pholedariae*, (part.) Brown, Syst. urw. Conch.
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- Pholidæa*, (part.) Leach, teste Swainson, Malacology.
- Adesmacea*, (part.) Blainville, Malacol., p. 577.

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- Montagu, Test. Brit., p. 7. Nyst, Foss. Belg., p. 38. Oken, Zool., p. 216. Oken, Allg. Naturg., vi. p. 274. Osler, Phil. Trans., 1826. Pallas, Misc. Zool. Pallas, Reise, Süd. Russ., p. 418. Pallas, Tabl. Phys., p. 40. Payraudeau, Coq. de la Corse, p. 26. Pennant, Brit. Zool., iv. p. 147. Philippi, Enum. Moll. Sicil., i. p. 2, and ii. p. 3. Pliny, Hist. Nat. lib., xxi. Cap. 80. Poli, Test. utr. Sicil. Potiez et Michaud, Galerie des Moll., ii. p. 270. Pultney, Dorset. Cat. Quatrefores, Ann. Sc. Nat., 3d ser., xi. p. 21. Rang, Manuel, p. 346. Recluz, Rev. et Mag. Zool., 2d ser., i. p. 64. Reeve, Conch. Syst., p. 37. Roissy, Moll., vi. p. 454. Scacchi, Cat. Coq. Reg. Neap., p. 8. Schröter, Einleit., ii. p. 571. Schumacher, Essai d'un Nov. Syst., p. 94. Schweigg, Natürg., p. 699. Sellius, Commerce. Liter. Nov., p. 409. Sellius, Hist. Nat. Terebinis. Sowerby, Genera. Sowerby, Conch. Man., ed. 1, p. 5; ed. 2, p. 272. Sowerby, Illust. Brit. Shells, t. 1. Spengler, Skrivt. Nat., ii. pt. 1, p. 99. Stimpson, Bost. Proc., iv. p. 113. Stimpson, Shells, N. E., p. 26. Swainson, Malacol., p. 364. Thompson, Ann. and Mag. Nat. Hist., xx. p. 174. Thompson, Edinb. Phil. Mag., xviii. p. 121. Thorpe, Brit. Mar. Conch., p. 27. Turton, Conch. dithyra, p. 13. Tufts, Proc. Essex Inst., p. 26. Wheatley, Catalogue. Woodward, Manual, p. 329.
- Serpula*, Da Costa, Brit. Shells, p. 21.
- Fistulana*, (part.) Lamarck, Anim. sans. Vert., v. p. 438; id. 2d edit., vi. p. 35. Blainville, Dict. Sc. Nat., xvii. p. 82. Blainville, Mal., p. 579. Favanne, Conchyl. Chenü, Man. Conchyl., ii. p. 12.
- Guetera*, (part.) Gray, Ann. and Mag. Nat. Hist., 2d ser., viii. p. 361.
- Uperotis*, (part.) Adams, Genera, ii. p. 333.
- Bruma*, Vallisnieri, Op. Phys. Med., ii.
- Pholas*, (part.) Müller, Prodr. Zool. Dan., p. 251. Fabricius, Fauna Groen., p. 427.
- Dentalium*, (part.) Linnæus, Faun. Suec. 380.
- Ligniperda*, Sellius.
- Xylophagus*, Gronovius, Zooph. p. 258. Sellius.
- Solen*, Klein, De Tub.
- Siphonium*, (part.) Browne.

### Species.

- a. *Valves externally smooth and glossy, or regularly transversely striated.*

*T. bipartita*, Jeffreys.

*T. bipartita*, Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 123.

*Hab.*—"In cedrela odorata (or West India Cedar.), thrown ashore, perhaps by the gulf stream, at Guernsey, with *T. spatha*."—*Jeffreys*.

*Description.*—"Tube ———? valves oval, thin, compressed, covered with a brownish epidermis; body smooth and glossy; anterior auricle moderately developed, angle rather obtuse, striæ very numerous and crowded; posterior auricle rounded, small but prominent, appressed to body, apex placed below the crown, internal margin indistinct; fang narrow and pointed; tubercle small; apophysis narrow. Pallets resembling those of *T. pedicellata*, but longitudinally divided into two equal parts by a deep furrow; stalk cylindrical, rather longer than pallet.

*Dimensions.*—"Length (of valves) 4-20ths; breadth 3-20ths."—*Jeffreys*.

*T. excavata*, Lukis.

*T. excavata*, Lukis, MSS. Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 123.

*Hab.*—"In drift fir. Guernsey and Sussex. Rare."—*Jeffreys*.

*Description.*—"Tube short, rather solid, and detached from the wood, slightly curved, jointed at intervals, with a very few transverse wrinkles at the opening, and an indistinct siphonal ridge. Valves roundish oval, thin, compressed;

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body glossy, marked with distant, but regular and fine, striæ or impressed lines; anterior auricle placed nearly at a right angle with the insertion of the fang, striæ rather numerous and waved; posterior auricle dilated and somewhat reflected, apex nearly on a level with the crown or umbo of the valve, inner margin free and well defined; tubercle slight, and not visible when the valve is in a supine position; fang obtuse; apophysis thin and narrow. Pallets long and narrow, bifid in front to nearly half their length, with two corresponding tubular cavities which terminate in separate points like the prongs of a steel fork; underneath they are abruptly sloped towards the bifurcate points, and closely striated in a longitudinal direction; stalks near as long as pallets, pointed at one end and at the other merging into the pallets.

*Dimensions.*—Length (of valves) 7-20ths; breadth 4-20ths."—*Jeffreys*.

*T. fusticulus*, *Jeffreys*.

*T. fusticulus*, *Jeffreys*, *Ann. and Mag. Nat. Hist.* 3d ser. vi. p. 125.

*Hab.*—In *Cedrella odorata* from Leith.

*Description.*—"Tube short and straight, with a slight calcareous lining, which is not easily separated from the wood. It is thickened internally at the opening, and has a few transverse wrinkles in that part.

Valves round, thin, compressed, body smooth, glossy, white under a brown epidermis; anterior auricle of moderate size, angle about 50°, striæ numerous; posterior auricle round expanded and appressed to body, internal edge well defined; fang broad, obtuse; tubercle small and sunk; apophysis thin and narrow. Pallets club-shaped, formed of several transverse layers, and externally tuberculate; stalk twice the length of pallet.

*Dimensions.*—Length (of valve) 4-20ths; breadth nearly as much."—*Jeffreys*.

*T. spatha*, *Jeffreys*.

*T. spatha*, *Jeffreys*, *Ann. and Mag. Nat. Hist.* 3d ser. vi. p. 124.

*Hab.*—With *T. bipartita*, in *Cedrella odorata*, at Guernsey.

*Description.*—"Tube rather long and flexuous, detachable, regularly jointed, increasing rapidly from the extremity, inside which there are a few transverse wrinkles and a sharp, but short, siphonal ridge.

Valves, triangular, compressed, rather solid; body smooth; anterior auricle large, angle about 50°, striæ exceedingly numerous and fine; middle area unusually large and rounded and appressed, internal margin indistinct; fang narrow and pointed; tubercle small and sunk; apophysis narrow. Pallets spade-shaped, in the young state calyciform; stalk of the same length as pallet.

*Dimensions.*—Length (of valves) 6-20ths; breadth nearly as much. A pair of pallets is in the British Museum, from Miss Saull; and another pair is in the collections of Natural History at the Jardin des Plantes. The localities of both the last-mentioned specimens are unknown."—*Jeffreys*.

*T. subericola*, *Macgillivray*.

*T. subericola*, *Macgillivray*, *Mss. Jeffreys*, *Ann. and Mag. Nat. Hist.* 3d ser. vi. p. 122.

*Hab.*—Great Britain.

*Description.*—"Tube rather thin, and adherent to wood, short, of the form of an elongated cone curved at the opening, with internal irregular transverse septa, which are close-set at the extremity.

Valves oval, rather convex, thin; body smooth and somewhat glossy; anterior auricle short, angle obtuse, striæ rather numerous; posterior auricle narrow, falciform, reflected at the outer edge, with its apex raised above the crown; tubercle strong and prominent; fang long, narrow, and incurved; apophysis rather broad. Pallets short, pear-shaped, compressed, and expanded towards the anterior margin, with a semilunar depression in the middle and a longitudinal groove in front; stalk short and pointed.

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*Dimensions.*—Length (of valves) 5-20ths, breadth 4-20ths. The embryonic state of some of the specimens which occur living in cork, as well as the nature of the material, induce me to consider this species indigenous. The posterior auricle is so small in comparison with that of *T. megotara*, that Dr. Lukis proposed the name of "*microtara*" for this species. Specimens in cork are frequently encysted.—*Jeffreys*.

b. *External surface of the valves ornamented by a narrow radiating area with crowded sculptured lines.*

\* *Pallels.*

Blade spatulate, truncate at the end. Concave on one side, convex on the other. Tube concamerated.	}	Norvagica.
Blade spatulate, truncate at the end. Concave on one side, convex on the other. Tube?		Senegalensis.
Blade spatulate, truncate at the end. Concave on one side, blade very short. Tube concamerated,	}	divaricata.
Blade spatulate, but the sides incurved in the middle, end margin concave. Tube not concamerated,		navalis.
Somewhat hastate, but truncate and heart-shaped at the end. Tube not concamerated	}	megotara nana.
Angularly ovate, dilating into a broad blade, abruptly truncate. Tube not concamerated		dilatata.
Transverse, end margin sinuous, stalk deflected at an angle from the plane of the blade. Tube not concamerated	}	malleolus.
Palæform, dilated, profoundly emarginate at the end. Tube?		elongata.
Obliquely truncate, tridentate and serrate at the end. Tube?	}	truncata.
Narrow, long, colored, stalk white. Tube not concamerated		pedicellata.

\*\* *Valves.*

Posterior auricle broad, towering above the beaks, its basal edge situated lower than that of the anterior area	}	megotara
		nana.
Posterior auricle broad, not extending above the beaks, its basal edge situated lower than that of the anterior area	}	navalis
		pedicellata
Posterior auricle broad, not extending above the beaks, its basal edge even with that of the anterior area	}	dilatata.
		Norvagica.
Posterior auricle narrow, apex extending above the beaks, the lower edge even with that of the anterior area	}	malleolus.
Posterior auricle narrow, apex not extending above the beaks, the lower edge even with that of the anterior area		divaricata.

The above table of distinctive characters must be used with extreme caution, as individuals of the various species sometimes occur which do not well accord with their characters as given therein.

Several East Indian species are but partially included, because the descriptions are not sufficiently accurate for the arrangement of their valves.

*T. elongata*, Quatrefages.

*T. elongata*, Quatrefages, Ann. Sc. Nat. 3d ser. xi. p. 33. Adams, Genera, ii. p. 333. Fischer, Journ. de Conchyl. 2d ser. i. p. 133. Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 126.

*T. Senegalensis*, Fischer, Mel. Conchyl. p. 19, t. 4, f. 2—6.

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*T. Petitii*, Recluz, Rev. et Mag. Zool. 2 ser. i. p. 64.

*Hab.*—Indian Ocean.—*Eydoux and Souleyet*.

East coast of Africa.—*Webbe*.

*Description.*—"Coquille assez solide, allongée, à angle antérieur très ouvert ( $95^{\circ}$ — $100^{\circ}$ ); oreillette antérieure courte; postérieure étroite, allongée, non relevée; sommet tronqué avec une légère crête horizontale dépassant la callosité de la charnière et située au-dessus; apophyse styloïde mince; palettes obliquement tronquées, bicuspidés; tube fragile."—*Fischer*.

Recluz thus describes *T. Petitii*.

"*T. palmulis* duabus rectis, palæformibus; latere dilatato, profundè emarginato; dentus obtusiusculis; tubo brevi, cylindrico-conico, vix arcuato; posticè supernè ac infernè emarginato, lateraliter angulis binis producto.

"*Hab.* trouvé par W. Webbe dans un morceau de palmier venant du haut de la rivière de Grand-Bassam (côte ouest d'Afrique), et envoyé à M. Petit de la Saussaie, qui a bien voulu nous permettre de le décrire.

"Coquille subglobuleuse, échancrée à la partie antéro-inférieure d'un peu plus du quart de son volume. Les valves sont plus hautes que tongues, courbées en arc, auriculées supérieurement à leur côte antérieur et brusquement atténuées en pointe à l'inférieur; convexes en dehors, concaves en dedans et auriculées, en avant et en arrière. Auricules antérieures anguleuses, profondément striées longitudinalement (transversalement Lk.), avec les lignes élevées, croisées en arrière. Auricules postérieures ascendantes à la marge et subtronquées. Le centre des valves divisé en deux parties par un large sillon vertical orné de stries arquées; la partie antérieure sculptée d'avant en arrière par des lignes régulières saillantes et granuleuses; la postérieure par d'autres lignes moins en relief, obliquant d'arrière en avant, courbées au sommet et à la base, où elles se continuent avec celles du sillon. Auricules postérieures ascendantes à la marge et tronquées. Appendice de l'intérieure des valves arqué, aplati, étroit et prolongé jusqu'aux deux tiers de leur face intérieure.

"Tube cornico-cylindrique, un peu arqué, recouvert d'un épiderme, brun, rugueux, très-ouvert et à bords minces en avant, solide en arrière, échancré en dessus plus fortement qu'en dessous, à côtés prolongés en pointe obtuse et renforcés en dedans par un angle aigu correspondant aux échancrures des palettes. Longueur 26 millim.; largeur: en avant 6 millim.  $\frac{1}{3}$ ; en arrière 2 millim.  $\frac{1}{2}$ ."

*T. dilatata*, Stimpson.

*T. dilatata*, Stimpson, Bost. Proc. iv. 1851, p. 113. Stimpson, Check List, No. 250. Stimpson, Shells of New England, p. 26. Adams, Genera ii. p. 333. Kurtz, Cat. p. 3. Tufts, Proc. Essex Inst. i. p. 26.

*Hab.*—United States from the coast of Massachusetts to South Carolina.

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*Description.*—"Valves white, polished; length and breadth equal; anterior area with fine, concentric, somewhat divergent striæ, varying in number in different specimens, and more crowded below; the slightly oblique lines on the succeeding narrow area are very minute but sharp; the next, fang-shaped area is ornamented with distant, narrow, elevated, subimbricated, concentric lines, more conspicuous on the anterior than on the posterior half of the area; the remaining portion of the body and the auricle are smooth and glossy. The auricle is not separated from the body by any sharp angle on the posterior ventral outline, but by a gently waved sinus. A depressed line runs from the beak around to the tip of the auricle, which does not tower above the callosities of the hinge. The subumbonal blade is thin, tapering, and extends to about half the distance from the beak to the ventral edge.

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"The pallets are of an angular ovate form, truncated posteriorly, where also, on the external surface there is a small depressed area. The style of insertion is sharp, and extends in the form of a ridge for some distance on both sides after its juncture with the pallet. The tubes are very thin, strongly concamerated posteriorly in an imbricated manner. This species differs from *T. megotara*, Hanley, which it greatly resembles, in the smaller altitude of the valves, the greater breadth of the auricle, which is also placed much lower, and in its concamerated tubes.

"Length of valves nearly one-half of an inch.

"For many living specimens of this species, I am indebted to Mr. S. Tufts, of Lynn (Mass.), who obtained them from a pine buoy used to indicate the position of the lobster pots of fishermen. Thus there can be no doubt of their being indigenous. They commit yearly great ravages upon the shipping of Lynn and Marblehead."—*Stimpson's description*.

*T. divaricata*, Deshayes.

*T. divaricata*, Deshayes, MSS. Fischer, Journ. Conchyl., 2d ser. i. p. 137, t. 7, f. 7, 8, 9.

*T. Norvagica*, var. *divaricata*, Jeffreys, Ann. & Mag. Nat. Hist. 3d ser. vi. p. 121.

*Habitat*.—Sicily.

*Description*.—Shell globular, convex, heavy, full as wide as its length. Anterior auricle very large and long, being two-thirds the length of the fang; its anterior margin thick, appearing almost ribbed, somewhat concave but nearly straight, inclining outwards; basal margin very convex, joining the fang by an acute angle. The fang is but slightly raised above the anterior area and is itself somewhat lower, or nearly on a level with the margin of the posterior auricle; the whole dorsal edge of the shell is slightly convex. Lateral margins of the fang inclining obliquely, with the ventral termination truncate. Posterior auricle very small, (almost none,) much longer than wide, but its basal margin does not extend nearly so far down as that of the anterior area. The latter is covered with concentric striae, which, at its junction with the body, are recurved obliquely downwards and posteriorward. The space between the centre and posterior lateral margin of the fang, appears to be occupied by the same double, narrow, closely striated radiating area, that is found on the anterior side in *T. megotara*, &c. Posterior auricle somewhat striated. Internal dorsal margin very wide and massive. Apophysis wide, recurved backwards in front.

Pallets truncate, resembling those of *T. Norvagica*, their blades very short.

Mr. Jeffreys considers this a variety of *T. Norvagica*, but, if Fischer's figures can be depended on, it is certainly very distinct from that species. It may be proper to add, that my description is made up from that of Fischer, and his illustrations.

*T. malleolus*, Turton.

*T. malleolus*, Turton, Conch. Dithyra, p. 255, t. 2. f. 19. Adams, Genera, ii. p. 333. Brown, Conch. Gt. Brit. p. 116, t. 50, f. 16. Fleming, Brit. Anim. p. 454. Gray, Phil. Mag. 1827, p. 410. Gray, Ann. & Mag. Nat. Hist. 2 ser. viii. p. 386. Hanley, Desc. Cat. p. 4, t. 11, f. 23. Hanley, Brit. Moll. i. p. 84, t. 1, f. 12—14. Jeffreys, Ann. & Mag. Nat. Hist. 3d ser. vi. p. 123. Sowerby, Ill. Brit. Shells, t. 1, f. 5. Thompson, Fauna of Ireland, Ann. & Mag. Nat. Hist. xx. p. 174. Thorpe, Brit. Mar. Conch. p. 28.

*Hab*.—England, Ireland, (*introduced*.) Native habitat Sumatra.

*Description*.—Valve, with the body very convex, narrow, much longer than 1862.]

broad, the anterior area moderate, the posterior narrow and extending above the beaks.

Anterior auricle with its dorsal margin declining concavely from the beak to a lateral angle, whence its basal margin extends rather convexly and obliquely downwards to its junction at an angle with the body, the point of junction being horizontal with, or slightly below that of the posterior auricle, and at about two-fifths the length of the shell from its apex.

The lateral margins of the fang are, anteriorly very slightly concave, posteriorly convex, and the ventral termination is infolded, forming a strong internal tubercle.

Posterior auricle quite narrow, being about three times as long as its width, reaching in typical specimens slightly above the beaks; its posterior margin is very oblique and curved, following the direction of the fang. Beaks elevated, not wide.

Internally, the shell is quite concave, with the auricles but little reflected, the posterior one marked by a shell-like ridge extending over the body. Apophysis oblique, slanting posteriorly, strongly clavate at its termination. Dorsal margin somewhat lamellar, becoming prominently elevated at the beaks, where it is crowned by a tubercle.

Color white, glossy; the anterior area elegantly concentrically sculptured, the anterior side of the body ornamented with the usual narrow radiating and decussately striated area, posterior to which the surface gradually becomes smooth.

The tube is semi-concaterated, and very fragile.

The pallets are widely different from those of any other species, the blade being very transverse, much broader than long and widest at the apex, which is a horizontal sinuous line: both lateral margins are generally angularly convex, rapidly diminishing to the short compressed stalk. The stalk, instead of continuing in the same plane as the broad side of the blade, is deflected from it at an obtuse angle.

*T. megotara*, Hanley.

*T. megotara*, Hanley, Brit. Conch. i. p. 77, t. 1, f. 6, and t. 18, f. 1, 2. Jeffreys, Ann. & Mag. Nat. Hist. 3d ser. vi. p. 121. Sowerby, Illust. Brit. Shells, t. 1, f. 3.

*nana*, (part.) Fischer, Journ. Conchyl. 2 ser. i. p. 136. Gray Ann. & Mag. Nat. Hist. 2 ser. viii. p. 386.

*occani*, Sellius, Hist. Nat. Tered.

*Bruma dell'oceano*, Vallisnieri, Op. Phys. Med.

*Hab.*—England.

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*Description.*—Valves about as wide across the auricles as their length, the body rapidly attenuated to the base. The anterior auricle is moderate and subtriangular; the posterior is dilated, very large, and rising above the beak, while its basal margin extends *below* the line of that of the anterior area.

The anterior area nearly approximates in form to that of *T. Norvagia* and joins the body below, at right angles. The posterior auricle exhibits a marked difference from that of the last-named species; its dorsal margin is so very concave in form as ordinarily to exhibit an approach to three-fourths of a circle, the highest posterior point of which is curved forwards somewhat, so that the dorsal apex of the auricle points anteriorly and extends above the beak. From this highest point the margin posteriorward is obliquely declining and moderately convex in outline to the extreme posterior extension, (which is considerably below the middle of the auricle) whence it sweeps around very convexly, joining the fang or body considerably below the middle of the valve, and below the line of the base of the anterior area, by a somewhat rounded angle. The anterior lateral margin of the body is directed posteriorly, and is

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slightly flexuous or nearly straight; the posterior lateral margin is more convex, and eventually sweeps rapidly to the anterior side, its junction with which forms an acute or narrow ventral termination. The beaks are very narrow, tuberculated, and elevated.

The surface externally and internally, like the other species, is ivory white and somewhat polished. The anterior area is concentrically sculptured, becoming more crowded towards its base; it is separated by a slightly impressed line from the body. The body is ornamented by a radiating narrow area, increasing towards the base, both sides defined by a furrow. This area is subdivided into two, and is closely transversely striated, and marked less frequently by minute raised ridges, directed obliquely downwards to the centre from each outer margin. The surface of the fang and auricle posterior to the radiating area, is smooth or sparingly striate. The auricle is not separated from the body by any marked line, but its commencement is marked by the transition from a convex to a concave surface, caused by the great outward reflexion of the auricle.

Internally, the beak is small but prominent, bearing a narrow oblique rib on its surface, and turned posteriorly. The apophysis hugs rather closely to the body, and is thin, blade-shaped and acuminate to the end. The ventral tubercle is well formed and conspicuous but does not exhibit much evidence of arising from an internal rib. The auricle is not internally defined, save by the greater thinness and translucency of its substance.

The pallets are small, the blades are somewhat heart-shaped at the apex, rounded and curved outwards to an extreme point near their base on either side. These points are not opposite, but one is situated higher on the blade than the other; from these the margins concavely contract into the stalks, which become narrower towards their termination, ending in a point.

Tube solid, not concamerated, twelve to eighteen inches long. Diameter of valves about half an inch. Mr. Hanley described this species in the British Mollusca, supposing it to be identical with Turton's *T. nana*, whose name and description he suppressed on the ground that they were founded on young and imperfect shells. It has since been ascertained that this species is distinct from *T. nana*.

Messrs. Fischer and Jeffreys both consider *T. dilatata* of Stimpson, a synonym of this species, but the concamerated tube and differently formed pallets are prominent distinctive characters.

The blade of the pallet in *dilatata* dilates convexly from a very fragile stalk into a broadly oval form, truncate at the end, while in *megotara* the dilation is *concave* to a point on each side, from which the margins are narrowed and rounded to a bilobed truncated end. The pallets of *dilatata* are more nearly allied to those of *Norvegica* than to *megotara*.

*T. nana*, Turton.

*T. nana*, Turton, Conch. Dithyra, p. 16, t. 2, f. 67. Adams, Genera, ii. p. 333. Brown Conch. Gt. Brit. p. 116, t. 50, f. 14, 15. Catlow, Conch. Nomenc. p. 3. Fleming, Brit. Anim. p. 455. Gray, Phil. Mag. 1827, p. 410. Hanley, Desc. Cat. p. 4, t. 11, f. 22. Jeffreys, Ann. & Mag. Nat. Hist. 3d ser. vi. p. 122. Thorpe, Brit. Mar. Conch. p. 29.

*T. nana*, (part.) Fischer, Journ. Conchyl. 2d ser. i. p. 136. Gray, Ann. & Mag. Nat. Hist. 2d ser. viii. p. 386.

*T. navalis*, Möller, Moll. Groen.

*T. denticulata*, Gray, Ann. & Mag. Nat. Hist. 2d ser. viii. p. 386. Adams, Genera, ii. p. 333. Fischer, Journ. Conchyl. 2d ser. i. p. 135.

*Pholas Terebo*, Müller, Prodr. Tool. Dan, p. 251. Fabricius, Faun. Groen. p. 427.

*Hab.*—England. "Floating wood. Occurs with *T. megotara* and *subericola*, but by no means so numerous as either of them." Jeffreys, Northern Ocean. Greenland.

1862.]

*Description*.—Having no good figure of *T. nana*, nor specimens to refer to, I can only give the distinctive characters from *T. megotara* as pointed out by Mr. Jeffreys, and also Fischer's description of *T. denticulata*.

"Coquille subsphérique, mince, très-ouverte antérieurement et postérieurement, inégalement divisée en deux portions par un zonule submédiane; bord antérieur étroit, formant un angle droit profond, oreillette antérieure aiguë postérieure lisse, plus large, réfléchie. Palettes ovalves, allongées, minces; pédicule grêle, court, aigu."—*Fischer*.

"It differs from *megotara* in the valves being more compressed and solid, in the anterior auricle being much smaller, and having a more obtuse angle and fewer striae, in the posterior auricle being larger and higher, and especially in the very strong and prominent tubercle or false tooth. The tube of *T. nana* appears to be destitute of calcareous lining, except towards the entrances, while *T. megotara* forms a solid tunnel; and the lunule of the pallets is more incised in *T. nana*. Adult specimens measure 21 inches in length. The Turtonian types decidedly belong to this species and not to *megotara*."—*Jeffreys*.

Turton's miserable description from imperfect and immature specimens, is—

"Shell with the valves rounded, and *without auricles behind*, a strong conic tooth on the margin above the teeth."

*T. navalis*, Linn.

*T. navalis*, Linnaeus, Syst. Nat. ed. 10, p. 651; ed. 12, p. 1267. Adams, Genera, ii. p. 333. Blainville, Dict. Sc. Nat. iii. p. 267. Bosc, Conch. ii. p. 202, t. 5, f. 4-7. Catlow, Conch. Nomenc. p. 3. Chenu, Eneye. Hist. Nat. Moll. p. 233, f. 245-7. Cuvier, Regne Anim. i. ed.; ii. p. 494. id. ed. 2, iii. p. 160; id. ed. Griffith, xii. t. 8, f. 2; id. ed. Audouin, t. 114, f. 2. Delle Chiaje, Mem. iv. p. 23, 32, t. 54, f. 2, 8. Deshayes. Traité Elem. i. pt. 2, p. 59, t. 3, f. 1-9. D'Orbigny, Moll.; Sagra's Cuba, p. 211. Eichwald, Fauna Caspio Caucasica, p. 23. Ferrussac, Eneye, Meth. p. 1003. Fischer, Journ. Conch. 2d ser. i. p. 134. Forbes & Hanley, Brit. Moll. i. p. 74, t. 1, f. 7, 8, t. 18, f. 3, 4. Georgi, Beschreib. des Russ. Reichs. iii. p. 2216. Gerville, Cat. Coq. Manche. p. 55, Gmelin, Syst. Nat. p. 3747. Gould, Invert. Mass. p. 26. Guerin, Iconog. du Reg. Anim. Moll. t. 33, f. 2. Hanley, Shells of Linn. p. 450. Heinrich, Medicinische Zeitung Russlands, 1845, p. 372. Jay, Desc. Cat. 4th edit. p. 9. Karsten, Mus. Leskeanum, t. 1, p. 308. Lamarck, Anim. sans. Vert. v. p. 440. Middendorff, Mal. Rossica, iii. p. 79. Pallas, Reise. Siid. Russ. p. 418. Pallas, Tabl. Phys. de la Tauride, p. 40. Payraudeau, Cog. du Corse, p. 26. Pennant Brit. Zool. 1 ed. iv. p. 147. Philippi, Moll. Sicil. i. p. 2; ii. p. 3. Poli, Test. Utr. Sicil. pt. 2, t. 57, f. 45, 46. Potiez et Michaud, Galerie des Moll. ii. p. 273. Scacchi, Cat. Coq. Reg. Neap. p. 8. Sowerby, Ill. Brit. Shells, t. 1, f. 1. Wheatley, Cat. No. 30.

*T. marina*, Sellius, Hist. Nat. Tered. t. 2, f. 2, 3, 6. Jeffreys, Ann. & Mag. Nat. Hist. 3d ser. vi. p. 124.

*T. Batava*, Spengler, Skrivt. Nat. ii. pt. 1, p. 103, t. 2, f. C. Gray, Ann. & Mag. Nat. Hist. 2d ser. viii. p. 386.

*T. vulgaris*, Lamarck, Syst. des Anim. s. Vert. 1801, p. 128.

*Dentalium navis*, Linnaeus, Faun. Suec. No. 1329. p. 380. Hofkmeer, Naturkundige. Zee, Worm. t. 2, f. 7, 8, 9. Frisch, Mus. Hoffmannianum, t. 1, t. 2, f. 9, t. 3, f. 19, 20, t. 4, f. 2, 5, 6. Massuet, Recherches sur les Vers. t. 1, f. 1, 2. Monath, Dissert. sur le Taret de Hollande, t. 1, t. 2, f. 9, t. 3, f. 19, 20, t. 4, f. 2, 5, 6. Rousset, p. 15, 16, 17, f. 1, 2, 3, 4, 10. Vallisnieri, Nat. ii. t. 4.

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*Hab.*—England; Holland; Senegal; United States; North Sea; Mediterranean Sea.

Coll. Acad. Nat. Sc. Helgate, New York, from a British frigate sunk during the revolutionary war.

*Description.* Valves about equal in length and breadth, much resembling in general form those of *T. Norvagia*, but with the posterior auricle expanded somewhat laterally, and its base extending lower than that of the anterior area. The anterior area moderate, not generally so large in proportion to the valve as that of *Norvagia*, and having a more convex basal margin; it inclines somewhat obliquely downwards to the fang, its junction being considerably higher up than that of the posterior auricle. Anterior lateral margin of the fang nearly straight; posterior lateral margin much shorter than the other, on account of the lower extension of its auricle, very oblique. Fang acuminate rapidly towards the base. Posterior auricle not ascending, but produced laterally, its dorsal edge mostly somewhat concave, lateral margin nearly straight, a little oblique, rounded at each end. Basal margin slightly declining towards the fang, shorter than the dorsal edge on account of the expansion of the fang laterally.

The internal ventral tubercle and the dorsal rim do not differ from those of *T. Norvagia*. The apophysis is broad but thin, not thickened at the end, and the same breadth throughout; it is twisted so that one sharp edge, instead of the flat of the blade, is turned towards the interior surface of the fang. The posterior auricle is defined by a close, projecting rim.

Externally, the anterior area is closely striated concentrically, and its posterior limit is defined by an impressed line; succeeding to this is a radiating, narrow area, the closely decussated striæ of which, are sometimes quite prominent; posteriorly the surface is slightly striate concentrically, becoming smooth. The auricle is defined by a sudden depression in the level of the surface of the fang.

The pallet is convex on one side and plane on the other; the stalk, which is about as long as the blade, is moderately thick, and flexuous; it is not continued as a rib beyond the commencement of the blade, which differs from that of *T. Norvagia* by being more convex below, (the entire base being semi-circular) with the sides concave, and the end two-pointed, caused by a decided concavity of the centre of the margin. Tube not concamerated, long, flexuous, solid, polished, gradually narrowing.

Valves and pallets each one-fourth of an inch, and the tube eight inches in length.

This species is the *T. marina* of Sellius, who published, in 1733, an excellent description and figures. Unfortunately his name cannot be adopted, because pre-Linnaean, and this is the more to be regretted since the description in the *Syst. Nat.\** will apply to any species in the genus, and the species is only limited by the reference to the figures of Sellius.

Mr. Hanley, as one important result of his laborious examination of the types in the collection of the great Swedish naturalist, demonstrated its identity with the species of Sellius.

The *navalis* of Brit. authors prior to Forbes and Hanley, is *T. Norvagia*, Spengler. Many of the authorities quoted above must be admitted with doubt, —several of their descriptions are equally applicable to any species, and occasionally the figures are no more characteristic.†

It is doubtful whether the *navalis* of Sicily, Corsica and the Black Sea is

\* "*T. Testa tenuissima cylindrica lævil.*"—Linn.

† The synonymy and specific description in Deshayes' *Expl. Scientifique de l'Algerie*, Mollusques, must be taken with great caution. The first is an indiscriminate grouping of references to all the species described by different authors, as the *T. navalis* of Linn., and the last is sufficiently general to cover them all!

the same as that of Linnæus; a close examination will perhaps prove them to be distinct.

*T. Norvægica*, Spengler.

- T. Norvægica*, Spengler, Skrivt. Nat. ii. pt. 1, p. 102, t. 2, f. 4—6, 1792. Fischer, Journ. Conch. 2d ser. i. p. 138. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386. Forbes and Hanley, Brit. Mollusca, i. p. 67, t. 1, f. 1—5. Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 121. Schumacher, Essai d'un Nov. Syst. p. 94.
- T. Norvegica*, Adams, Genera, ii. p. 333, t. 90, f. 6. a. b. c. d. Chenu, Man. Conchyl. tome 2, f. 60, 61. Jay, Catalogue, 4th edit. p. 9. Sowerby, Illust. Brit. Shells, t. 1, f. 2. Thompson, Ann. and Mag. N. H. xx. p. 157. Woodward, Manual, t. 23, f. 26—27.
- T. Bruguerii*, Delle Chiaje, Mem. iv. p. 28, 32, t. 54, f. 9—12. Philippi, Moll. Sicil. i. p. 2; and ii. p. 3.
- T. Deshayi*, Quatrefages, Ann. des Sc. Nat. 3 ser. xi. p. 26.
- T. fatalis*, Quatrefages, Ann. des Sc. Nat. 3 ser. xi. p. 23, t. 1, f. 1.
- T. nigra*, Blainville, Dict. Sc. Nat. lii. p. 267.
- T. Senegalensis*, Laurent, Journ. Conchyl. i.
- T. navalis*, Brown, Conch. Brit. p. 116, t. 50, f. 1—7. Burrows, Conch. t. 22, f. 4. Crouch, Introd. Lamarck's Conch. t. 2, f. 10. DeKay, Moll. N. Y. p. 249, t. 34, f. 325, a. b. c. Donovan, Brit. Shells, v. t. 145. Encyc. Meth. t. 167, f. 1—5. Fleming, Brit. Anim. p. 454. Gould, Invert. Mass. p. 26? Gray, Phil. Mag. 1827, p. 410. Hanley Desc. Cat. p. 3. Humphrey, Conch. t. 10, f. 2, 3. Lamarck, Anim. sans. Vert. ed. 2, vi. p. 38 (not Synon's.) Matou and Rackett, Linn. Trans. viii. p. 249. Mawe, Conch. t. 35. Montagu, Test. Brit. p. 527; and Supp. p. 7. Pennant, Brit. Zool. iv. p. 147. Pultney, Dorset. Cat. p. 53, t. 18, f. 21. Reeve, Conch. Syst. t. 21. Sowerby, Genera; Sowerby, Conch. Man. f. 48. Thorpe, Brit. Mar. Conch. p. 28. Turton, Conch, Dict. p. 183. Turton, Conch. Dithyra, p. 14, t. 2, f. 1, 2, 3. Wood, Index Test. t. 38, f. 2.
- T. navium*, Sellius, Hist. Nat. Tereb. t. 1, f. 1, 5.
- T. Mediterraneus*, Catlow, Conch. Nomenc. p. 3.
- Septaria Mediterranea*, Matheron, Ann. des Sc. du Midi, France, i. p. 77, ii. p. 312, t. 1. Deshayes, Traite Elem. i. pt. 2, p. 46, t. 2, f. 9 and 10. Cuvier, Reg. Anim. (ed. Audouin) t. 114, f. 3.
- Serpula Tereb.*, De Costa, Brit. Shells, p. 21.
- Bruma delle navi*, Vallisnieri, Op. Phys. Med.
- Fistulana corniformis*, Lamarck, Anim. sans. Vert. v. p. 435; 2d edit. vi. p. 31. Blainville, Dict. des Sc. Nat. xvii. p. 85. Blainville, Man. Mal. t. 81, f. 4. Chenu, Man. de Conchyl. ii. f. 63.
- Guetera corniformis*, Gray, Ann. and Mag. N. Hist. 2 ser. viii. p. 386.
- Uperotis corniformis*, Adams, Genera, ii. p. 333.
- Tereb. corniformis*, Catlow, Conch. Nomenc. p. 3. Deshayes, Note in Lam. Anim. sans. Vert. 2 edit. vi. p. 29. Gray, Phil. Mag. 1827, p. 410.
- Tereb. utriculus*, Gmelin, Syst. Nat. p. 3748. Bosc, Conch. ii. p. 202. Dillwyn, Desc. Cat. p. 1089. Kammerer, Cab. Rudolst. p. 7, t. 1? Wood, Index Test. t. 38, f. 3.

*Hab.*—Channel Isles and Devonshire, England; coast of France; Senegal? United States? Mediterranean Sea.

Coll. Acad. Nat. Sciences.

*Description.*—Valves of moderate size and solidity, longer than broad. The anterior auricle subtriangular, about equalling the posterior in size, and the basal margins of the two being nearly on a horizontal line. The body or fang-shaped portion is rather more than double the length of the auricles, and is about half as wide as its length. The posterior auricle is not elevated nor ex-

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panded, its outline is semi-orbicular, flattened somewhat on the upper margin, but quite convex laterally, and moderately so basally, where its junction with the body is not angulated or but slightly so.

The dorsal edge of the anterior area descends concavely to an acute point, whence the basal edge, sweeping in a quarter circle and thence continuing horizontally, is brought to join the body or fang almost at right angles. The anterior side of the body from this junction is almost straight to the base, its direction being slightly inclined to the posterior side of the valve. The posterior lateral edge of the body from its junction with the auricle is continued towards the base, first slightly, but at length becoming decidedly convex in outline, until its somewhat angular junction by a rounded basal margin, with the anterior side. The surface of the body towards the beaks becomes convex and elevated, sloping off towards each side and also towards its dorsal margin, which is mostly higher than either auricle, and convex in outline. The dorsal edge of the posterior auricle is generally somewhat concave in outline, descending slightly from the beaks in typical specimens, although occasionally it is parallel with or even rising slightly above them; its posterior lateral termination is marked by a slight reflexion upwards, from which the marginal outline of the lateral and basal sides, as before stated, is convex to its junction with the body.

Viewed internally, the whole dorsal margin of the valve is marked by a raised or thickened border; the beaks are rather large and overhanging, culminating in an irregular tubercle in the centre, from beneath which springs a rather broad curved blade, which terminates in a rapidly enlarging, rounded or irregular clavate end. The inner surface of the fang or body is also marked by an elevated rib, which, not particularly prominent at first, becomes more distinct as it approaches the base, and is there arrested and turned upon itself apparently by the infolding of the exterior surface, forming a rounded tubercle. The division of the posterior auricle from the fang is internally defined by an oblique curved carina, the lower edge of which, near the beaks, slightly projects over the inner disc, but it does not, as in some of the other species, form a continuous ledge from the beaks to the margin. The internal surface of the fang is hollowed in the centre, rising towards either auricle, which becomes convex in the middle and laterally reflected outwards. The surface is pure white and polished.

The external markings of the valve are very beautiful,—the anterior area is ornamented by about sixty close and sharp concentric striæ diverging from the dorsal margin. A narrow radiating area enlarging from the beaks towards the base, occupies the anterior portion of the body and is closely covered with a series of beautiful minute grooves, which define the boundary-line of the anterior area by their junction almost at right angles with its striæ, these fine grooves, when viewed with a microscope, are found to be decussated by still finer lines. Posteriorly, to this area, the grooves diverge into rather distant slight concentric arches gradually vanishing towards the posterior auricle, the commencement of which is defined by a line, occasionally obsolete. The auricle is generally smooth, but occasionally with confluent raised granules or points. The whole surface is white and polished when devoid, as it usually is, of its thin olivaceous epidermis.

The pallets are somewhat spoon-shaped in outline with a truncate apex. One side is convex and plain, whilst the other is concave, with a raised mid-rib, which, becoming more prominent towards the base, merges into the stalk, which is slender, cylindrical, or flexuous, and about as long as the blade.

The tube is not much contorted, but generally slightly flexuous, narrow, tapering, polished externally, solid in texture and rather easily detached from its burrow. It is semi-concamerated at its lower end, divided by ten or twelve crowded, thin, orbicular partitions, which, however, leave a large oval orifice in the centre.

1862.]

*Dimensions.*—Length of valves half an inch ; breadth somewhat less. Length of tube about one foot ; but individuals have occurred in which the tube is two and one-half feet long and the valves three-fourths of an inch.

Mr. Jeffreys considers the *T. corniformis* of Lamarek to be the tube of this species, which is very probable, and I have therefore placed that species among the synonyms of *Norvagia*.

The present shell is the *T. navalis* of all British authors prior to Forbes and Hanley's *Mollusca*, the confusion of the species originating in the miserable description of the *Syst. Naturæ*, which will apply equally well to any species of the genus, and continued, probably, from the difficulty of procuring extensive suites of specimens, and from the uninviting nature of their study.

The figures of DeKay are copied from Turton, and therefore represent this shell and not the true *T. navalis*.

The illustrations in Donovan and Pultney will suit equally well for this or either of the other British *Teredæ*.

*T. nigra*, Blainville, is considered by Messrs. Fischer and Jeffreys to be a synonym of *Norvagia*, and not having seen specimens, I have followed them in including it here, but as it appears to me that the original description does not exactly suit *Norvagia*, I reproduce it here.

“Coquille assez grande, de quatre à cinq lignes de haut sur autant de long, épaisse, solide, entièrement couverte d'un epiderme noir ; côté postérieur ou tranchant fortement anguleux et strié au moins de soixant stries très-serrées, surtout sur la partie verticale ; pallets ovales, allongées, *non-tronquées*.

Cette grande espèce de taret, dont je possède un individu envoyé par Mlle. Warn à M. DeFrance, a été trouvée sur les côtes d'Angleterre, dans la carcasse d'un navire venant de l'Inde et échoué depuis long-temps à quelque distance, du rivage. Elle est parfaitement distinct par sa taille, sa couleur, et par le nombre considerable de ses stries.

*T. pedicellata*, Quatrefages.

*T. pedicellatus*, Quatrefages, *Ann. des Sc. Phys.* 3d ser. xi. p. 23, t. 1, f. 2. Adams, *Genera*, ii. p. 333.

*T. pedicellata*, Fischer, *Journ. Conchyl.* 2d ser. i. p. 139. Jeffreys, *Ann. and Mag. Nat. Hist.* 3d ser. vi. p. 123.

*Hab.*—Islands in the British channel and Northern Coast of Spain and Algiers.

*Description.*—“Coquille subsphérique à peu près aussi longue que large ; angle antérieur presque droit (90°), tombant fort en arrière. Stries très-fines et très nombreuses. Palmules étroites, allongées, portées à l'extrémité d'une sorte de manche d'apparence cartilagineuse. Le pédicule est toujours blanc, tandis que les palettes sent colorées en brun foncé. Taille inférieure de moitié environ à celle du *Ter. Norvagia*.”—*Fischer*.

“Although the valves in adult specimens bear a close resemblance to those of the following species, (*T. marina*) the pallets are unmistakably different ; and in the young the striae on the anterior auricle of the valves are much fewer, and consequently more remote than in that species. Where both species occur together, the present occupies the outer layers of the wood, while the other penetrates into its recesses. Quatrefages discovered this species at Guibuscoa, on the North coast of Spain ; and I noticed it in some wood which M. Deshayes had taken on the Algerine coast. The tube is a beautiful object, being jointed in an imbricated manner, like the stalk of an *equisetum*.”—*J. Jeffreys*.

*T. Senegalensis*, Blainville.

*T. Senegalensis*, Blainville, *Dict. des Sc. Nat.* lii. p. 267. Jeffreys, *Ann. and Mag. Nat. Hist.* 3d ser. vi. p. 126. Adams, *Genera*, ii. p. 333.

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*Taret du Sénégal.* Adanson, Hist. Nat. du Senegal, p. 264, t. 19. Adanson, Mem. de l'Acad. des Sc. 1759, p. 278, t. 9, f. 9, 10.

*Hab.*—In Mangrove roots. Coast of Senegal.

*Description.*—"Coquille un peu plus grosse, plus évidemment rhomboïdale, ou à quatre côtés obliques. Le bord tranchant strié de vingt-cinq stries denticulées. Pallets en spatule tronquée et non bicornée. Cette espèce, qui est indubitablement distincte du taret commun, quoiqu'il soit assez difficile de la caractériser complètement, à cause du peu de détails dans lesquels Adanson est entré à son sujet, est fort commune dans les racines des mangliers qui bordent les fleuves Niger et de Gambie. Elle les perce verticalement, quelquefois à deux ou trois pieds; mais ordinairement à six pouces au dessus de terre."—Blainville.

*T. truncata*, Quatrefages.

*T. truncata*, Quatrefages, Ann. des Sc. Nat., 3d ser., xi. p. 27. Adams, Genera, ii. p. 333. Fischer, Journ. Conch., 2d ser., i. p. 133. Jeffreys, Ann. and Mag. Nat. Hist., 3d ser., vi. p. 126.

*Hab.*—Amboina, Quoy et Gaimard.

*Description.*—"Coquille fragile, presque sphérique, fortement échancrée et anguleuse à son bord antérieur; l'angle antérieur est de 90° environ, son sommet se trouve placé assez en arrière, et ses bords paraissent plus rectilignes que dans la plupart des autres espèces. Stries de l'oreillette antérieure assez irrégulières, si ce n'est vers les bords; palettes pédiculées, tricuspidées, obliquement taillées en biseau de dehors en dedans."—Fischer.

Quatrefages' Description is . . . . "testâ fragili, quasi sphericâ, alte emarginatâ; emarginatione 90 gradibus hiante; palmulis pedicellatis, in obliquum truncatus, tridenticulatis."

#### Subgenus CALOBATES, Gould.

CALOBATES, Gould, Proc. Bost. Soc. Nat. Hist., viii. p. 280, Feb., 1862. Gould, Otia Conchologica, p. 241, 1862.

*Description.*—"Pallets stilt-shaped, bony. Type *T. thoracites*, Gould."

I owe to the kindness of the author, an opportunity to examine specimens of the valves of this interesting shell, and also a sketch of the pallets. The latter are indeed very remarkable, and indicate very clearly a subgeneric, if not generic distinction, from *TEREDO*. A more particular description of them is contained in that of the species.

*T. thoracites*, Gould.

*T. thoracites*, Gould, Bost. Proc., vi. p. 15. Gould, Otia Conchologica, p. 222, 241.

*Hab.*—Burmah.

*Description.*—"Shell large, solid, length and breadth about equal; valves trifoliate, the anterior area or leaf being very large proportionally, or about equal to the fang-like body, excepting that it is truncated anteriorly, where it is smooth, shining and callous. This anterior area is obtusely lance-pointed and sculptured with concentric striae parallel to its basal edge, and with a few delicate cracks or rugæ radiating from the beaks; the fang-like body is large and broad, obtuse at point, and armed within by a firm rib, terminating in a rounded ivory knob; a strong flattened ridge traverses its posterior extremity, running from the junction of the posterior wing above to the point of the fang; anterior to this the fang is grooved parallel to the anterior edge; while posterior to it they take the direction of the inferior edge of the wing, and become gradually more and more recurved towards the point, and are continued on to the ridge. The posterior dorsal wing is very small and lunate, not rising above the beaks, gently arched, scarcely projecting beyond the posterior margin of the fang, its lower margin would correspond with the lower 1862.]

margin of the anterior area if continued; the superior margin is rough and bony, forming a broad area defined by a sharp crested ridge, and emarginated at the junction of the wing. Hinge tubercles large, with a hook-shaped process from each, by which the valves are interlocked; the wing is formed by a sharp shell-like ridge, and is smooth and slightly excavated. The cavity of the beak is filled with a spongy calcareous matter, from which issues the delicate and flattened subumbonal process which presents its flat side to the valve, and at about one-third its length forms a decided elbow backwards.

Length from before backwards  $\frac{5}{8}$  inch; from above downwards a little less.

Pallettes very large and long, stilt-shaped; the style long and subulate, slightly flexuous, bony, surrounded by a broad dilatation or step, concave on one side and convex on the other; its upper surface deeply excavated, on this is placed the blade, which is three-fourths as long as the style, thin, linear, obliquely truncated at tips, about one-third the width of the step.

Length of style 7-10ths; of blade 4-10ths inch.

Brought by Rev. F. Mason and Rev. J. Benjamin from Tavoy.

In size and solidity this exceeds all the species yet described, it is chiefly distinguished by the great size of the anterior triangular portion when compared with the posterior alar portion or auricle.

The form of the pallettes also is entirely different from any yet described; nor do I find any mention elsewhere of the spongy calcareous growth in the umbonal cavity."—Gould.

#### Genus UPEROTIS, Guettard.

UPEROTIS, Guettard, Memoirs, ii. p. 128. Adams, Genera, ii. p. 333.

*Guetera*, Gray, Syn. Brit. Mus., 1842. Gray, Zool. Proc., p. 188, 1847. Gray, Ann. and Mag. Nat. Hist., 2d ser., viii. p. 381.

*Serpula*, (part.) Mawe, Conch., p. 194.

*Fistulana*, (part.) Blainville, Dict. Sc. Nat., xvii. p. 82. Bosc. Hist. Coq., ii. p. 203. Griffith, Cuvier Regne Anim., xii. p. 124. Guerin, Iconog. Reg. Anim. Moll., t. 33. Hanley, Desc. Cat., p. 3. Lamarek, Anim. sans. Vert., v. p. 432; id. 2d edit., vi. p. 25. Potiez et Michaud, Galerie des Moll., ii. p. 272. Schröter, Einleit., ii. Walch, Naturf., x. p. 38.

*Teredo*, (part.) Catlow, Conch. Nomenc., p. 2. Cuvier, Regne Anim., edit. Audouin Moll., p. 252. Deshayes, Traité Elem., pt. ii. p. 47. Deshayes, Note in 2d edit., Lamarek, Anim. sans. Vert., vi. p. 39. Dillwyn, Desc. Cat., p. 1087. Gray, Phil. Mag., 1827, p. 409. Jay, Cat., 4th edit., p. 9. Wood, Index Test., t. 38.

Dr. Gray includes in his genus *Guetera*, besides the *U. clava*, two other specimens, which he names:—

*G. lagenuala*? this = *Cucurbitula cymbia*, Spengler (GASTROCHÆNIDÆ).

*G. corniformis*, this = tube of *Teredo Norvagica*, Spengler.

*U. clava*, Gmelin, sp.

*Teredo clava*, Gmelin, Syst. Nat., p. 3748. Dillwyn, Desc. Cat., p. 1090.

Gray, Phil. Mag., 1827, p. 410. Guettard, Mém., iii. t. 7, f. 6—9. Wood, Index Test., t. 38, f. 4.

*Guetera clava*, Gray, Ann. Mag. Nat. Hist., 2d ser., viii. p. 386.

*U. clava*, Adams, Genera, ii. p. 333.

*Fistulana gregata*, Lamarek, Anim. sans. Vert., v. p. 435; ditto, 2d edit., vi. p. 31. Bosc, Hist. Coq., ii. p. 204. Encyc. Meth., t. 167, f. 6—14. Griffith, Cuv. Reg. Anim., xii. t. 8, f. 3. Guerin, Iconog. Reg. Anim. Moll., t. 33, f. 3. Hanley, Desc. Cat., p. 3. Potiez et Michaud, Galerie des Moll., ii. p. 272. Schröter, Einleit., ii. p. 574, t. 6, f. 20. Walch, Naturforsch., x. p. 38, t. 1, f. 9, 10.

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*Teredo gregata*, Deshayes, Note in 2d edit. Lam. Ann. sans. Vert., vi. p. 39.

*Fistulana gregaria*, Blainville, Dict. Sc. Nat., p. 83.

*Serpula retorta*, Mawe, Conch., t. 34, f. 5.

*Teredo nucivorus*, Spengler, Skrivt. Nat., ii. pt. 1, p. 105, t. 2, f. d. Catlow,

Conch. Nomencl., p. 3. Cuvier, Regne Anim., ed. Audouin, t. 114, f. 4.

Deshayes, Traité Elem., t. 2, f. 15—18. Dillwyn, Disc. Cat., p. 1090.

Jay, Catalogue, 4th edit., p. 9.

Hab.—Tranquebar, Pondichery, etc.\*

Coll. Acad. Nat. Sciences.

*Description*.—Valves covered by a brown epidermis, solid in texture, very convex, narrow, being two and one-half times longer than their width; in this respect differing very much from the other species of the family. Anterior auricle extending about one-third the total length, with its basal margin very oblique and long, and its dorsal margin short and declining; lateral anterior side sharply angulated by the junction of the dorsal and basal margins. Posterior auricle very small, consisting of a mere triangular lateral swelling of the margin, appearing in some specimens like a tooth. Beaks very narrow, much raised, and tuberculate.

Internally the fang is deeply and narrowly channelled from the beaks to the ventral tubercle. Apophysis very oblique, curved, turning to the posterior side. Anterior to the central channel the substance of the valve is much thinner.

Externally the anterior area is marked by a few rather coarse concentric striæ. Anterior to the centre of the fang and opposed to the internal channel is a corresponding longitudinal raised rib, which is rather closely transversely striated; posterior to the rib the surface is nearly smooth, with the exception of a few longitudinal striæ, visible on the posterior shoulder.

Length  $\frac{1}{2}$  inch; breadth not quite  $\frac{1}{4}$ th inch.

Pallels about  $\frac{1}{2}$  inch in length, the blade exceeding the style; blade spoon-shaped, concave on one side, convex on the other, and thickened on the convex side to a little above the middle, whence it is depressed to the tip; the depressed area is covered with elegant ribs which radiate to all parts of the upper margin, causing it to be toothed.

Tubes singularly contorted and twisted upon themselves, a mass of them frequently growing together, they are of a light brown or yellowish red color, and very solid, rapidly acuminate from the rounded base to the upper end.

Length four inches; breadth at base three-fourths of an inch, at tip half as much.

#### Genus XYLOTRYA, Leach.

XYLOTRYA, Leach, MSS. (subgenus.) Adams, Genera, ii. p. 333. Gray, Zool.

Proc. p. 188, 1847. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 381.

Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 125. Menke, Syn.

Meth., 1830. Sowerby, Illust. Brit. Shells.

*Xylotrya*, Quatrefages, Ann. des Sc. Nat. 3d ser. xi. p. 28.

*Bankia*, Gray.

*Teredo*, (part.) Blainville, Dict. Sc. Nat. lii. p. 259. Blainville, Malacol. p.

579. Bosc, Hist. Coq. ii. p. 197. Catlow, Conch. Nomencl. p. 2. Chenu,

Man. ii. p. 12. Cuvier, Regne Anim. edit. Griffith, xii. p. 123. Delle

Chiaje, Mem. iv. Deshayes, Encyc. Meth. p. 1002. Fischer, Journ.

Conchyl. 2d ser. i. Forbes and Hanley, Brit. Moll. i. p. 58. Hanley,

Desc. Cat. p. 3. Home, Phil. Trans., 1806. Lamarck, Anim. Sans.

Vert. edit. 1, v. p. 438; et edit. 2, vi. p. 35. Lamarck, Syst., 1801.

Philippi, Enum. Moll. Sicil. i. p. 2, et ii. p. 3. Spengler, Skrivt. Nat.

ii. pt. 1. Schumacher, Essai d'un Nov. Syst. Thompson, Ann. and

Mag. Nat. Hist., 1847. Turton, Conch. dithyra, p. 13.

\* The specimen in Coll. A. N. S. is marked "St. Croix, W. I.," doubtless a mistake.

## X. BIPENNATA, Turton.

- X. BIPENNATA, Turton, Conch. Dict. p. 184, f. 38—40. Turton, Conch. dith. Brit. p. 15. Brown, Conch. Gt. Brit. p. 116. Catlow, Conch. Nomencl. p. 2. Fischer, Journ. Conchyl. 2d ser. i. p. 257. Fleming, Brit. Anim. p. 454. Gray, Phil. Mag., 1827, p. 411. Hanley, Desc. Cat. p. 4, t. 9, f. 50. Hanley, Brit. Mollusca, i. p. 80, t. 1, f. 9—11. Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 126. Quatrefages, Ann. des Sc. Nat. 3d ser. xi. p. 30. Thorpe, Brit. Mar. Conch. p. 28.
- X. pennatifera, (part.) Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386.
- X. carinata, Leach, Adams, Genera, ii. p. 333.
- T. carinata, Leach, Blainville, Dict. Sc. Nat. lii. p. 269. Catlow, Conch. Nomencl. p. 3. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 368.
- T. carinata, Blainville, Fischer, Journ. Conchyl. 2d ser. i. p. 256.
- T. carinata, Gray, Phil. Mag., 1827, p. 411. Hanley, Desc. Cat. p. 4.
- T. navalis, Home, Philos. Trans., 1806, p. 276. Home, Comparit. Anat. ii. t. 43.

*Hab.*—England (*bipennata*), a doubtful native. Sumatra (*carinata*). Coll. Acad. Nat. Sciences.

*Description.*—"Valves with the body or medial portion narrow and elongated. Auricle typically projecting higher than the beaks; its upper internal edge most strongly reflected outwards; the lower internal edge scarcely sloping, and projecting shelf-fashion over the body. Triangular area extending as low down as the auricle, not large, its outer edge very oblique; tooth-like apophysis greatly slanting posteriorwards. Pallets very large, quill-shaped, of a spongy texture.

The shape of the valves is very different from that of *Norvagia* or *Batava*, the medial portion being decidedly more elongated, and the lower end of the auricle slightly more remote from the ventral tubercle than is that of the front triangle. This latter occupies less than two-fifths of an imaginary line drawn from the beaks to the base of the shell, and is concentrically traversed by raised striæ, or narrow lyræ, which are moderately close-set, and not much arcuated below, but more distant and more curved towards the commencement of the series. These are succeeded by another set of minutely decussated striæ, which occupy the narrow strip situated between the lateral triangle and the internal radiating groove, and are produced thence along the front margin of the shell. Then follows a still narrower strip, which, together with the preceding, is elevated towards the beaks above the remainder of the surface, covered with very oblique, distant, raised concentric striæ, often with finer intermediate ones, which, after passing the central, shallow, groove-like, radiating area, are more or less distinctly continued over the remainder of the surface as far as the auricle. This latter, which is smooth, small, and ear-shaped, projects at its upper part above the summit of the beak, and is internally cut off as it were from the body of the shell by its lower edge, which, almost straight and scarcely declining, projects like a ledge over the subumbonal region. Its basal line is thus almost at right angles to the hinder margin, whilst its much arcuated posterior outline runs nearly parallel to the base of the lateral triangle. This ear-shaped appendage is also most strongly reflected outwards, and is internally rather closely grooved with concentric costellæ; its hinder termination is attenuately rounded, and its front extremity is in the adult concavely, in the young subrectilinearly, more or less obliquely subtruncated.

The entire shell is white and faintly glossy; there is an extremely oblique lamina surmounted by a tooth-like process upon the hinge margin, running at acute angles to the very oblique and flat subumbonal blade, which latter is clavate, and in the most perfect specimens we have met with either tubercu-

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lated or jagged at its edge near its termination. Both the posterior and anterior edges of the valves, which are inclined to solidity, are rectilinear, the front being nearly perpendicular, the hinder much more oblique; but in the young these sides are rather more parallel, and the central, or linguiform portion of the shell, much more narrow. The ventral apex is narrow, but not acute, and its internal tubercle rather broad and compressed. The pallets are very curious, and of a sponge-like look and color. They are remarkably large, in some measure resemble a quill in shape, are usually more or less curved, and have their stalk or unbarbed portion most minutely tuberculated. The upper portion, which is usually about one-half of the entire length, and even at its broadest part scarcely wider than the stalk, is closely articulated; the upper and concave edge of each joint terminating at either extremity in an ascending filament, is adorned on one side with a very fine fringe of similar but more minute filaments. The joints towards the extremity appear in the few specimens we have seen to lose their lateral filament, and the concavity of the upper edges so increases as to form a decided angle near their middle.

The tube, which we have not seen ourselves, is declared by Dr. Turton to be thicker and stronger than that of *Norvagia*, and simple in its outer orifice; and by Mr. Gray (1827) to be not concentered. The diameter of the valves, from which our description was drawn up, is about four-sevenths of an inch, whilst the pallets are actually three inches in length, and about two inches broad at the widest part.

These dimensions, however, especially that of the pallet, are greatly exceeded in the Sumatran examples, from whence we may reasonably conclude that that country is in all possibility its native habitat. Specimens are extremely rare."—*Forbes & Hanley*.

Mr. Jeffreys remarks that "this species requires further investigation, because of the similarity of its valves to those of *T. malleolus*, and of its pallets to those of *T. pennatifera*. The former, however, appear to present a difference in being more arched and solid than in *T. malleolus*, with the anterior auricle larger and having more striæ, as well as in the posterior auricle being usually smaller; and the latter in having a shorter and much thicker stalk than in *T. pennatifera*, which is not annular or tracheiform as in that species, as well as in the lateral filaments being shorter and less slender."

#### *X. cucullata*, Norman.

*X. cucullata*, Norman, MSS. Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 125.

*Hab.*—In drift fir wood at Guernsey: in teak, with *T. fimbriata* at Belfast.

*Description.*—"Tube long, thick, not easily detached from the wood, internally wrinkled near the opening. Valves roundish-oval, rather convex; body marked transversely, but regularly, with a few striæ or impressed lines; anterior auricle small, angle obtuse, striæ numerous; posterior auricle dilated and appressed, having its apex nearly on a level with the crown or umbo of the valve, inner edge free and overlapping the body; fang broad; tubercle small; apophysis sickle-shaped. Pallets composed of 20-30 calciform points or cuculli, which are broad on the outer surface, and slightly overlap one another in succession, lateral edges setaceous, with short filaments; stalks cylindrical, of same length as pallet. Dimensions: length (of valves) 8-20"; breadth 6-20".

"The pallets resemble those of *T. minima*, Blainville (*T. palmulata*, Philippi) in having the front margin quite plain; but they differ in the joints being of nearly equal breadth, and (especially in the earlier stage of growth) being much more numerous and compact.

"The pallets of *T. cucullata* are also three or four times as long as those of *T. minima*. The tube and valves of each species are easily distinguishable."—*Jeffreys*.

*X. fimbriata*, Jeffreys.*X. fimbriata*, Jeffreys, Ann. and Mag. Nat. Hist. 3d. ser. vi. p. 126.*X. palmulata*,\* Forbes and Hanley, British Mollusca, i. p. 86, t. 2, f. 9-11. Stimpson, Check-List, No. 249. Sowerby, Illust. of Brit. Shells, t. 1, f. 6.*T. bipalmulata*, Thompson, Ann. and Mag. Nat. Hist., 1847.*Hab.*—A doubtful inhabitant of the British coast.

*Description.*—The shell of this species differs so little from that of *T. navalis*, that it is difficult to find any important distinctive characters in the valves alone. They appear, however, to be always much smaller than in *navalis*, and the external surface is not so highly polished; the overlapping ledge which internally marks the line of the posterior auricle is more elevated. The valves  $\frac{1}{2}$  inch in length. "The pallets, which are extremely fragile, and never attain to any considerable dimensions, closely resemble diminutive specimens of those of *bipennata*. They vary much with age and circumstances in regard to the number of articulations, their closeness or laxity of approach to each other, and even in their individual shapes. In the smaller specimens, (and almost all hitherto taken in our seas belong to this class, not exceeding half an inch in length,) the stem resembles a piece of fine thread, and is about equally long with the broader pennated portion which surmounts it. This latter is composed of numerous somewhat triangular pieces, of which the narrower end is jointed as it were to the broader opposite extremity of the preceding one, which is more or less deeply incurved in the middle, and has, in consequence, its lateral terminations more or less strongly forked. The basal articulation is often peculiarly graceful in shape, the lateral outline being formed by two convex lines of corresponding curve on either side. The number of these joints may average about a dozen, some apparently having only eight distinct ones, whilst others, (chiefly the larger) have nearly twice that number. The articulated portion is usually about three times as broad as the stalk, and tapers towards its termination, where the joints likewise are smaller and more closely set. In the larger pallets, where the articulations are more remote from each other, their forked extremities, instead of embracing (as in the young) the succeeding joint, project on either side beyond the narrow bases, so as to cause the lateral edges to appear serrated; in certain specimens, where the joints are peculiarly distant, and their subtrigonal forms have become in consequence less distinct, these forked terminations are produced in narrow filaments, and the central concavities are clothed with a more or less fringed membrane, which in some measure conceals the depth of incurvation. . . None of the valves we have seen at all equal the dimensions of our three first species, (*Norvagia*, *marina*, *malleolus*,) and the longest pallet was under two inches in length.

The tube was concamerated in Mr. Clark's examples (Exmouth) in the cabinet of Mr. Jeffrey; we confess, however, we perceived no indication of such structure in the very small perforations of the Irish specimens; in both, the testaceous matter was sparingly deposited."—*Hanley*.

*X. minima*, Blainville, sp.*T. minima*, Blainville, Dict. des Sc. Nat. lii. p. 268. Fischer, Journ. Conchyl. 2d ser. i. p. 256. Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 127.*T. bipalmulata*, Delle Chiaje, Mem. iv. p. 28, t. 54, f. 18, 22, 23, 24.*T. palmulata*, Philippi, Enum. Moll. Sicil. i. p. 3, ii. p. 2, t. 1, f. 8.*T. serratus*, Deshayes, Mss.*T. Philippii*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386. Fischer, Journ. Conchyl. 2d ser. i. p. 257.*X. Philippii*, Adams, Genera, ii. p. 333.\* This is not the *T. palmulata* of Lamarck or Philippi.



*Hab.*—Mediterranean Sea.

*Description.*—"Coquille à peu près semblable à celle de *T. navalis* mais plus petite, à peu près aussi haute que large; oreillette antérieure portant plus de soixante stries; oreillette postérieure moins abaissée que chez le *T. navalis*.

"Palettes courtes, ressemblant à un petit épi d'orge formées de huit à dix godets courts, comprimés, imbriqués, denticulés à leur bord inférieur et le plus souvent noirâtres. Epines latérales peu développées. Pédicule cylindrique, grêle, blanc, un peu plus long que la palette.

"*Observ.*—Cette charmant espèce n'attient jamais de grandes dimensions, mais ses ravages n'en sont pas moins redoutables; car elle abonde dans les lieux où elle vit."—*Fischer, desc. of T. Philippii*.

Fischer separates *Philippii* from *minima*, and remarks that the latter is described from a young shell. Jeffreys unites the two, giving the preference to Blainville's name, as the oldest which is not pre-occupied.

*X. minima* is thus described in Journ. Conchyl. p. 256.

"Coquille extrêmement petite, à peu près aussi haute que large; oreillette et zone antérieures plus grandes que les postérieures; stries très nombreuses, presque également, serrées et espacées sur les deux côtés de l'angle antérieur.

"Palettes portées sur un très-long pédicule et formées de douze articulations en godets, non épineuses sur les côtes."—*Fischer*.

*X. palmulata*, Lamarck (sp.).

*Teredo palmulata*, Lamarck, Anim. sans. Vert. v. p. 440; id. 2d edit. vi. p. 38. Blainville, Man. Malacol. t. 80, bis, f. 8. Catlow, Conch. Nomenc. p. 3. Chenu, Man. Conchyl. ii. f. 64, 65. Cuvier, Regne Anim. edit. Griffith, xii. t. 7, f. 5. Ferussac, Encyc. Meth. p. 1004. Fischer, Journ. Conchyl. 2d ser. i. p. 254. Hanley, Desc. Cat. p. 4, t. 11, f. 13. Quatrefages, An. des Sc. Nat. 2d ser. xi. p. 29.

*X. palmulata*, Adams, Genera, ii. p. 333, t. 90, f. 6e.

*X. bipalmulata*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386.

*T. bipalmulata*, Lamarck, Syst. Anim. sans. Vert. p. 129. Bosc, Hist. Coq. ii. p. 202. Gray, Phil. Mag., 1827, p. 410.

*Taret de Pondichéry*, Adanson, Mem. Acad. des Sc., 1759, p. 278, t. 9, f. 12.

*Hab.*—East Indies.

*Description.*—The valves and tubes of this species are unknown, and but two specimens of the pallets exist in European collections; from one of these pallets (that in the Jardin des Plantes) Lamarck's description is taken,\* which in fulness of detail and accuracy is scarcely inferior to the description of *T. navalis*, by Linnæus.

The pallets are quite large, the blade composed of twenty or more triangular joints, which are attenuated laterally into sharp projecting points. The stalks are somewhat shorter than the pallets, moderately thick, rounded, and about one-third the width of the blade. Total length about one inch.

Mr. Jeffreys remarks that they are "allied to the pallets of *T. bipennata*, although evidently distinct."

This species is not the *T. palmulata* of Forbes and Hanley, nor of Philippi.

*X. pennatifera*, Blainville (sp.)

*Teredo pennatifera*, Blainville, Dict. des Sc. Nat. lii. p. 269.

*X. pennatifera*, Adams, Genera, ii. p. 333. Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 126.

*X. pennatifera*, (part.) Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386.

\* "*T. palmulis longiusculis, pinnato-ciliatis, subarticulatis.*"—*Lam.*

*X. palmulata*, Leach, teste Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386.

*Hab.*—England, floating wood on the coast of Guernsey (a doubtful native); and at Cherbourg, France.

*Description.*—"Coquille assez petite et mince, échancrée très anguleusement en avant, finement multistriée; palmules extrêmement considérables, huit ou dix fois plus longues que les valves, composées d'un grand nombre d'articulations, pourvus de chaque côté d'un long cil, et postées sur un long pédicule ce qui les fait ressembler à une pennatule.

"Cette jolie espèce, qui existe . . . . dans la collection du Museum Britannique, vient les mers de l'Inde.

"Les palmules pourroient être aisément prises, au premier aspect, pour des pennatules fort élégantes; elles diffèrent beaucoup par leur grandeur, et par leur forme de celles du taret des Indes de M. de Lamarck, (*palmulata*, Lam)."—*Blainville*.

*X. Stutchburyi*, Leach (sp.).

*T. Stutchburyi*, Leach, Blainville, Dict. Sc. Nat. lii. p. 268. Fischer, Journ. Conchyl. 2d ser. i. p. 255. Jeffreys, Ann. and Mag. Nat. Hist. 3d ser. vi. p. 127. Quatrefages, Ann. des Sc. Nat. 3d ser. xi. p. 28.

*X. Stutchburyi*, Gray, Ann. and Mag. Nat. Hist. 2d. ser. viii. p. 386. Adams, Genera, ii. p. 333.

*T. campanulata*, Deshayes, Mss., Brit. Mus.

*T. navalis*, Spengler, Skrivt. Nat. ii. p. 100, t. 2, f. 1—3. Schumacher, Essai d'un Nov. Syst. p. 94.

*Hab.*—Sumatra.

*Description.*—"Coquille sensiblement moins longue que large; valves fort minces; angle antérieur obtus (115—120°); oreillette antérieure courte, chargée de stries très-fines et très nombreuses; oreillette postérieure assez marquée, mais moins saillante que dans les *Ter. palmulata* et *bipennata*.

"Palettes assez courtes, à pédicules très courts, formées par des godets en partie cornés et demi-transparents, diminuant graduellement du pédoncule au sommet de la palette. Le bord inférieur des godets est épaissi et semble frangé, quand l'individu est fraîchement recueilli ou conservé dans l'alcool. Les godets sont légèrement comprimés, assez profonds; chacun d'eux adhère au bord inférieur de celui qui le précède par un court pédicule.

*Obs.*—Très-bonne espèce, bien caractérisée par des godets triangulaires, sans épines latérales. Les différentes descriptions que l'on a fait des coquilles, différent par plusieurs points essentiels, et il ne serait pas étonnant qu'il y eût quelques espèces à palettes articulées semblables et à coquilles différentes, comme nous l'avons constaté chez les Tarets à palettes simples."—*Fischer*.

#### Subfamily 2. TEREDININÆ, Tryon.

TEREDININÆ, Tryon, Proc. Acad. Nat. Sc. p. 65, 1862.

Genus TEREDINA, Lamarck.

(*Fossil*.)

#### Subfamily 3. KUPHINÆ, Tryon.

TEREDINA, (part.), Gray, Zool. Proc. 1847, p. 188.

TEREDININA, (part.), Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386.

Genus KUPHUS, Guettard.

CUPHUS, Guettard, Mem. iii. p. 139. Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 381.

KUPHUS, Gray, Syn. Br. Mus. 1840. Adams, Genera, ii. p. 648.

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*Kyphus*, Agassiz.

*Furcella*, Lamarck, Syst. p. 104, 1801, *note*. Gray, Zool. Proc. pt. 25, p. 243 and pt. 26, p. 258. Gray, Ann. and Mag. Nat. Hist. 3d ser. i. p. 295; and ii. p. 374. Menke, Synops. Meth. edit. 2, p. 122. Oken. Zool.

*Septaria*, Lamarck, Anim. sans. Vert. v. p. 436; id. edit. 2, vi. p. 32. Anton, Versuch. p. 1. Blainville, Dict. Sc. Nat. xxxii. p. 362. Blainville, Malacol. p. 581. Deshayes, Traite Elem. i. pt. ii. p. 40. Deshayes, Encyc. Meth. iii. p. 246. Hanley, Desc. Cat. p. 3. Latreille, Fam. Nat. Potiez et Michaud, Gallerie, ii. p. 271. Rang. Man. p. 349. Schweigg, Naturg. 1820, p. 601. Sowerby, Conch. Man. ed. 2, p. 255. Voigt, Cuv. Thier. iii. p. 570.

*Septana*, Fisch. Bibl. Pal. 1834, p. 273, error typ.

*Leptana*, Gray, Ann. and Mag. N. Hist. 2d ser. viii. p. 386, error typ.

*Teredo*, (part.), Adams, Genera, ii. p. 333. Catlow, Conch. Nomenc. p. 2. Deshayes, Note in Lam. Anim. s. Vert. edit. 2, vi. p. 39. Fischer, Journ. Conchyl. 2d ser. i. p. 132. Home, Philos. Trans. 1806, p. 276. Home, Anat. Comparit. Jay, Cat. 4th edit. p. 9. Wood, Index Test. t. 38.

*Serpula*, (part.), Linnæus, Syst. Nat. edit. 10, p. 787; and edit. 12, p. 1266. Linnæus, Mus. Ulric. p. 700. Gmelin, Syst. Nat. p. 3739. Hanley, Shells of Linn. p. 446. Pallas, Spicil. Zool. p. 140. Schröter, Einleit. ii.

*Solen*, (part.), Hebenstr. p. 295. Humphrey, Conch. Klein, De Tub. p. 3. Lesser, Conch. p. 139. Rumphius, Mus.

*Clausaria*, Menke, Syn. Meth. edit. 1, 1828.

#### K. *arenarius*, Linn. sp.

*Serpula arenaria*, Linnæus, Syst. Nat. ed. 10, p. 787. Linnæus, Mus. Ulric. p. 700. Hanley, Shells of Linnæus, p. 447. Pallas, Spicil. Zool. p. 140.

*Solen arenarius*, Rumphius, Mus. t. 41, f. d. e. Klein, De Tub. p. 3. Hebenstr. p. 295.

*Septaria arenaria*, Lamarck, Anim. sans. Vert. v. p. 437; ed. 2, vi. p. 33. Deshayes, Traite Elem. i. pt. 2, p. 44. Hanley, Desc. Cat. p. 3. Potiez et Michaud, Gallerie des Moll. ii. p. 271.

*Leptana arenaria*, Lamarck, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386, (typo. error.)

*Teredo arenaria*, Catlow, Conch. Nomenc. p. 2. Gray, Phil. Mag. 1827, p. 410. Jay, Catalogue, 4th edit. p. 9.

*Teredo arenarius*, Deshayes, Note in Lam. Anim. sans Vert. 2d ed. vi. p. 39.

*Cuphus arenarius*, Gray, Ann. and Mag. Nat. Hist. 2d ser. viii. p. 386.

*Kuphus arenarius*, Adams, Genera, ii. p. 648.

*Serpula gigantea*, Schröter, Einl. ii. p. 557.

*Septaria gigantea*, Chenu, Man. de Conchyl. ii. f. 67.

*Furcella gigantea*, Gray, Zool. Proc. pt. 25, p. 243, t. 39, f. 1—3; id. pt. 26, p. 258; id. Ann. and Mag. Nat. Hist. 3d ser. p. 295; and ii. p. 374.

*Teredo gigantea*, Home, Philos. Trans. 1806, p. 276, t. 10; and 11, f. 1—7. Home, Anat. Comparit. ii. t. 41. Adams, Genera, ii. p. 333. Dillwyn, Desc. Cat. p. 1087. Fischer, Journ. Conchyl. 2d ser. i. p. 132. Wood, Index Test. t. 38, f. 1.

*Serpula polythalamia*, Linnæus, Syst. Nat. ed. 12, p. 1266. Gmelin, Syst. Nat. p. 3742. Hanley, Shells of Linnæus, p. 446. Schröter, Einleit. ii. p. 549.

*Solen corrugatus*, Klein, De Tub. p. 5. Lesser, Conch. p. 139.

*Serpula anguina*, Var. B. Gmelin, Syst. Nat. p. 3743.

Martini, Conch. Cat. 1, p. 40 and 45, t. 1, f. 6, 11.

Davilla, Cat. Syst. p. 97, 102.

Seba, Mus. iii. t. 94.

*Hab.*—Philippine Islands, Van Dieman's Land, East Indies.  
Coll. Acad. Nat. Sciences.

*Description.*—Valves wanting. Tube contorted somewhat, gradually increasing in diameter to the base, and growing to the length of three feet. The siphonal end is divided into two internal tubes by a transverse partition. External surface roughened, by its contact during growth with surrounding objects, and exhibiting impressions of pebbles, shells, &c. Diameter at base one and a half inch inches, at siphonal end, three-quarters inch. Base rounded, "closed by two overlapping, convex septa, arising from the sides and completely closing the ends. The tube is thickened above as the animal leaves it, and is much thinner near the lower or closed extremity,"\* just around which are scattered small perforations for the admission of water to the animal.

Pallets about one inch or more in length, the stalk gradually increasing into a triangular blade, the end of which is truncate on one side and two-horned on the other side.

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*Oct. 7th.*

DR. RUSCHENBERGER in the Chair.

Eighteen members present.

The following paper was presented for publication :

Monograph of the prehensile-tailed *Quadrupana*. By J. H. Slack,  
M. D.

Mr. Kilvington gave an account of his attempts at cultivating a number of living plants brought by Dr. Hayes from the Arctic region and presented to the Academy. Notwithstanding great care, he had failed in developing the plants to any extent. Though kept in the coolest places, yet the high temperature of our latitude appeared to destroy all after budding and the seeds after germinating. The young plants and seeds were planted in the original soil which accompanied them. They began to perish when the temperature reached 50° F.

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*Oct. 14th.*

MR. CASSIN in the Chair.

Nine members present.

The following paper was presented for publication :

Description of a new species of *Cephalopod*. By W. M. Gabb.

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*Oct. 21st.*

Vice-President VAUX in the Chair.

Seventeen members present.

The following papers were presented for publication :

On the Limits and Affinity of the Family of *Leptoscopoids*, and On the Classification of the *Squali* of California. By Theo. Gill.

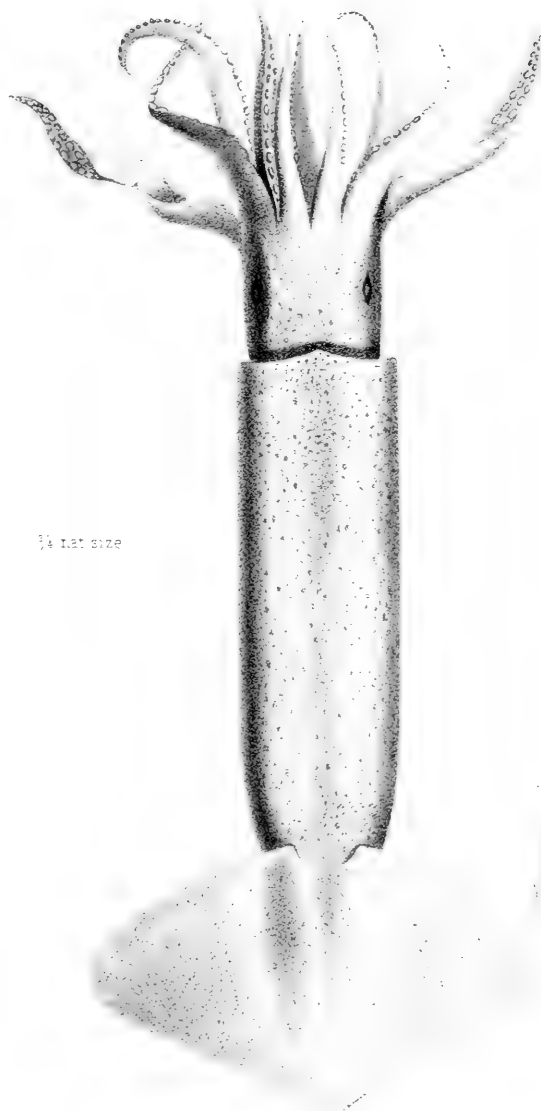
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*Oct. 28th.*

Vice-President VAUX in the Chair.

Fourteen members present.

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Ibbotson, on stone

OMMASTREPHES TRYONII, GABB.



On report of the respective Committees, the following papers were ordered to be published in the Proceedings:

**Description of a new species of CEPHALOPOD from the Coast of California.**

BY W. M. GABB.

**OMMASTREPHES TRYONII.**—Body large, subcylindrical for about two-thirds of its length, posterior third tapering, acute at the extremity. Fins between one-third and one-fourth the length of the body, nearly twice as broad as long, rhomboidal; angles rounded. Anterior of the body truncated at a right angle to the length and with a slight angle on the dorsal median line. Siphon short broad, head small, not wider than the body, flattened above (and at the sides?) Eyes small. Sessile arms robust, short, compressed: comparative length 4, 2, 1, 3, the dorsal being the shortest, although they are all of nearly equal length. The second and third pair are so compressed that the caps appear to be arranged in a single line. The lower half or two-thirds of the outer side of the dorsal and the whole of the same portion of the other arms are fringed with a narrow membrane. The inner side of the third pair is also fringed on each side of the cupules.

The cupules are all small, but the bordering rows of teeth are well marked. Tentacular arms compressed, very little longer than the longest pair of sessile arms. Cupules arranged on the distal two-fifths, largest in the middle, becoming very small towards each end. Mouth small, the surrounding membrane without cupules, with a bifurcating process between the dorsal pair of arms and one extending to each of the other sessile arms. Surface flesh colored, covered with small dots, sparsely placed on the lower side and pinkish; on the back these dots are nearly black and placed close together so as to produce a mottled appearance. Between the back and sides there is a well marked lighter band extending from the edge of the fins to the anterior end of the body.

Shell narrow, pointed in front and tapering backwards regularly, except the last half inch which is dilated into the usual slipper-like process.

Length of body 5.5 in.; circumference 3 in.; length of fin 1.8.; width of fin 3.4 in.; length of head .8 in.; breadth (about) .9 in.; length of longest sessile arm 2.1.; length of shortest 1.5 in.; length of tentacular arm 2.5 in.; length of siphon (about) .5 in.

*Locality.* Coast of California?

The specimen was presented to me by Dr. W. O. Ayres, of San Francisco, and was found in a lot of salt, most probably from near Point Conception. The colors are well preserved, but the specimen is so soft after relaxation that the exact form of the head cannot be determined.

It resembles *O. sagittata*, d'Orb., in both external form and the shape of the shell. It differs from that species, however, in the much shorter tentacular arms and the broader fin. The shell, which is pointed in nearly the same manner anteriorly, tapers regularly, while in d'Orbigny's species it is suddenly constricted.

**On the Classification of the Families and Genera of the SQUALI of California.**

BY THEODORE GILL.

In continuing at intervals the study of the Elasmobranchiate Fishes, I have felt obliged to modify several portions of the classification of the Squali that have been adopted in the "Analytical Synopsis of the order," from previous 1862.]

laborers on that group. Happily those families whose arrangement most requires modification are represented by species found along the coasts of California. I therefore, submit through the medium of a classification of those species, some of the changes which appear to be necessitated in the present state of our knowledge.

Order *SQUALI* (Müller et Henle) Agassiz.

Suborder *SQUALI* Gill.

*Squalidæ veri Bonaparte*, *Selachorum Tabula Analytica*, p. 4, 1838.

Pectoral fins produced directly outwards, or curved backwards from the anterior basal angle.

Caudal fin heterocercal and with a more or less developed inferior lobe procurrent forwards beneath the vertebral column.

Family *GALEORHINOIDÆ* Gill.

*Les Squales* sp. *Cuvier*, *Regne Animal*, tome ii. p. 123, &c., 1817.

*Squalidæ*, (16) *Squalini*, (19) *Triænodontini* *Bonaparte*, *Selachorum Tabula Analytica*, p. 5.

*Carchariæ* part.

*Triænodontes*

*Galei*

*Scylliodontes*

*Musteli*

*Nictitantes* *Owen*, *Lectures on Comparative Anatomy*, vol. ii. p. 51, 1846.

*Carcharidæ* } *Richardson*, *Encyclopædia Britannica*, vol. xii. (Ichthyology) p. 323.

*Galeidæ* } *Bleeker*, *Enumeratio Specierum Piscium hucusque in Archipelago*

*Carchariodei* } *Indico Observatorium*, &c., pp. 11, 12.

*Galeoidei* } *Indico Observatorium*, &c., pp. 11, 12.

*Galeorhinoidæ* *Gill*, *Analytical Synopsis of the Order of Squali*, pp. 29, 30, 33.

Body elongated, subcylindrical, gradually tapering towards the caudal fin.

Scales minute, more or less rhomboid and imbricated, and generally surmounted by longitudinal keels.

Head more or less depressed and plane, oblong, semi-elliptical or conic above, with the snout projecting on the plane of the head, with its margin thin, more or less rounded, and declining obliquely backwards to the mouth.

Eyes lateral, submedian or anterior, with the nictitating membrane distinct.

Mouth inferior, large and arched in front.

Teeth compressed, with trenchant and entire or serrated edges (*Galeorhininae*), or small and paved.

Nostrils inferior, and near the sides of the snout; simple and generally with a triangular flap from the anterior or inner border.

Spiracles, obsolete or developed.

Branchial apertures five, the last of which are small, and above the base of the pectoral fin.

Dorsal fins two; each is curved towards the anterior angle which is rounded and more or less projecting, especially that of the first fin, while the posterior angle is acutely produced backwards. First dorsal large and situated more or less in advance of the ventral fins; second moderate or small, and above or nearly above the anal fin.

Anal fin generally similar to the second dorsal in form and size, rounded at its anterior angle, and acutely produced behind.

Caudal fin decidedly heterocercal; the upper or vertebral lobe moderately elongated and abruptly curved upwards and backwards, and with the mem-

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brane notched at its inferior margin near the end and forming a triangular lobe; the inferior or basal lobe is moderate or small.

Pectoral fins more or less falciform, rounded at the external angle, and with the posterior margin subtruncated or sinuated and incurved to the inner angle which is also rounded.

Ventral fins inserted more or less behind the middle, oblong or trapezoidal, rounded at the anterior angle and acute at the posterior.

The family of the Galeorhinoidæ as it has been now circumscribed, appears to be a very natural group, all the types included therein agreeing in physiognomy and general form, and for the most part differing from each other in details of secondary value. The only characteristics of greater than generic value are the more marked peculiarities of dentition, and the presence or absence of spiracles. Müller and Henle have attached much importance to such characters, and have regarded them as distinguishing five families. As, however, none of those characters are co-ordinate with others, the value assigned to them by those biologists appears to be much greater than they merit, and scarcely even sufficient to base subfamilies upon. The most important and trenchant variation in the family is found in the dentition of the genus *Mustelus* as opposed to that of all the other types. The latter may therefore be combined in one subfamily, while *Mustelus* can be regarded as the type of a second one. The typical subfamily of the Galeorhininæ is then subdivisible into four minor groups equivalent to families of Müller and Henle, and only characterized by the various combination of two characters. The following synoptical view will facilitate the recognition of the several groups.

- I. Teeth compressed and trenchant..... GALEORHININÆ.
  - A. Spiracles obsolete in adults.
    - Teeth without lateral prongs..... Cynocephali.
    - Teeth with one or two lateral prongs on each side..... Triænodontes.
  - B. Spiracles developed.
    - Teeth with lateral prongs..... Scylliodontes.
    - Teeth without lateral denticles..... Galeorhini.
- II. Teeth flat and paved..... MUSTELINÆ.

#### Subfamily GALEORHININÆ Gill.

- Squalini }
  - Triænodontini } *Bonaparte*, *Selachorum Tabula Analytica*, p. 5.
  - Caschariæ pp. }
  - Triænodontes } *Müller and Henle*, *Systematische Beschreibung der Plagistomen*,
  - Galei } pp. 28, 55, 57, 63.
  - Scylliodontes }
  - Squaliana pt. }
  - Leptochariana } *Gray*, *List of the Specimens of Fishes in the Collection of the*
  - Galeiana } *British Museum*, part 1, *Chondropterygii*, pp. 40, 51, 52, 55.
  - Triakiana }
- Galeorhininæ *Gill*, *Analytical Synopsis of the Order of Squali*, pp. 33, 35.

Teeth compressed and cultrate, smooth or serrated and with or without lateral denticles.

Spiracles obsolete or of small size.

#### Group SCYLLIODONTES Müller and Henle.

- Scylliodontes *Müller and Henle*, *Systematische Beschreibung der Plagiotomen*, p. 63.
- Scylliodontidæ *Girard*, *Explorations and Surveys for a Railroad Route, &c.*, vol. x. *Fishes*, p. 362.

Teeth scyllioid, or each one with one or two prongs on each side of the large central pointed one.

1862.]

Spiracles of small size, developed.

To this group are now referred two genera.

#### Genus RHINOTRIACIS Gill.

Body compressed, elongated and subfusiform in profile.

Scales tricarinated.

Head oblong, with the snout produced, oblong and attenuated towards the transversely rounded apex.

Eyes rather small.

Mouth moderate and boldly arched in front. The grooves at the corners are well defined and the upper lip folds over the lower.

Teeth with an acute median prong and a smaller lateral one on each side.

Nostrils nearer the mouth than the front of the snout, obliquely transverse and with a wide convex flap arising from the anterior or inner border of each aperture.

Dorsal fins nearly similar in form, obliquely produced upwards towards the anterior angle, which is rounded; acutely produced backwards from the posterior angle; the first dorsal is intermediate between the pectoral and ventral fins.

Anal fin similar to the second dorsal.

Caudal fin with a terminal triangular lobe, and with the membrane above the vertebral column moderately developed; inferior lobe scarcely produced downwards from the anterior angle.

Pectoral fin moderate, extensible partly under the first dorsal, rounded at each angle and subtruncated behind.

Ventral fins trapezoid, rounded at the external angle.

*Rhinotriacis* is very closely related to *Triacis*, but is separable from that genus on account of the produced snout, the position of the first dorsal fin and perhaps the greater development of the pectoral fins. It has a superficial resemblance to the genus *Isoplagiodon* of the group of Galeorhini produced by the situation of the first dorsal fin and the elongation of the snout, as well as its color, but the dentition, the presence of spiracles as well as the form and relative position of the fins at once distinguish it.

The only known representative of this genus is Californian; a single young specimen of the species was sent to the Smithsonian Institution by Mr. Samuel Hubbard, and referred to as a species with the aspect of *Isoplagiodon* immediately after the *Triacis semifasciatus*. It differs from the species of *Triacis* in color as well as morphological characters, being uniform reddish-brown above, and greyish-white below, with which color the pectoral, ventral and anal fins are also margined.

#### RHINOTRIACIS HENLEI Gill.

(The following table of measurements will suffice for the identification of the species. It is hoped that older specimens may be obtained in time to prepare a complete description for a work on the Fishes of Western America. The umbilical cord of the specimen noticed has entirely disappeared.

The base of each fin is considered as being on a level with the body; the height is measured in an oblique direction parallel with the axis of cleavage of the fin; the greatest breadth is parallel with the base or terminal margin, and crosses obliquely the line of cleavage.

Extreme length  $9\frac{1}{2}$ .

Body—Greatest height 10; greatest width 6; height of tail behind anus 4; least height of tail  $2\frac{1}{2}$ .

Head—Greatest length 18; greatest width 12; height of snout  $7\frac{1}{2}$ .

Eye—Diameter  $4\frac{1}{2}$ ; distance from snout 9.

Mouth—Width  $6\frac{1}{2}$ ; depth from symphysis of jaw to line between corners of mouth 3.

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Dorsal—Distance from snout 30; length of base 10; length of horizontal "posterior" margin  $4\frac{1}{2}$ ; greatest oblique height 9; (second) distance from snout 58; length of base 8; length of posterior (horizontal) margin  $3\frac{1}{2}$ ; greatest (oblique) height 7.

Anal—Distance from snout 61; length of base 6; greatest height 4; height behind to point  $3\frac{1}{2}$ .

Caudal—Length 23; length of inferior lobe 15; oblique height of lobe near front 5; oblique height at end  $1\frac{1}{2}$ ; greatest height of terminal lobe  $3\frac{1}{2}$ .

Pectoral—Greatest length  $12\frac{1}{2}$ ; length within internal border 9; greatest width  $8\frac{1}{2}$ .

Ventral—Distance from snout 33; greatest length (from base to inside of outer angle)  $5\frac{1}{2}$ ; length within internal border 4; greatest width 6.

#### Genus TRIACIS Müller and Henle.

Triakis Müller et Henle, Magazine of Natural History, vol. ii. 1838.

" Bonaparte, Selachorum Tabula Analytica, 1838.

" Müller et Henle, Systematische Beschreibung de Plagiostomen.

" Girard, Explorations and Surveys for a Railroad Route, &c., vol. x. Fishes, p. 362.

Body compressed, elongated and scarcely subfusiform in profile.

Scales provided with three keels producing a tridigitate margin.

Head scarcely oblong, with the snout short and transverse, the anterior margin being arched or convex.

Eyes rather small, and nearly above the angles of the mouth.

Mouth large and transversely arched. The groove at each corner of the mouth is very sharply defined, and the upper lip folds over the angle of the lower.

Teeth with a large acute median prong, and two smaller oblique ones on each side; the unpaired symphyseal tooth is symmetrical.

Nostrils nearer the mouth than the front of the snout, transverse and with a wide convex flap arising from the anterior (inner) border.

Dorsal fins similar in form, obliquely produced towards the anterior angle which is rounded; acutely elongated from the posterior angle; the first fin is rather nearer the ventrals than the pectorals; the second is smaller and partly in advance of anal.

Anal fin similar to second dorsal.

Caudal fin with a terminal triangular lobe, and with the membrane above the vertebral column moderately developed; inferior lobe obsolete or scarcely produced downwards and obtuse.

Pectoral fin rather small, rounded at each angle, not extending beyond the front margin of first dorsal.

Ventral fins trapezoidal, rounded at the external angle.

Type.—Triakis scyllium M. and H.

Two species of this genus are known; Triakis semifasciatus Girard, from California; Triakis scyllium Müller and Henle from Japan.

#### TRIACIS SEMIFASCIATUS Girard.\*

Triakis semifasciatus Girard, Proc. Academy of Natural Sciences of Phila., vol. vii. p. 196, 1854.

Mustelus felis Ayres, Proc. California Academy of Natural Sciences, part 1, p. 17, 1854.

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\* The following name probably belongs to the synonymy of *Triakis semifasciatus*, but as it has never been joined to a description, the suggestion can be only verified by one having access to the British Museum. It is scarcely necessary to add that such a verification will not at all influence the nomenclature of the species, the name being a worthless synonym by default of description.

Triakis californica Gray, List of Specimens of Fish, in the Collection of the British Museum, part 1, *Chondropterygii*, p. 56, 1851.

*Triakis semifasciatus Girard*, explorations and Surveys for a Railroad Route, &c. vol. x. *Fishes*, p. 362.

Family *HETERODONTOIDÆ* Gill.

*Les Squalus partim* } *Cuvier*, *Regne Animal*, tome ii. 1817.  
*Squalus*

*Cestraciontes Agassiz*, *Poissons Fossiles*, tome ii. 1833.

*Squalidæ veræ* (*Cestracionini*) *Bonaparte*, *Selachiorum Tabula Analytica*, p. 5, 1838.

*Squalidæ* (*Centrininæ*) *Swainson*, *Natural History of Fishes*, &c., vol. ii. p. 1839.

*Cestraciontes Müller and Henle*, *Systematische Beschreibung der Plagiostomen*, p. 76, 1841.

*Cestraciones Müller*, *Arc.* 1, 1317, 1845.

*Cestraciontidæ Owen*, *Lectures on the Comparative Anatomy and Physiology of the Vertebrate Animals*, p. 51, 1846.

*Squalidæ* (*Heterodontina*) *Gray*, *List of the Specimens of Fish in British Museum*. *Chondropterygii*, p. —, 1857.

*Cestraciontoidæ Bleeker*, *Systematis Piscium Naturalis Tentamen*.

*Heterodontoidæ Gill*, *Analytical Synopsis of the Order of Squali*, p. 29, 30, 37, 1862.

*Squalidæ* (*Cestraciontini*) *Bonaparte*, *Syst. Vert.*

Body elongated and obtusely trihedral, gradually tapering from the anal region towards the caudal fin.

Scales very small.

Head high, with the forehead declivous and the snout little prominent.

Eyes lateral, but very high on the sides; nictitating membrane obsolete.

Mouth subterminal but inferior and more or less arched in front.

Teeth in front compressed and trenchant or digitated, on the sides arranged in whorls, paved and adapted for grinding.

Nostrils continued backwards to the mouth.

Spiracles small.

Branchial apertures five, moderate or small; the last above the base of the pectoral fin.

Dorsal fins two, each well developed and with a spine enveloped in the front of its margin; the anterior angle of each is rounded, and the posterior acute; the first fin above the interval between the pectoral and ventral fins; the second more or less behind the ventral fins, and remote from the caudal.

Anal fin small or moderate, below or behind the second dorsal fin, and remote from the caudal; the anterior angle is rounded but produced, and the posterior blunt.

Caudal fin heterocercal; the upper lobe moderate and with its under edge notched and lobed nearer the end, and with the portion above the ventral column enlarged; the lower lobe is small or moderate.

Pectoral fins normally developed, with each angle rounded, but towards the anterior produced.

Ventral fins moderate, inserted nearer the head than the tail, with each angle obtuse.

The characters of the family of *Heterodontoids* as here exposed are derived almost entirely from our knowledge of the species living at the present day. The earliest known living representative of the family, the Port Jackson shark, has become celebrated on account of the views of *Agassiz*, by whom it was considered as the type and sole existing representative of a family rich in peculiar genera and species at former epochs of the world's history. That naturalist has proposed to refer to the family of *Cestraciontes*, numerous vestiges of the representatives of the order of *Squali*, found in every formation from the earli-

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est period down to our own days. These vestiges are almost solely the more or less complete remains of teeth and spines. It is therefore by no means demonstrated that all such remains are indications of the pertinence of the species of which they are the witnesses, to the present family. All these remains require to be re-examined with reference to the present views held by naturalists regarding the nature of families. Such an examination will doubtless result in the disseverment of some of the genera known from such remains, from the family of Heterodontoids.

That family of Heterodontoids as now restricted, is distinguished among all the others representatives of the order by the peculiar form of the body and head. While in all the other recent sharks, the head is depressed and the snout above nearly parallel or on the same plane with the upper surface of the head, in the Heterodontoids, the head is elevated, the sides vertically expanded and the snout deflected downwards. The teeth form another very characteristic feature, those towards the front being incisorial or digitated, while those on the sides are molar and arranged in oblique whorls. Each dorsal is in front provided with a spine mostly enveloped in its substance, but with its point exposed. The simple teleological adaptation of the teeth of the ancient representatives of the Squali and their concurrence with spines have been the cause of the reference of those remains to the Cestracionts or Heterodontoids.

There are now known four living species of the family of Heterodontoids which appear to belong to three distinct genera, chiefly separated on account of the modifications of dentition, and the size of the branchial apertures. The several may be briefly distinguished by the following characters:

- I. Branchial region higher than long, the slits being elongated.. Heterodontus.
- II. Branchial region longer than high, slits little elongated.
  - a. Molar teeth rounded and carinated along the middle. Dorsals little produced towards the anterior angle. .... Tropicodorus.\*
  - β. Molar teeth flat and closely contiguous. Dorsals produced backwards to the anterior angle..... Gyropleurodus.

#### Genus GYROPLEURODUS Gill.

Cestracion sp. *Girard*.

Heterodontus sp. *Gill*.

Gyropleurodus *Gill*, Proc. Academy of Natural Sciences of Phila., vol. xiv. p. 330, July (Sep.), 1862.

Body triquetrous in front, behind the anus attenuated and compressed towards the caudal fin.

Head short and high, broad, but with subvertical sides, with the forehead very declivous from eyes, and with the snout wide and transverse, but prominent. Two blunt diverging ridges are continued from each side of the snout and abruptly merge into the more conspicuous superciliary ridges, the interval between which is nearly plane. Inferior surface of head plane.

Eyes entirely lateral, protected above by the superciliary ridge.

Mouth inferior, but near the front, with the cleft semi-elliptical but externally transverse and simply arched in front. The branches of the jaws are separated by an ovate-triangular space, wide and rounded in front and thence curved outwards to the angles.

Teeth in front digitated with three or five cusps, quincuncially distributed in rows slightly converging towards the middle; in the upper jaw on the sides, molars oblong and flattened, arranged in about four oblique whorls, uniform or increasing backwards, except the last, which is smallest. On the sides of

\* With this genus I am only acquainted through the figure and description of Valenciennes, who describes its type as the *Cestracion pantherinus* in the Ichthyology of the *Venus*, Voyage autour du monde sur le fregate la *Venus*, *Zoologie*, p. 350. *Ichthyologie*, pl. x. fig. 2.

the lower jaw also molars oblong, with flattened crowns, and arranged transversely oblique whorls, but decreasing backwards.

Upper lip narrow, emarginated in the middle, and with a median furrow; lower lip obsolete at middle, and developed laterally as a transverse flap, covered at the angle of the mouth by a duplicature or flap above.

Nostrils with a broad flap on the internal side, separated by a furrow from the lip, and with a roll of skin curled inwards on the external side.

Branchial apertures five, small and regularly decreasing in size, the branchial region being longer than high.

Dorsal fins rather large, similar in form, but first rather larger than second; each with a large compressed trihedral spine enveloped in the front margin, but separated partly by a slit and groove from the rest of the fin; the latter is recurved backwards towards the "anterior angle," which projects about as far behind as the posterior.

The present genus is an interesting addition to the living representatives of the ancient family of Heterodontoids, to which it belongs. It decidedly differs from *Heterodontus*\* in the development of the jaws, dentition and the size of the branchial apertures. In the latter genus, the branches of the lower jaw are at first contiguous and diverge from each other at an acute angle, while in front of the oblique whorls of molars and between the acute teeth of the front, which encroach on the sides, a cordiform area exists. The lateral or molar teeth are numerous and arranged in oblique whorls, which rapidly increase in size to the fifth, behind which they again decrease. The branchial apertures are also comparatively large, the first being longer than the length of the branchial region. In *Gyropleurodus*, the branches of the lower jaw are widely separated by an interval rounded in front and becoming wider behind, the sides themselves being curved outwards; the acute teeth are confined to the front, and the molar teeth are few and disposed in about four whorls, the first three of which slightly decrease, while the fourth is almost rudimentary. The branchial area is also almost oblong. There will be few, I think, who will not at once admit the value of these characters and allow their generic importance. Upon differences of much less value, many acknowledged genera of Squali have already been established.

The genus *Tropidodus*, established for the reception of the *Cestracion pantherinus* of Valenciennes, differs from *Gyropleurodus*, at least in the keeled and rounded molar teeth of the sides of the jaw, and the smaller dorsal fins, the anterior angles of which project comparatively little backwards.†

#### GYROPLEURODUS FRANCISCI Gill ex Girard.

*Cestracion francisci* Girard, Proc. Academy of Natural Sciences of Phila., vol. vii. p. 196, 1854.

*Cestracion francisci* Girard, Explorations and Surveys for a Railroad Route, &c., vol. x. Fishes, p. 365.

*Heterodontus francisci* Gill, American Journal of Science and Art, ser. 2, vol. xxx. p. 281, 1860.

*Gyropleurodus francisci* Gill, Proc. Academy of Natural Sciences of Phila., vol. xiv. p. 330, 1862.

(On account of the interest attached to the representatives of the family of Heterodontoids, the following extended description of *Gyropleurodus francisci* is submitted.)

\* The following is the diagnosis of the genus *Heterodontus*, published by Blainville:

6°. *Heterodontus*, Car. Dent. heteroelitis; Insp. nullis; P. S. [Pinnis superioribus vel dorsalibus.]  
2 ut in precedenti; P. A. magna; P. C. ferè ut in præced.

Spec. Philippi.

† "Le bouche n'est pas très-large, elle parte en avant cinq à six rangs de petites dents aiguës, ayant à la base deux petits tubons épineux, puis viennent sur les côtés des mâchoires six rangées de molaire arrondies et carénées sur le milieu."—*Valenciennes*.

*Form.*—The body is triquetrous in front, declining from the dorsal ridge to the sides of the plane abdomen. The greatest height equals an eighth ( $\cdot 12$ ) of the total length from the snout to the vertical from the end of the caudal fin. The greatest breadth is a fourth greater ( $= \cdot 15$ ) than the height. Behind the anus and ventral fins the tail becomes abruptly slender and compressed, the height entering fourteen times ( $= \cdot 07$ ) in the length and about twice as high as at the base of the caudal ( $= \cdot 03\frac{1}{2}$ ). The back in front of the dorsal gently declines and meets the forehead, from which it is separated by a slight groove, and is itself furrowed in the middle.

*Head.*—The head from the snout to the branchial region forms more than a sixth ( $\cdot 17\frac{1}{2}$ ) of the length. The height at the forehead equals  $\cdot 10\frac{1}{2}$ , and at the margin of the superciliary ridge a ninth ( $\cdot 11$ ) of the total length. The width between the external margins of the superciliary ridge nearly equals a twelfth ( $\cdot 08$ ) of the same length, and the greatest width at the cheeks is nearly twice as great ( $= \cdot 15$ ). The forehead or interorbital area is nearly plane between the superciliary ridges or scarcely convex along the middle. The superciliary ridges are blunt, very hard, angulated and obliquely truncated behind, and incurved inwards; they merge into the widening but less conspicuous ridges in front, which are continued to the snout, where they are separated by a shallow furrow and a slight depression; the rest of the profile is channelled. The cheeks are very tumid.

*Eyes.*—The eyes are oval; the longitudinal diameter between the skin about equals a sixth ( $\cdot 03$ ) of the head's length, and that of the outer ring a fourth ( $\cdot 04\frac{1}{2}$ ). The distance from the snout equals a half ( $\cdot 09$ ) of the head's length.

*Mouth.*—The mouth is transverse, the margin of the lower jaw describing the three sides of a nearly regular octagon, and the distance from one corner to the other equals a twelfth ( $\cdot 08$ ) of the total length, and four-fifths of the width of the head at the same vertical. The patch of teeth encroaching on the outside of that jaw is transversely fusiform.

*Teeth* in front of each jaw digitated, with a median cusp and two on each side, which become lateral and directed outwards on teeth next to the symphysis; they are arranged in five rather oblique rows, each row in the upper jaw having six on each side of the symphyseal ones, and in the lower, four. The area with molar teeth equals in length the width between the lower lips.

*Fins.*—The first dorsal originates at the vertical from the beginning of the last third of the base of the pectoral fin, or near the front of the second fourth of the total length ( $27\frac{1}{2}$ ). Its attached base nearly equals a twelfth ( $\cdot 08$ ) of the same length, and the free-extension backwards to the posterior angle a sixteenth ( $\cdot 06$ ). The spine is rectilinear, rather exceeds a tenth of the length, and its compressed base forms half of the base of the fin itself. The margin of the fin describes a parabolic curve backwards to the "anterior angle," which is obliquely rounded and projects rather farther backwards than the "posterior angle;" the latter is little acute, and the margin between it and the anterior is vertical and little emarginated. The greatest (oblique) height rather exceeds an eighth ( $\cdot 13$ ) of the total length.

The second dorsal is similar in form to the first, but less elevated in proportion, and with the anterior angle not extending beyond the posterior, and the emargination deeper. The distance from the snout exceeds a half ( $\cdot 54$ ) of the total length, and that from the posterior angle of the first dorsal equals the base of that fin to such angle. Its base equals about a fourteenth ( $\cdot 07\frac{1}{2}$ ) of the length, and the posterior angle extends nearly a nineteenth ( $\cdot 05\frac{1}{2}$ ) more behind. The spine is rather more oblique than that of the first dorsal; its base forms two-thirds of that of the entire fin, and its length equals a tenth of the total. The greatest (oblique) height of the fin equals a ninth ( $\cdot 11$ ) of the total length.

The anal fin commences at the middle between the sixth and seventh-tenths ( $\cdot 65$ ) of the length, or rather in advance of the posterior angle of the second  
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dorsal; it is directed very obliquely backwards and passes slightly beyond the base of the caudal; its greatest (oblique) height rather exceeds a ninth of the length, and its base equals about a twentieth; the anterior angle is broadly rounded and passes much beyond the posterior; the (oblique) height behind equals the base, or a twentieth of the length.

The caudal fin is bent obliquely upwards, and its (oblique) length nearly equals a fourth ( $\cdot 24$ ) of the total; the vertebral column is regularly attenuated and disappears near the truncated posterior margin; the elevation above the lower boundary of the column is slightly greater behind the middle of the fin, and equals almost a twentieth of the total length. The greatest height or width of the upper caudal lobe, just before its vertically truncated end, is rather less than a tenth ( $\cdot 09\frac{1}{2}$ ) of the length; its angles are rounded; the distance from the base of the lower lobe to its upper angle enters about five times and two-thirds ( $\cdot 17\frac{1}{3}$ ) in the length; the posterior margin is slightly oblique and emarginated; the upper angle extends rather beyond the lower; the greatest depth (or width) in front of the angles is rather more than a tenth ( $\cdot 10\frac{1}{2}$ ) of the length.

The pectoral fin is subtriangular; the outer margin is first curved and thence is produced in nearly a straight line outwards and backwards to the external angle; the posterior border is nearly straight and scarcely more produced towards the exterior than the inner angle; the latter is more broadly rounded than the outer; the distance from the front of the base to the outer angle is little less than a quarter of the length ( $\cdot 24\frac{1}{2}$ ), and a fourth greater than the distance from the same point to the margin outside of the inner angle ( $= \cdot 18$ ), or the width of the fin before the angles ( $\cdot 18$ ). The fin extends almost as far backwards as the posterior angle of the first dorsal.

The ventral fins originate at the beginning of the second-fifth ( $\cdot 40$ ) of the total length and considerably behind the vertical from the "anterior angle" of the first dorsal; they are oblong, quadrangular, slightly overlapping towards the middle of the inner borders, slightly emarginated and with the angles equally rounded; the length equals an eighth of the total and the greatest breadth almost an eleventh.

*Scales*.—The scales are more or less cruciform or shaped like a Greek cross, and often with each end divided. They are rather small, there being about forty oblique rows beneath the attached base of the first dorsal fin. Those on the inferior surface of the body and of the pectoral and ventral fins, as well as the anal and caudal, are polished and more or less cordiform.

*Color*.—The color is brownish, variegated with sparsely-scattered, small black spots on the entire body and fins.

#### Family NOTIDANOIDEÆ Owen ex M. and H.

Les Squales partim } *Cuvier*, Regne Animal, tome ii. p. 123 (128), 1817.  
Squalus }

Squalidæ veræ (Notidiani) *Bonaparte*, Selachorum Tabula Analytica, p. 4, 1838.

Notidani *Müller and Henle*, Systematische Beschreibung der Plagiostomen, p. 80.

Squalidæ (Hexanchina) *Gray*, List of Species of Fish in British Museum. Chondropterygii, p. 40, 67, 1851.

Notidanidæ *Owen*, Comparative Anatomy of the Vertebrated Animals, vol. i. p. 51, 1846.

Notidanoidei *Bleeker*, Systematis Piscium Naturalis Tentamen.

Notidanoideæ *Gill*, Analytical Synopsis of the Order of Squali. p. 38; *ib.* in Annals of the Lyceum of Nat. Hist. of N. Y. vol. vii. p. 404.

Body elongated, somewhat depressed before, tapering towards the caudal fin.

Scales minute and generally pointed and traversed by one or three keels. Lateral line present on each side of the back.

Head depressed, oblong and semi-oval or semi-elliptical above, with the snout projecting, indicated by more or less distinct constriction at the anal

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region, with its margin rounded, and thence declining very obliquely backwards to the mouth.

Eyes submedian or anterior, without nictitant membranes.

Mouth inferior, ample and arched in front.

Teeth in the lower jaw compressed, transverse and acutely multicuspoid; in the upper dissimilar.

Nostrils inferior, provided at the upper front or margin with a small flap.

Spiracles, small.

Branchial apertures all in advance of and dissimilar in size to the pectoral fins; in the known species there are six or seven on each side.

Dorsal fin single, angulated and produced toward the anterior angle, acute at the posterior above or in advance of the anal; first obsolete.

Anal fin present, similar in form to the dorsal.

Caudal fin heterocercal; the vertebral lobe is moderately elongated, and has beneath near its end a small triangular lobe; the inferior basal lobe is moderate or small.

Pectoral fins moderately developed, rounded at each end produced towards the external.

Ventral fins normally developed, inserted as near or nearer the head than the tail, rounded at the anterior and acute at the posterior or inner angle.

The family of the Notidamids is distinguished from all others of the order by the absence of the first dorsal fin. The increased number of branchial apertures, the dentition, common to all of its known species, and the form of the head and body support the claims of the group to family rank. The situation of the branchial apertures in front of the pectoral fins recalls a character of the Lamnoidæ, a family including the Porbeagle, great white shark and basking shark.

#### Genus NOTORHYNCHUS, Ayres.

*Notorhynchus Ayres*, Proc. California Academy of Natural Sciences, vol. i. p. 72, 1855.

*Heptanchus*, sp. *Müller and Henle, Gray, Girard, Gill.*

Body depressed over abdomen, thence becoming subcylindrical and tapering backwards.

Dorsal line conspicuous.

Head oblong, depressed and ovoid above, with the snout wide, and with its periphery transversely rounded, but more or less constricted at the nasal region, and very prominent.

Eyes moderate, over or in advance of the middle of the side of the jaws.

Nostrils at horizon of eyes, more or less in advance of mouth, oblique and with a small triangular flap on the hinder margin.

Teeth of the upper jaw chiefly developed at the front on each side of the symphysis (2—3) simple, acute and curved outwards, or rectilinear with the bases increasing outwards as the teeth severally recede from the symphysis, first (1—2) assuming a smaller external pointed cusp and thence becoming still wider and pectinated on their obliquely declining margins on the outer side of the greater cusp; those at and near angle formed by the front and side of jaw bone serrated, and one or two small cusps on the inner ascending margin of the greater one; teeth of the laterals of the jaw rather abruptly decrease in size. Teeth of the lower jaw uniform, broader, each obliquely diminishing in height outwards, digitated by oblique cusps decreasing from the first, which is minutely serrated on its ascending margin; median unpoised tooth small, with no median cusp but two or more directed outwards.

Dorsal fin moderate, acutely angulated at its posterior angle and obliquely emarginated above.

Anal fin about as large as dorsal, rather further behind, but partly under it, with the anterior angle less produced.

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Caudal fin elongated, with the anterior lobe in front produced downwards and nearly rectangular, and with the terminal one distinct and acutely triangular.

Pectoral fins moderate, trapezoid produced towards its external terminal angle.

Ventral fins oblong, emarginated along its external border, acutely produced at its inner or produced angle.

This generic name of *Notorhynchus* was proposed by Dr. Ayres, under a misapprehension, for a species which is congeneric with one regarded by all previous naturalists as a species of the genus *Heptanchus*. After an examination of the jaws of a shark presumed to belong to the species noticed by Ayres, and presented at Nisqually to one of the representatives of the Exploring Expedition under Commodore Wilkes, I am compelled to believe that such species should be separated from *Heptanchus*. The name of Ayres must then be adopted for the genus embracing that species.

*Notorhynchus* may be briefly characterized as a *Hexanchus* in form and dentition with the seven branchial apertures of *Heptanchus*. If the totality of its character is considered to be of more importance than the number of branchial apertures, *Notorhynchus* is then more closely related to *Heptanchus*, having the same form of the head and the same dentition, while it agrees with the latter only in the number of its branchial apertures.

In addition to the type of the genus, that species of the East Indian Seas first made known by Müller and Henle under the name of *Heptanchus indicus* must be referred to *Notorhynchus*. Like *Notorhynchus maculatus*, the East Indian species is spotted, and although it appears to differ considerably from the former in dentition, that difference cannot be regarded as being of more than specific importance.

The differences in the dentition of the genera *Heptanchus* and *Notorhynchus* principally refer to the relative development of the teeth of the lower jaw and their armature. In *Heptanchus*, the developed teeth on each side of that jaw regularly increase in breadth from the symphysis towards the corners of the mouth, the inner cusp is much enlarged, and its ascending or inner margin is armed with one or two smaller cusps. The median tooth of the lower jaw is also well developed and has a central acute cusp. In *Notorhynchus*, on the contrary, the teeth of the lower jaw are either uniform or decrease towards the corner of the mouth, the cusps on the oblique cutting margin are regularly graduated, while the ascending inner margin of each tooth is finely serrated. The median tooth is also emarginated instead of cuspidate at its own middle. The difference between the teeth of the upper jaw in the respective genera is of much less importance.

The typical or Californian species of *Notorhynchus* is closely related to the *Notorhynchus indicus*, but is at once distinguishable by its dentition,—the teeth of the lower jaw being comparatively broader and less elevated, and armed with six or seven points instead of five, and there being no very prominent denticles on the inner margin of the upper teeth near the front ones as there are in those of *N. indicus*. The dorsal appears also to be nearer the snout than it is in its Indian representative.

The *Notorhynchus maculatus* is said by Ayres to be "apparently not uncommon in the Bay of San Francisco, at certain seasons of the year." It attains to a length of six or seven feet, and is used as food by the Chinese inhabitants of California.

It will be necessary to bear in mind that the description of the dentition of *Notorhynchus maculatus* is based on the jaws of a specimen obtained at Nisqually by the Exploring Expedition under Commodore Wilkes. There can be little doubt as to the specific unity of the different materials, but as Dr. Ayres' notice of the dentition is equally applicable to any species of the family, the correctness of this identification still requires to be verified.

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## NOTORHYNCHUS MACULATUS Ayres.

*Notorhynchus maculatus* Ayres, Proc. California Academy of Natural Sciences, vol. i. p. 72, 1855.

*Heptanchus maculatus* Girard, Explorations and Surveys for a Railroad Route, &c., vol. x. Fishes, p. 367.

$$\begin{array}{r} | 3^1 + 2^2 + 3^4 + 3^m \\ \text{Dent. } + \hline 6 \quad | \quad 1 \end{array}$$

The first three teeth on each side of the symphysis are on an arch more advanced in front than the others; they successively increase in size and each has a quadrate bony base from which the enamelled cusp slightly curves outwards and backwards, and whose internal margin is common to it at the base, while the external angle of the latter is more and more produced laterally. The two (or three) succeeding teeth are nearly similar and have a much smaller acute cusp at the outer base of the primary one; the fifth or outermost of the two bicuspid teeth is wider and much shorter than the preceding, slightly serrated in its ascending margin, and equals in size the next; the succeeding are finely serrated on the internal basal half of the cusp, while the oblique margin on the outer side of the cusp is armed with very oblique, small and successively decreasing denticles; the seventh and eighth teeth being alike armed with two or three such denticles directed outwards, while the third is broader with a smaller cusp and an obliquely descending inner margin armed with three or four denticles; the three succeeding teeth (9—11) are smaller, and the great cusp successively becomes smaller and nearer the centre of the teeth. Behind are nine or ten small, wide tubercular teeth.

There are six teeth on each side of the lower jaw, uniform in shape, very wide, obliquely declining sideways or outwards, and generally with seven graduated cusps, the first of which is largest and the outermost rudimentary and horizontal. The obliquely ascending inner margin of each tooth is gibbous or curved near the jaw and finely denticulated along most of its edge. The osseous portion is much more developed than the enamelled part and is about twice as wide as high. Next to each corner of the jaw are about nine rudimentary tuberculous teeth.

Family *SPINACOIDÆ* (Owen,) Gill ex Müll. and Henle.

Les Squalès partim } *Cuvier*, Regne Animal, tome ii. p. 123 (129) 1817.

Squalus

Squalidæ veræ (Spinacini) *Bonaparte*, Selachorum Tabula Analytica, p. 4, 1838.

Spinaces *Müller* and *Henle*, Systematische Beschreibung der Plagiostomen, p. 83.

Squalidæ (Anacantiana) *Gray*, List of Specimens of Fishes in British Museum, Chondropterygii, pp. 40, 69.

Spinacidæ *Owen*, Comparative Anatomy of the Vertebrated Animals, vol. i. p. 51, 1846.

Spinacoidei *Bleeker*, Systematis Piscium Naturalis Tentamen.

Spinacoideæ *Gill*, Analytical Synopsis of the Order of Squali, pp. 29, 31, 38; *ib.* in Annals of the Lyceum of Nat. Hist. of N. Y., vol. vii. p. 395, &c.

Spinax (genus) *Cuvier*, Regne Animal, ed. 1, tome ii.

Body more or less elongated, obtusely trihedral or subcylindrical and fusiform, gradually tapering behind.

Scales variable.

Head depressed, oblong and transversely rounded, or obtusely produced in front, with the snout projecting along the plane of the forehead, and below declining backwards to the mouth. Eyes lateral, anterior or submedian, with no nictitating membrane.

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Mouth inferior, large or moderate, and more or less arched in front.

Teeth compressed, and with the edges consequently trenchant or blunt, and entire or serrated; supplementary prongs are frequently present at their bases.

Nostrils inferior and lateral near the front margin of the snout.

Spiracles present and moderately developed.

Branchial apertures moderately fine on each side, all of which are in front of the pectoral fins.

Dorsal fins two, each armed in front with a spine, which is more or less exposed; the anterior angle of each fin is more or less rounded, and the posterior acutely produced backwards; the first is above the space between the pectorals and ventrals; the second more or less behind the latter.

Anal fin obsolete.

Caudal fin obliquely truncated or emarginated, with the upper lobe obtusely angulated at its extremity; lower lobe obsolete or rudimentary.

Pectoral fins normally developed, obtusely angulated at the external angle, and rectangular or acutely produced at the interval.

Ventral fins inserted far behind and nearer the tail than head.

The family of Spinacoids, as it has been here restricted, is equivalent to the genus *Spinax* of Cuvier, and embraces only those forms agreeing in physiognomy, the shape of the several fins, and the relations of the dorsal spines to their fins. The genus *Oxynotus* of Rafinesque or *Centrina* of Cuvier is consequently excluded from it. That genus has a very characteristic aspect resulting from the decided trihedral form of the body and the acute back, the opposition of the second dorsal and ventral fins, and the abrupt attenuation of the tail behind as well as from the shape of the fins, and the insertion of the spines of the dorsal fins. These characters appear to indicate that *Oxynotus* is less closely related to the Spinacoids than has been generally supposed, and that it is rather the representative of a peculiar family; such being the case, the family thus recognized should receive the name of *Oxynotoidea*. The Scymnoids are still less allied to the Spinacoids than the Oxynotoidea, as they differ in the form of the head and fins as well as in the total absence of spines from the front margin of the dorsal fins. The Echinorhinoids are still more widely separated by the form of the fins as well as the posterior position of the dorsal and ventral ones.

The family of Spinacoidæ as now restricted appears to be represented at the present day by six genera, which may be briefly distinguished by the characters exhibited in the analytical synopsis herewith given. This arrangement differs considerably from that of Müller and Henle and their successors.

A. Teeth without supplementary lateral cusps. Scales cor-  
date or rhomboid.

α. Teeth similar in each jaw, with the incisive margin hori-  
zontal, and terminated at the outer angle in an acute  
point, directed outwards.

1. Ventral fins nearly intermediate between two dorsals;  
pectoral fin obtusely angulated at the inner angle;  
caudal fin with an entire upper lobe..... Squalus.

2. Ventral fins little before the second dorsal; pectoral  
acutely produced at inner angle; caudal with a ter-  
minal inferior lobe..... *Entoxychirus*.

β. Teeth in upper jaw oblique or vertical.

1. Teeth in upper jaw vertical and acute, somewhat in-  
flated on each side of the base; those of lower jaw  
with the points directed obliquely outwards, ser-  
rated on the incisorial or inner margin, and in-  
flated on the outer side of the base. Scales very  
small and rhomboid..... *Centrophorus*.

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2. Teeth of upper jaw oblique, with the inner margin continuous from the base; those of lower jaw with the points directed obliquely outwards, and with entire inner incisoral edges. Scales rather large, cordate and keeled along middle..... Lepidorhinus.

B. Teeth in upper or both jaws digitate or with a large acute central cusp, and one or more smaller acute cusps on each side, as in *Scyllium*. Scales hair-like or quadrangular with an upright point.

1. Teeth of upper jaw only digitated; of lower like those of *Squalus*. Scales hair-like..... Spinax.

2. Teeth of both jaws digitated. Scales quadrangular, each with an upright point..... Centroscyllium.

#### Genus SQUALUS (Artedi,) Raf.

*Squalus Artedi*, Linn.

*Squalus Rafinesque*, Caratteri di alcuni nuovi generi e nuovi specie, &c., p. 12, 1810.

*Acanthorhinus Blainville*, Journal de Physique, &c., tome lxxxiii. p. 263, (type *S. acanthias*.) Oct., 1816.

Les Aiguillats (*Spinax*) *Cuvier*, Regne Animal, ed. 1, vol. ii. p. 129, 1817.

*Acanthias Bonaparte*, Selachorum Tabula Analytica.

Body fusiform, slender, with the caudal peduncle also elongated and slender.

Scales cordiform or heart-shaped, with a middle point, and one or more keels on each side.

Head oblong-ovate and flattened, with the muzzle projecting and subconic, but blunt at its extremity.

Eyes above the mouth, longitudinal and with subcircular pupils, flop from the nostril, nearer the snout than the mouth; each with a produced border.

Spiracles large behind and slightly above the eyes, crescentiform convex in front and with a valve at its front margin.

Mouth little arched in front. Labial cartilages two above and one below.

Corner pits of the mouth large and obliquely point outwards and backwards.

Teeth nearly similar in each jaw, subquadrate, with the incisive edge nearly horizontal, and at the external angle terminating in a point directed outwards and separated by a notch from the body. The root of each tooth is higher on its inner side than its outer, and has on the former a longitudinal keel; on the outer forms a round ledge towards the point of the tooth.

Dorsal fins moderate, with a nearly naked spine in the front margin, each fin rounded at its anterior angle, and with the posterior acutely extended backwards. First dorsal larger, much nearer to the pectorals than the ventrals. Second, far behind and with the spine proportionately larger.

Caudal fin with the upper lobe much developed and the membrane increasing in height towards the end above the caudal vertebrae, rounded at its end and regularly incurved to the sinus separating it from the lower lobe which is moderately developed. Tail pits developed at least at the base of the upper caudal lobe.

Pectoral fins produced at the external angle, which is rounded, and incurved at nearly right angles to the inner angle, which is more or less blunt.

Ventral fins submedian, little nearer to the second dorsal than the first, obtusely angulated in front, and acutely angulated behind.

The claspers of the male are furnished on the exterior side near the end with a moveable prickle or spine whose tip is curved.

Type.—*Squalus acanthias* Linn.

The present genus is here restricted more precisely than has been done, 1862.]

under the name of *Acanthias*, by Müller and Henle, and has the same limits that appear to have been intended for it by the Prince of Canino. It embraces only those species which possess all the characteristics assigned to the genus *Acanthias* by Müller and Henle, and which in addition agree in the relative situation of the ventral fins, and the form of the pectoral and caudal fins. The *Squalus uyato* of Rafinesque is thus excluded. This species differs from *Squalus acanthias* and the allied species, by the distinct terminal lobe with which the caudal fin is provided, the obtuseness of the external angle of the pectoral, and the acute prolongation of the internal one, as well as the posterior insertion of the ventrals, those fins being but little in advance of the second dorsal. The transverse grooves or pits at the base of the caudal fin are also obsolete. It cannot be doubted, that this combination of characters is indicative of generic distinction from the *Squali*. The *Squalus uyato* should then be regarded as the type of a peculiar genus, and in allusion to one of the characters which distinguishes it from *Squalus*, it may be named *Entoxychirus uyatus*. This species has been referred with doubt to the genus *Spinax* as distinguished from *Acanthias*, by Bonaparte, but it evidently does not belong to that group, and is more nearly allied to the latter, in which it has been placed by Müller and Henle.

The name of *Squalus* has been retained for this genus instead of *Acanthias*, because it was first restricted to the group.

The genus *Squalus* of Artedi and Linnæus was equivalent to the order of *Squali*; its species were distributed by Rafinesque among a number of smaller groups or genera, and by him the name was first retained for those species which are deprived of an anal fin and have a blunt back. As Rafinesque was perfectly justified in this limitation, the name of *Squalus* must be preserved for a portion of that group, and having been first in this limited sense applied to the species with spinous dorsals, must be so retained. Rafinesque's genus *Squalus*, however, was co-extensive with the fourth section of Müller and Henle, after the exclusion of the genus *Centrina* and the family of *Squatina*; it embraced all the species with an obtusely trihedral or subcylindrical body and without an anal fin. At the same time, under a misapprehension, supposing that some species were destitute of spiracles, he referred them to another genus called *Dalatias*, not perceiving the identity of those species with some that he had already placed in the genus *Squalus*.

In 1816, Blainville proposed the generic name *Acanthorhinus* for a group which is co-equal with *Squalus* and *Oxyrinotus* of Rafinesque, referring to it all the species of *Squali* without an anal fin, and with the first dorsal fin on the back, in contradistinction to *Echinorhinus* in which both dorsals are on the tail.\* *Squalus* was not retained as the name of a subgenus.

Again, in the following year, Cuvier distributed the same representatives of the suborder *Squali* among three genera; *Spinax*, distinguished by the presence of dorsal spines, and the advanced insertion of the ventral fins; *Centrina*, with spinous dorsals the second of which and the ventrals were opposed to each other, and *Scymnus*, the dorsals of which were unarmed. He likewise omitted to retain the Artedian name for any minor group or subgenus of *Squali*.

The name of *Spinax* was retained unaltered for the group so called until the Prince of Canino, in 1838, restricted it to the *Squalus spinax* of Linnæus, and referred the *S. acanthias* to a new genus which was named *Acanthias*. These names were retained for those groups till 1862.

In the "Analytical Synopsis of the order of *Squali*," the history of the nomenclature of the genera of that order was briefly discussed, and it was urged

\* 5°. *Acanthorhinus*, Car. Dent. var.; *Insp. magnis*; P. S. 2, 1, in dorso; 2, magna; P. A. nulla; C. lata, bifurcata, lobo sup. brevi, Cute asperima.

Spec. *Acanthias*; *Ferdinandus*; *Asierii*; *Spinax*; *Norwegianus*; *Americanus* aut *Nicensis*; *Microcephalus*; *Centrina*; *Squamosus*; *Granulosus*; *Cepedianus*; *Blochianus*. (*Journal de Physique*, &c., lxxxiii. p. 263.)

that the Artedian name should be reserved for the genus to which it was first restricted by Rafinesque. Blainville's name of *Acanthorhinus* and Cuvier's of *Spinax*, consequently were referred to it as synonyme.\*

The genus *Squalus* as now understood contains four species.

*Squalus acanthias* Linn. Europe generally.

*Squalus americanus* Gill = *Acanthias americanus* Storer. Eastern America.

*Squalus sucklii* Gill = *Acanthias sucklii* Girard. Western America.

*Squalus blainvillii* Gill = *Acanthias blainvillii* Risso. Mediterranean sea.

#### SQUALUS SUCKLIi Gill.

*Spinax* (*Acanthias*) *sucklii* Girard, Proc. Academy of Natural Sciences of Philadelphia, vol. vii. p. 196, 1854.

*Acanthias sucklii* Girard, Explorations and Surveys for a Railroad Route, &c., vol. x. Fishes, p. 368.

*Acanthias sucklii* Suckley, op. cit., vol. vii. book ii. p. 367.

#### Suborder RHINÆ Gill.

*Squalidæ anomalæ* Bonaparte, *Selachorum Tabula Analytica*, p. 4, 1833.

Pectoral fins produced forwards from the anterior basal angle, while the produced portion is separated from the nape by a cleft, in which the branchial apertures are lodged.

Caudal fin terminal and nearly homocercal, being nearly equally developed above and below the vertebral column.

This suborder is most nearly allied to the order of *Raiæ*. The rays sometimes present as a monstrosity a separation of the pectoral fins by a cleft from the neck somewhat similar to the mode found as a normal feature in the *Rhinæ*. The nominal genus *Propterygia* of Otto is founded on such a monstrous example of a species of *Raia*.†

#### Family RHINOIDÆ Gill.

*Squatinae* Cuvier, *Regné Animale*.

*Squalidæ anomalæ* (*Squatinae*) Bonaparte, *Selachorum Tabula Analytica*, 1839.

*Squatinae* Muller and Henle, *Systematische Beschreibung der Plagiostomen*.

*Raiidæ* (*Squatinae*) Swainson, *Natural History of Fishes*, vol. ii. 1839.

*Squatinaidæ* Owen, *Lectures on Comparative Anatomy*, vol. ii. 1844.

*Squatinoidei*, Bleeker, *Systematis Piscium Naturalis Tentamen*.

*Rhinoideæ* Gill, *Analytical Synopsis of the Order of Squali*, pp. 30, 31, 42, 1862.

Body depressed, rather rapidly diminishing in width behind the ventral fins towards the caudal.

Scales minute and conical.

Head depressed, about as wide as long, rapidly decreasing in width to the snout, which is transversely truncated or bluntly rounded. Eyes on the dorsal surface of the head and near the snout.

Mouth terminal, transverse.

Teeth subconical or impressed and slightly trenchant.

Nostrils terminal, in front of the upper lip.

Spiracles well developed and behind the eyes, from which they are quite remote.

Branchial apertures five, approximated, and in front of the base of the pectoral fin, in a cleft between the anterior projection, of which, and the neck they stand.

\* Bonaparte afterwards adopted the name of *Spinax* for the genus still retained under that appellation, but the genus should be credited to him.

† See also "Nota sopra una singolare mostruosità di una razza del Dottor F. de Filippi," &c., in *Nuovi Annali delle Scienze Naturali di Bologna*, Feb. 1852.

Dorsal fins rather small, placed far back on the tail and behind the ventral fins; each angle is rounded, and the anterior project backwards.

Anal fin obsolete.

Caudal fin small and emarginated, with its lower lobe equal to or larger than its upper.

Pectoral fins much developed, subrhomboidal, extending forwards from the base and separate by a cleft from the neck. The external angle is obtuse and the inner rounded.

Ventral fins much developed, rounded at the external and produced at the internal, nearer the head than the caudal fin.

#### Genus RHINA Klein.

*Squalus*, sp. *Artedi*, &c.

*Rhina Klein*, *Historiæ Piscium promovendæ missus tertius de piscibus per branchias occultas spirantibus*, 1742.

*Squatina Dnnéril*, *Zoologie Analytique*, 1806.

*Rhina Rafinesque*, *Caratteri di Alcuni nuovi Generi e nuove specie*, &c., p. 14, 1810.

*Squatina Rafinesque*, *Blainville*, *Cuvier*, *Risso*, *Lesueur*, *Fleming*, *Jenyns*, *Müller* and *Hentle*, *Bonaparte*, &c.

*Rhina Gill*, *Catalogue of the Fishes of the Eastern Coast of North America*.

Body elongated and depressed, rather abruptly attenuated towards the caudal fin behind the ventrals and carinated on each side.

Scales conical, terminating in a fine point.

Head transverse, suborbicular, at the neck slightly constricted, and with the snout transverse. Each side furnished with a cutaneous ledge running from the external corner of the nostrils to the branchial fissure.

Eyes small, circular, in a line with the nostrils and spiracles and nearly equally remote from each.

Spiracles crescentic and convex before. Upper lip broad.

Cartilages of the mouth two above as well as below.

Nostrils in the anterior border of the upper lip, notched in the middle, and provided on each side with a flap, the external of which is broad and indented, and the interval divided into several scalloped lappets.

Teeth conical, little trenchant, scattered and absent at the symphysis of both the upper and lower jaw.

Dorsal fins nearly equal, small, and nearly equidistant from each other, the ventrals and the caudal; the angle is rounded and projects backwards as far as the rounded posterior angle.

Caudal fin emarginated with obtuse lobes, the lower of which is larger.

Pectoral fin large, produced towards the external angle, and broadened at the inner.

Ventral fins oblong, rounded at the anterior or external angle, and acutely produced towards the inner.

The genus *Rhina* is the only existing representatives of the family of which it is typical, and is readily recognizable by its peculiar form. In allusion to that form, the vulgar namer of Angel fish has been applied to it, the physiognomy of the species recalling to the mind of the people the figures of "*Cherubim*."

Six species of this genus are more or less perfectly known. They are distributed in all the temperate seas of the Northern hemisphere. Three species have been assigned to the Mediterranean sea.

*Rhina squatina Raf. ex Linn.*

*Rhina oculata Gill* = *Squatina oculata Bon.*

*Rhina fimbriata Gill* = *Squatina fimbriata M. and H.*

One species closely related to the *R. squatina* and formerly confounded with it is found at Japan.

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*Rhina japonica* Gill = *Squatina japonica* Bleeker.

Another species also nearly allied to the *R. squatina* is found along the eastern coast of the United States.

*Rhina dumérilii* Gill = *Squatina duméril* Les.

A sixth has been described as an inhabitant of the California seas.

*Rhina californica* Ayres = *Squatina californica* Ayres, olim.

The name of a species (*Squatina angelina* Gray,) inhabiting the Caribbean sea has been published in Gray's Catalogue of the Chondropterygians, but not the slightest diagnosis has been given.

#### RHINA CALIFORNICA Ayres.

*Squatina californica* Ayres, Proc. of the California Academy of Natural Sciences, part 2, p. 29, 1859.

*Rhina californica* Ayres, Proc. of the California Academy of Natural Sciences, part 2, p. 54, fig. 7, 1861.

### On the limits and affinity of the Family of LEPTOSCOPOIDS.

BY THEODORE GILL.

In the Proceedings of the Academy of Natural Sciences for April, 1859, (vol. xi. p. 282,) there has been first made known a peculiar type (*Dactyloscopus tridigitatus*) of fishes having the general appearance of a Uranoscopoid, but distinguished by the structure of the ventral fins, each of which had three simply articulated rays like those of the Blennioids. "Notwithstanding the abnormal and blenniod structure of the ventrals," the new type was said to agree in all other characters, except dentition and the origin of the dorsal fin, with a species referred to the genus *Uranoscopus*\* by Sir John Richardson; it was consequently referred next to that fish, but as the type of a distinct subfamily, (*Dactyloscopinæ*,) the species of Richardson being also considered as the type of another peculiar subfamily, (*Leptoscopinæ*.)

In the "Annals and Magazine of Natural History," for February, 1860, (vol. iii. p. 86,) Günther described a type which differed from *Leptoscopus* and agreed with *Dactyloscopus* in the want of palatal teeth.

In a subsequent "Synopsis of the Uranoscopoids," published in the Proceedings of the Academy for May, 1861, (vol. xiii. p. 108,) the correctness of the approximation of the *Dactyloscopinæ* next to *Leptoscopinæ* was still further insisted upon, and both were retained in the same family with the *Uranoscopinæ*.

In the third volume of the "Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum," *Dactyloscopus* was referred to the Blennioids, and interposed between *Tripterygium* and *Dictyosoma*. Dr. Günther remarked, that "*Dactyloscopus* has been referred by Gill to the *Uranoscopina*,† from which, however, it differs in several cardinal characters. The structure of the dorsal and ventral fins is that of a Blenniod. The absence of *pseudo-branchiæ* is very peculiar; but in this respect it differs equally from the *Uranoscopina* and Blenniida."‡§

The *Uranoscopinæ* formed a "group" or subfamily of the family of Trachinidæ as understood by Günther.

\* *Leptoscopus macropygus*.

† The group *Uranoscopina* of Günther, which is equivalent to the family of *Uranoscopoids*, after the elimination of the species with less than five ventral rays, is meant, and not the subfamily of *Uranoscopinæ* as restricted by Gill.

‡ Günther, op. cit., iii. p. 279.

§ In his remarks on the family Blenniida, Dr. Günther has observed that the value of the development of the *pseudo-branchiæ*, as a character of that family, "appears not to be sufficient, *Dactyloscopus* and *Patæcus* forming exceptions, although the structure of their dorsal fin proves that their natural place is with or near the Blennioids." The real structure of the dorsal of *Dactyloscopus* proves the contrary; the natural place of *Patæcus* is rather near, than with, the Blennioids. (*Genypterus* is a Chilian *Ophidioid*; *Loarces* and *Lycodes* form a peculiar family, all wanting true dorsal spines.)

The characters of the Trachinidæ and Blenniidæ given by Günther are essentially interchangeable, with the exception of the following :

TRACHINIDÆ.—“One or two dorsal fins, the spinous portion being always much less developed and shorter than the soft ; the anal similarly developed as the soft dorsal ; ventrals with one spine and five rays.\* Gill openings more or less wide.”†

BLENNIIDÆ.—“One, two, or three dorsal fins, occupying nearly the whole of the back,—the spinous portion, if distinct, being as much developed as the soft, or more.” “Ventrals jugular, composed of a few rays, and sometimes rudimentary or entirely absent.”

Only two “cardinal characters” have thus been used to distinguish the Trachinidæ and Blenniidæ.

*Dactyloscopus* was said by Günther to have “one dorsal, formed by spines only ;” it therefore had nominally the distinctive characters of the Blennioids as understood by that gentleman.

I have, on the other hand, specifically asserted that only the first eleven or twelve rays are spines, the others (22—31) being “articulated, and divided on each side of the mesial line to the base, but so connected as to appear like simply articulated rays, especially from a lateral view.” Günther’s observation is therefore incorrect.‡

*Dactyloscopus* then agrees with the Trachinoids and differs from the Blennioids in a character which has been emphatically insisted upon by Dr. Günther, and to which the structure of the ventrals has been always subordinated by him.

It disagrees with the Trachinoids and agrees with the Blennioids in the structure of the ventral fins ; a character which Günther has elsewhere regarded as of little importance.

It therefore, according to Günther’s diagnosis, only differs from the Trachinoids in one “cardinal character,” which is of much less value than the cardinal character which it shares in common with the Blennioids.

Further, it agrees with the Trachinoids and departs from the Blennioids by the width of the gill openings, and also differs from the Blennioids by the large scales.

Accepting Dr. Günther’s own views of the relative value of certain characters, *Dactyloscopus* is thus more allied to the Trachinoids than to the Blennioids. Therefore, it was probably only on account of a misapprehension that the genus was referred to the Blennioids. I shall, however, still refer to the arguments adduceable in favor of its reference near the Uranoscopoids.

The form of the head of a Blennioid is quite characteristic, owing to the abrupt decurvature of the profile in front of the eyes, and the almost or quite horizontal cleft of the mouth.

Equally characteristic is the form in the Uranoscopoids, the profile in front of the eyes being continued on nearly the same plane as the crown, while the cleft of the mouth is very oblique or vertical.

*Dactyloscopus* agrees in general form with the Uranoscopoids.

The Uranoscopinæ, § Leptoscopinæ and *Dactyloscopinæ* agree with each and differ from the Blennioids in—

1st. General form.

\* In *Epicopus* with one spine and six rays.—Günther.

† The italicized parts are repeated from Günther’s Work.

‡ I am happy to state, that Dr. Günther has since admitted that the anterior rays of *Dactyloscopus* alone are spinous. In a letter of the 25th May, he writes : “Your statement of a portion of the dorsal rays being articulated is correct ; they are very well preserved in the smallest of our specimens, (18 lines long,) whilst in the larger (30 lines) most of them are broken at the top, as I now see.” Dr. Günther has not given his present opinion of the affinity of the *Dactyloscopi*.

§ It is proper here to remark, that the *Uranoscopus adhaesipinnis* of Blyth (Journal of the Asiatic Society of Bengal, vol. xxix. (1860.) p. 42.) does not belong to the same family as *Uranoscopus*, but apparently belongs to the same genus as the *Polycaulus elongatus* (Günther ex Cuv.)

2d. Form of the head.

3d. Direction of the mouth.

4th. Extent of the branchial aperture.

5th. Development of a fold between the limbs of the lower jaw.

6th. Fringed lips.

7th. Brevity of the spinous portion of the dorsal fin.

The Leptoscopinæ and Dactyloscopinæ still further agree with each, still differing from the Blennioids in—

1st. Special form.

2d. Course of lateral line.

3d. Special form of head.

4th. Fringed opercula.

It agrees with the Blennioids, and departs from the Uranoscopoids in—

1st. The structure of the ventrals.

2d. Simplicity of the pectoral rays.

With the knowledge that the attributes of the Uranoscopoids above referred to are very peculiar and characteristic, it must be evident that such a combination is entitled to much more consideration than the simple agreement in two features, which are by no means peculiar to one group, but shared by many dissimilar families and regarded as of slight importance by Günther himself.

In the "Synopsis of the Uranoscopoids," I have remarked that, on account of the special similarity of form, the larger scales, median lateral line, smooth head, extent of the dorsal and anal fins, and the absence of pyloric cæca, "the Leptoscopinæ and Dactyloscopinæ" together would "be probably referred by some future naturalist to a distinct family." But owing to the many characters shared in common, I doubted the propriety of such a separation. Since the discovery of two other forms, I am now convinced that such a family exists in nature, and therefore now establish it under the name of *LEPTOSCOPOIDÆ*.

#### Family *LEPTOSCOPOIDÆ* Gill.

Body equally developed above and below the axis, regularly and slowly decreasing in height to the caudal fin, and behind the abdominal region much compressed.

Scales cycloid, moderate in size, and regularly imbricated.

Lateral line anteriorly running along each side of the back and thence decurved and continued along the middle to the base of the caudal fin.

Head oblong, above nearly plane or slightly convex transversely and not crested, scarcely curved towards the snout. Eyes rather small, more or less directed upwards or on the upper surface of the head, and advanced far forwards. Suborbital chain enlarged, but no bone connected with the preoperculum as a "stay." Nostrils double. Opercular bones normally developed with regard to each other. Operculum fringed.

Mouth with the cleft very oblique or subvertical. Intermaxillary bones with moderate or rather short posterior branches, and with the diverging forming the upper portion of the oral arch, the supramaxillars forming the sides. Lips fringed.

Branchial apertures very large and below in front of the scapular arch, partly covered below by a transverse duplicature or fold of the membrane between the limbs of the lower jaw.

Branchiostegal rays, six.

Pseudobranchiæ, present or absent.

Dorsal fin entire and very long, with its anterior rays spinous, and the posterior articulated.

Anal fin very long, commencing behind the anus, which is itself in or close behind the breast.

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Caudal fin completely homocercal or equally developed above and below the axial line.

Pectoral fins variable, with the base concave and descending forwards below.

Ventral fins jugular, normally developed (I. 5) or with only three articulated rays, and a rudimentary spine in each.

The vertebræ are present in increased number  $(\frac{10 + x}{14 + y})$ .

The stomach is siphonal, and the pyloric cæca are obsolete.

This family is closely related to that of the Uranoscopoids, but appears to be sufficiently distinguished on account of its elongated form, the course of the lateral line, the development of the dorsal and anal fins, and the absence of pyloric cæca. Other characters of less importance, but possessed by all the representatives of the Leptoscopoids, and by none of the Uranoscopoids, are the entire nudity or smoothness of the head, the fringes of the opercula, and the larger size of the scales.

Its affinities with other families are remote; the one most nearly allied to it after the Uranoscopoids is that of the Trachinoids. Its relations to the Blennioids are no more intimate than with a number of others.

The representative of the family of Leptoscopoids may be distributed among three minor groups or subfamilies, as follows:

- I. Pectoral rays branched. Ventral fins perfect, (I. 5). (Dorsal fin remote from nape. Pseudobranchiæ developed), LEPTOSCOPINÆ.
  - a. Vomerine and palatine teeth developed..... Leptoscopus.
  - β. Vomerine and palatine teeth obsolete..... Craptalus.
- II. Pectoral rays simply articulated. Ventral fins imperfect, each with three simply articulated rays, (I. 3).
  - A. Dorsal fin commencing quite far behind the nape. Pseudobranchiæ developed..... MYXODAGNINÆ.
    - β. Head conoid. Lower jaw obtusely pointed and with a short flap in front..... Myxodagnus.
    - α. Head cuboid. Lower jaw transversely rounded in front..... Dactylagnus.
  - B. Dorsal fin commencing at the nape. Pseudobranchiæ obsolete..... DACTYLOSCOPINÆ.
    - Head cuboid..... Dactyloscopus.

In deference to the opinions of some naturalists, I had at one time almost resolved to refer the tridigitate Leptoscopoids to a peculiar family which would be characterized by the simply articulated rays of the pectoral fins and the imperfect blennioid condition of the ventral fins. On reconsideration, however, I am yet unable to convince myself of the propriety of such an act, and think that it will be advisable to at least defer it until the value of family characters among fishes may be better known.

#### LEPTOSCOPINÆ Gill.

Leptoscopinæ *Gill*, Proc. Acad. Nat. Sci. Phila. vol. xi. (1859), p. 133; vol. xiii. (1861) p. 116.

#### LEPTOSCOPIUS Gill.

Leptoscopus *Gill*, loc. cit.

#### LEPTOSCOPIUS MACROPYGUS Gill.

Uranoscopus macropygus *Rich*.

#### CRAPTALUS Günther.

Craptalus *Günther*, Annals and Mag. Nat. Hist. ser. iii. vol. vii. p. 86, (1861.)

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## CRAPTALUS NOVÆ-ZELANDIÆ Günther.

## MYXODAGNINÆ Gill.

*Myxodagninæ* Gill, Proc. Acad. Nat. Sc. Phila. vol. xiii. (1861), p. 263.

## DACTYLAGNUS Gill.

## DACTYLAGNUS MUNDUS Gill.

## MYXODAGNUS Gill.

*Myxodagnus* Gill, op. cit. and Günther.

## MYXODAGNUS OPERCULARIS Gill.

## DACTYLOSCOPINÆ Gill.

*Dactyloscopinæ* Gill, Proc. Acad. Nat. Sci. Phila. vol. xi. (1859), p. 133 ; vol. xiii. (1861), p. 116.

## DACTYLOSCOPUS Gill.

*Dactyloscopus* Gill. op. cit.

The three species of this genus may be distinguished as follows :

## I. Scales of median portion of lateral line 31—32.

Height scarcely equal to one-seventh of length. Scales of dorsal portion of lateral line 11 (12)..... *D. tridigitatus*.

Height nearly equal to a sixth of length. Scales of dorsal portion of lateral line 13. (conf. color)..... *D. poeyi*.

II. Scales of median portion of lateral line 24..... *D. pectoralis*.

## DACTYLOSCOPUS TRIDIGITATUS Gill.

*Dactyloscopus tridigitatus* Gill, Günther.

D. X-XI. 27. A. II. 28-33. C. 13. P. 13. Scales 11 (12) | 4 | 31. Günther in litt.

D. XI-XII. 26-28. A. II. 30-32. C. 12. P. 13. Scales 11 | 4 | 30-31. Gill.

## DACTYLOSCOPUS POEYI Gill.

D. XI. 31. A. II. 32. C. 12. P. 13. Scales 13 | 4 | 31.

## DACTYLOSCOPUS PECTORALIS Gill.

D. XII. 22. A. II. 26. C. 12. P. 12. Scales 13 | 3 | 24.

## Genus DACTYLAGNUS Gill.

Body moderately elongated, its greatest height equalling a sixth or seventh of the length.

Scales moderately large and uniform.

Head cuboid, oblong, scarcely convex transversely above. Eyes small, directed obliquely upwards, and situated near the snout on the upper surface of the head. Interorbital area moderate and channelled.

Mouth very oblique or subvertical, the snout truncated in front. Lower jaw transversely convex in front and with no barbel.

Teeth acute, in a narrow band along each jaw. Palate smooth.

Dorsal fin perfectly entire, commencing rather farther behind than the anal, and with its anterior portion armed with about ten slender spines.

Anal fin longer than the dorsal.

This genus so closely resembles *Dactyloscopus* externally that I had provisionally referred its typical and only species to that group, without a suspicion that it might belong to a different one, and it was only after my attention was particularly attracted to it that I ascertained how distinct it really was. It may be briefly described as a *Myxodagnine* in the mask of a *Dactyloscopus*. It differs from the latter genus chiefly in the structure of the dorsal 1862.]

fin and the presence of pseudobranchiæ, of which no trace is perceptible in *Dactyloscopus*\*

DACTYLAGNUS MUNDUS Gill.

The greatest height is rather less than a sixth ( $\cdot 16$ ) of the total length. The head, from the prominent chin to the posterior margin of the suboperculum, forms a fifth of the same length, while the caudal forms a tenth. The dorsal fin commences nearly over the second inarticulated ray of the anal fin, and its spines increase in a slightly curved line towards the articulated rays. The oblique levator muscle of each pectoral ray is remarkably developed externally, and impart to the rays a curve upwards towards the ends.

The lateral line runs near the back through fourteen scales, is deflected on four, and thence continued along the middle through thirty-six.

D. X. 31. A. II. 38. C. 11, 1, 4, 4, 1, IV. P. 15. V. I. 3.

Scales 14 | 4 | 36 —  
5

Extreme length  $5\frac{3}{4}$  inches.

Body—Greatest height 16. Least height 16. Least height of tail 4. Greatest width 12.

Head—Greatest length 20. Distance from upper jaw to nape 10. Height at preoperculum 12. Greatest width 12. Width behind eyes  $8\frac{1}{2}$ . Height behind eyes 10. Width of interorbital area 2.

Eye—Diameter 3. Distance from snout 3.

Dorsal (spinous).—Distance from snout 23. Height at first spine  $3\frac{1}{2}$ . Height at second spine  $4\frac{1}{2}$ . Height at tenth spine  $5\frac{1}{2}$ . Height at first ray  $5\frac{3}{4}$ .

Anal—Distance from snout 27.

Caudal—Length of middle rays 10.

Pectoral—Length 18.

Ventral—Length of inner ray 10.

A single specimen of this species was obtained at Cape St. Lucas by Mr. Xantus, and is contained in the collection of the Smithsonian Institution. The species is decidedly the giant among the known species of the tridigitate Leptoscopoids, its length being nearly twice as great as the largest specimen of *Dactyloscopus tridigitatus* known to me.

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November 4th.

Mr. LEA, President, in the Chair.

Sixteen members present.

The following papers were presented for publication:

"Note on the species of *Brachinus* inhabiting the United States" and "Synopsis of the species of *Colymbetes* inhabiting North America, etc. By John L. Le Conte, M. D."

"On the Pedipalpes of North America. By Horatio C. Wood."

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November 11th.

Mr. VAUX, Vice-President, in the Chair.

Seventeen members present.

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\* Dr. Güthier has kindly informed me that he was unable to find pseudobranchiæ in the *Dactyloscopus tridigitatus*, but that there is "a slight swelling at their usual place," which is ascertained to be "muscular substance, as seen under the microscope."

November 18th.

Mr. LEA, President, in the Chair.

Twenty-one members present.

Prof. Baird communicated the fact that in his recent visit to Philadelphia, he had noticed that the leaves of the Silver Maple in the city and vicinity were dotted with black, indurated spots. Having transmitted specimens to Mr. C. C. Frost, the cryptogamic botanist, of Brattleboro', Vt., he was informed that the spots consisted of the *Rhytisma aceris-eriocarpæ*, Schw.

Dr. Leidy presented a specimen of syenite obtained from a recent exposure of that rock, among the gneiss on the Schuylkill, at Fairmount Park. He also remarked that he had noticed a boulder, apparently of Potsdam sandstone, at the corner of Thirty-seventh and Market Sts., which had been exposed in digging gravel. It was the largest transported block he had observed in our vicinity. It is oblong square and measures 7 feet long, 32 inches high and 40 inches wide.

November 25th.

Mr. VAUX, Vice-President, in the Chair.

Eleven members present.

On report of the Committee, the following paper was ordered to be published in the Proceedings:

**Monograph of the Prehensile-tailed QUADRUMANA.**

BY J. H. SLACK, M. D.

Few departments of mammalogy are less thoroughly understood than that of the American *Quadrumana*. The great variety of coloration in many species consequent on age and sex, added to their comparative rarity, combine to render their study excessively difficult. Suites of specimens of any species are rare even in the great European Museums. The species of the genus *Cebus*, perhaps the most common of the American *Quadrumana* have long been a source of dispute among naturalists. Wagner, (Schreber's *Saugethiere*, Supplement band, vol. i. p. 207, 1840,) reduces the number of species in this genus to two, regarding the second as doubtful, while Reichenbach, (*Die Vollständigste Naturgeschichte der Affen*, part I.) is content with no less than thirty-seven, not only describing but figuring them! In the *Cebus fatuellus*, the young is of a light brown, and the adult of a deep black color, and in the *Aluatta niger* (*Stenor niger*, Geoff.) the female and young are of a pale straw color, slightly dashed with black, while the adult male is entirely of an intense black. As such states of coloration have been regarded by certain eminent naturalists as specific characters, great confusion in synonymy has resulted.

In regard to nomenclature, I have followed closely the rule of priority, always adopting the oldest generic and specific names whose applications can be ascertained. In regard to the rules given by Isidore Geoffroy St. Hilaire,\* (*Cat. des Primates*, p. xi,) the first and second are broken by him on the fourth page of the work in which they are promulgated; where the generic name *Troglodytes* is retained for an animal living among the branches of trees, the

\* Rejeter les noms absurdes par eux memes, ou contradictoires avec les faits ou les idées qui sont destinés à exprimer.

Rejeter les noms déjà employés dans une autre acception.

Considérer comme non avenus (toutfois les citant en synonymie) les noms tombés en désuétude.

same name having been given to a genus of birds by Vieillot, (*Oiseaux de L'Amerique septentrionale*, p. 52, 1807,) five years previous to its being applied to the above mentioned ape by Geoffroy St. Hilaire; and, on page 53 of the same work, the specific name *niger* is retained for a howler, the female and young of which are characterized as being yellowish (*jaunatre*.) The third rule is not generally recognized at the present day.

The measurements recorded have been taken with great care, but allowance must be made for the distortion of the specimens by skinning and mounting; this distortion is sometimes very great, especially in the specimens from the Paraguay and Atrato expeditions. The length of tail in the same species is very variable, owing probably to the great liability of that organ to injury.

The materials for the present paper have been drawn from the following sources. The collection of the Academy of Natural Sciences of Philadelphia; that of the Smithsonian Institution, Washington City, the Quadrumana belonging to which, collected by the United States' Paraguay, Amazon, and Atrato Expeditions, were kindly forwarded to me by the Secretaries, who are ever ready to assist the student-naturalist by every means in their power; the magnificent collection of the British Museum, London, opened to me without restriction, through the kindness of Dr. J. E. Gray, and Mr. G. R. Waterhouse; the collection in the magazin of Messrs. J. & E. Verreaux, No. 9, Place Royale, Paris, where every facility for investigation was kindly afforded me; and a view (through the glasses,) of the specimens in the Musée d'Histoire Naturelle, at the Jardin des Plantes, Paris, where, however, I was refused permission to open the cases for the closer examination of the specimens. I am therefore unable to give measurements of some species, unique specimens of which are preserved in that magnificent, though inaccessible collection.

I adopt the following classification of the American Quadrumana:

#### Order QUADRUMANA.

Family SIMIÆ. Dentes primores  $\frac{4}{4}$  - contigui.

Subfamily Cebinæ. Molares  $\frac{6}{6}$  -

Subfamily Hapalinæ. Molares  $\frac{5}{5}$  -

The *Cebinæ* I propose to divide into three tribes, viz.:

Lagothrice. Cauda prehensili; apice subtus calva; dentes primores erecti.

Cebi. Cauda laxa; villosa; dentes primores erecti.

Pitheciæ. Cauda laxa; villosa; dentes primores obliqui.

The *Cebiræ* have been regarded by most authors as having the prehensile tail, and this is mentioned by Erxleben (*Syst.* 1777, p. 44,) as a generic character of this group. Though sufficiently flexible to be wound around the body, it is far from serving the purpose of a fifth hand, as is the case in the *Lagothrices*. This organ in the *Cebi* is clothed with hair to the tip, while in the *Lagothricines* the terminal inferior portion is naked and callous.

#### Tribe I. LAGOTHRICES.

Simia (parte), *Linn.*, Ed. xiii. 1788, p. 26.

Cebus (parte), *Erxleben*, *Systema*, 1777, p. 44.

Gymnuri, *Spix*, *Sim. et Vesp.*, 1823, p. 1.

Cebus (parte), *Fisher*, *Syn. Mam.*, 1829, p. 37.

Atelina and Mycetina, *Gray*, *Proc. Zool. Soc.*, 1849, p. 10.

Cauda longa, prehensili; apice subtus calva.

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Tail very long, generally exceeding the head and body in length, very strongly prehensile, terminal inferior portion naked and callous.

I have selected the genus *Lagothrix* as the typical genus of this tribe, as each of the other genera possesses some peculiarity either of excessive, or arrested development.

#### Genus I. SAPAJOU, Lacépède.

*Simia* (parte), *Linn.*, *Systema*, ed. xiii. 1788, p. 26.

*Cebus* (parte), *Erzleben*, *Systema*, 1777, p. 44.

Sapajou, *Lacépède*, *Mem. de l'Institut*, 1800—1801, p. 489.

Ateles, *Geoff.*, *Ann. du Mus.*, 1806, p. 260.

Artus graciles longi; antipedes tetradactyli aut verruca in loco pollicis; instructa dentes primores superiores inequales, lanarii illis longiores, conici.

Body light and slender; compressed at the loins, and expanding in the thoracic region; limbs very long and slender; anterior thumbs wanting, or replaced by a small nailless tubercle; forehead salient, muzzle elongate, molars circular and small, the fourth and fifth being largest, canines large and conical, superior incisors of unequal length, the median equalling in size the largest molars; hair silky.

Isidore St. Hilaire, in his paper upon the Eriodes, (*Mem. du Mus.*, vol. xviii. 1829, p. 121,) states that in the skull of this genus a portion of the circumference of the anterior nares is formed by the ascending portion of the superior maxillaries, the intermaxillaries not articulating with the nasal bones. This is not always the case, as I have met with several skulls of species of this genus, in which the ascending portion of the intermaxillaries, and the inferior borders of the nasal bones were in contact; no true articulation, however, takes place, the points of the bones merely touching each other. The name Sapajou proposed for this genus by Lacépède, has not been adopted by subsequent authors; it certainly is at least five years prior to that of Ateles, and should be restored.

#### SAPAJOU PANISCUS, Lacépède.

*Simia paniscus*, *Linn.*, *Syst. ed.* xiii. 1788, p. 36.

*Cebus paniscus*, *Erz.*, *Systema*, 1777, p. 46.

Ateles paniscus, *Geoff.*, *Ann. du Mus.*, vol. vii. 1806, p. 269.

Coati, *Buffon* and *Latreille*.

Quatto and Coactu, *Vosmaer*.

Icones, *Audebert*, *Singes Fam. V. sect. 1, fig. 2.* *Buffon*, *Hist. Nat.*, vol. xv. fig. 1. *Latreille*, *Les Singes*, vol. ii. fig. 62.

*S. ater*. Facie tota nuda, carnea; palmis tetradactylis.

*Hab.*—Guiana.

Entirely of a deep shining black color; anterior hands tetradactyl; tail about one-fourth longer than body; face naked and of a flesh color; hairs of forehead very long and projecting anteriorly.

This species is by far the best known of any of the genus, numbers being captured when young by the natives of Guiana, and, as they are of a hardy temperament, they thrive well in captivity; its habits in this state are gentle and pleasing. In a state of nature they live in large troops, numbering sometimes as many as one hundred individuals. They are much hunted for food by the natives, their flesh being considered a great delicacy. Their food consists chiefly of the fruit of a species of palm. Dampier (*Voyages*, vol. iv. p. 228) states that they resort to the sea-side, at low water, in large numbers, for the purpose of collecting oysters, breaking the shell between stones, and eating the animal with great gusto. Latreille states, (*Hist. Nat. des Singes*, vol. ii. p. 145,) that they devour large numbers of fishes, which they capture by means of their tails! this we fear must be received "cum grano salis," though that organ is used for a great variety of purposes. The naked portion is studded with papillæ analogous to those of the human hand, and, from experiments made 1862.]

upon the living animal, it appears to be more sensitive than the hand itself. This species is found in Guiana and Northern Brazil.

Current No.	LOCALITY.	Sex.	From tip of nose to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands.	Post. hands.	Ant. limbs.	Post. limbs.		
5140	Guiana?	♀	1.5	3.2	7	19	25	5	5.9	12	15	Smithsonian	Mounted
21	Guiana.	♀	2	3.5	8.5	24	30	5	5.8	17	22	Academy	Mounted

Skull No. 189 in collection of Academy—Antro-posterior 4.2; occipito-frontal 3.2; bi-temporal 2.25; bi-parietal 2.5; cranial capacity 6 inches; facial angle 55°.

*Lower Jaw*.—Angle to symphysis 2.5; angle to condyle 1.8; angle to coronoid process 1.8; posterior molar to coronoid process 1.05.

#### SAPAJOU ATER.

*Ateles ater*, *F. Cuvier*, Mammifers, 1823.

*Cebus ater*, *Fischer*, Synopsis, 1829, p. 40.

Le Cayon.

Icones, *Cuv.*, Mammifers, (Icon sine numero.) Règne Animal (editio Fortin, Masson & Co.), Mammifers, T. xvi.

*S. ater*; palmis tetradactylis; facie nigra.

Junior, brunneus.

*Hab.* Guiana.

Entirely black; thumbs of anterior hands wanting; face black, the superior portion naked, the chin covered with short stiff black hairs, among which are scattered a few of a white color; hairs of forehead directed posteriorly, forming a tuft.

This species closely resembles the *paniscus*, but may always be distinguished by the color of the face, and the direction of the hairs of the forehead. The color of the young is much lighter than that of the adult. A young specimen, (No. 4618) in the Smithsonian collection, has a decided brown tint upon the back and external surface of limbs.

Its habitat is Guiana.

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Specimen owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands.	Post. hands.	Ant. limbs.	Post. limbs.		
4618	Guiana	♂	1.5	3.5		19	26	5.5	5.5	15.5	14.5	Smithsonian	Mounted
697	"	♂	1.5	3.5		19	22	?	5	14.5	13	Academy	"

#### SAPAJOU PENTADACTYLUS.

*Ateles pentadactylus*, *Geoff.*, Ann. du Mus., 1806, t. vii. p. 267.

*Ateles chamek*, *Humb.*, Rec. des Obs. Zool., 1811, p. 353.

*Ateles subpentadactylus*, *Desmarest*, Mammalogie, 1820, p. 77.

*Chamek*, *Buffon* and *Humboldt*.

Icon, *Reichenbach*, Naturgeschichte der Affen, vol. i. T. 148. (Fig. pessima.)

*S. ater*; palmis subpentadactylis; pollice minimo; facie nuda cupreaque.

*Habitat.* Guiana.

Entirely black; anterior thumbs replaced by a small nailless tubercle, face naked, and of a copper color.

The coloration of this species is similar to that of the *ater* and *paniscus*, but it may readily be distinguished by the presence of a tubercle upon the anterior hands in the position of the thumb; the hairs of forehead are long, projecting anteriorly, as in the *paniscus*, the skull differs materially from that of any other of the genus in being compressed laterally, forming a slight crest at the sagit-

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tal suture, the rami of the lower jaw are much broader, approaching in shape that of the Howlers. Isidore St. Hilaire in his memoir upon the classification of the *Quadrupana*, (Arch. du Mus. vol. ii. p. 449), mentions a specimen having the thumb absent on one hand.

#### SAPAJOU BELZEBUTH.

*Simia belzebuth*, *Brisson*, *Regne Animal*, vol. 1, 1756, p. 194.

*Ateles belzebuth*, *Geoff.*, *Ann. du Mus.*, vol. vii. 1806, p. 260.

*Ateles belzebuth*, *Humb.*, *Receuil*, vol. i. 1811, p. 337 and 353.

*Cebus Brissonii*, *Fischer*, *Synopsis*, 1829, p. 40.

*Marimonda et Aru*, *Humb.*

*Icon. Ann. du Mus.*, vol. vii. T. 16.

*S. niger*; palmis tetradactylis; ventre cruribus et caudæ parte interiore ochroleucis.

*Hab.*—Guiana, Brazilia et Peruvia.

General color brownish-black, becoming reddish brown in the lumbar region: belly, neck, and internal surface of limbs yellowish-white; inferior surface of tail reddish-brown. Face naked and black; tip of nose sometimes reddish-brown, sometimes black.

Humboldt states that in captivity this species is cross and fretful, frequently attacking those from whom it habitually receives its food. Its cry is a repetition of Ou-â, Ou-â, and may be heard to a great distance.

Its geographical range extends across the entire continent from Guiana to Peru. I have met with no specimens collected south of the Amazon. Humboldt found it quite common on the banks of the Orinoco.

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
24	Guiana	♂	2	3		26	30	4.5	6	19	21	Academy	Skin
362	"	♂	2	3.2	6	22	31	6	7	21	22	"	Skeleton.

Skull No. 362, Academy—Antro-posterior 4.3; occipito frontal 3.3; bi-temporal 2.2; bi-parietal 2.3; cranial capacity 5; facial angle 56°.

*Lower Jaw.*—Angle to symphysis 2.8; angle to condyle 1.45; angle to coronoid process 1.6; posterior molar to coronoid process 1.05.

#### SAPAJOU GEOFFROYII.

*Ateles Geoffroyii*, *Kuhl*, *Beitrag*, 1820, p. 26.

*Ateles fuliginosus*, *Kuhl*, *Beitrag*, 1820, p. 25.

*Cebus Geoffroyii*, *Fischer*, *Synopsis*, 1829, p. 40.

*Ateles melanocheir*, *Desmarest*, *Mam.*, 1820, p. 76.

*Eriodes frontatus*, *Gray*, *Voy. of Sulphur*, vol. i. 1844, p. 1.

*Ateles variegatus*, *Natterer*,\* in *Reichenbach's Atlas*, pt. 1, p. 62.

*Icones, Voyage of the Sulphur*, T. i. *Foemina et juvenes*. *Reichenbach's Atlas*, pt. 1, fig. 154.

*S. ater*; ventre et artibus interne stramineis; macula triangulari frontali aurea aut nigra; dorso nigro.

*Foem. straminea aut fuliginosa*; genubus et manibus nigris; macula frontali nigra.

*Hab.*—Brazil et Bolivia.

Adult male, back, external surface of limbs and tail glossy-black; belly, throat, internal surface of limbs, and inferior portion of tail bright-yellow. upon the forehead a triangular spot of bright golden yellow, the hairs com-

\* I have never met with Natterer's original description. I find it quoted in *Reichenbach's Atlas*. the figure is that of the adult of this species, though the frontal spot is too large.

posing which are directed superiorly; hairs of occiput long and black; cheeks covered with short white hair; behind and beneath cheeks, two pencils of long black hairs directed anteriorly.

Female and young male, coloration generally lighter than in male, the black of the back and limbs being replaced by a brown of greater or less intensity, according to the age of the specimen; triangular spot upon the forehead black, the hairs composing it being yellow at their bases and black throughout the remainder of their length; elbows and feet black.

Young, yellowish, dashed with brown, frontal spot as in female, or with the hairs black to the root.

By means of a fine suite of specimens, in the collections of the Academy and Smithsonian Institution, I have been enabled to study with care this most curious species. Though varying greatly in coloration it may always be recognized by the triangular frontal spot.

I have examined the skull of a female corresponding in coloration to Dr. Gray's *Brachyteles frontatus*, and find it decidedly that of a Sapajou, the distance between the intermaxillaries and nasal bones being one-tenth of an inch.

The only specimen I have met with from a well authenticated locality is one collected by the Paraguay expedition (Sm. Inst. No. 3252), in Bolivia. Specimens in the collection of the Academy are marked Brazil, but as they were purchased of a dealer, little reliance can be placed upon it. Dr. Gray's type is marked Tropical America, and no locality is given for any specimen in the Paris museum, all being "De la Ménagerie."

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
3232	Bolivia	♂	2	3		22	21	6	7.5	20	22	Smithsonian	Skin Mounted skin
26	Brazil?	♂	2	3		23	32.5	5	6	20	20	Academy	
88	"	♀	1.5	2.2		15	18	4	3	11.5	10	"	

Skull of No. 3232, occiput broken\*—Antro posterior?; occipito frontal?; bi-temporal 2.35; bi-parietal 2.4; facial angle 56°; cranial capacity?.

Lower Jaw.—Angle to symphysis 2.8; angle to condyle 1.5; angle to coronoid process 1.7; posterior molar to coronoid process 1.25.

#### SAPAJOU MARGINATUS.

*Ateles marginatus*, Geoff., Ann. du Mus., vol. xiii., 1809, p. 92.

*Ateles frontatus*, Bennett, Proc. Zool. Soc., 1830, p. 38.

*Ateles albifrons*, Schinz., Synopsis, vol. i., 1844, p. 63.

Chuva, Humboldt.

Icon. Ann. du Mus., vol. xiii., T. 9.

*S. niger*; pilis faciem cingentibus partim albis; sincipite albo.

*Hab.*—Brazil, Grand Para.

General color black; belly and internal surface of limbs ashy-grey; face naked, flesh-colored in the ocular region, the remainder black; forehead, sinciput and a spot on each side of nose white or grey.

Humboldt found this species quite abundant in the province of Jaen de Bracamoros; he describes its disposition as fierce and libidinous.

#### SAPAJOU HYBRIDUS.

*Ateles hybridus*, Is. Geoff., Mem. du Mus., vol. xvii., 1828, p. 168.

\* This skull presents the anomaly of a well developed seventh molar in the left superior maxillary; such anomalies are not unfrequently met with among the *Quadrumana*. I recollect examining at the Magazin of Verreaux freres, Paris, a skull of the *Simia satyrus* having on each side of the lower jaw six well defined molars.

Mono zambo, native name.

Icon. Guerin, Mag. de Zoologie, 1832, fig 1.

S. Supra griseo-brunneus; infra albidus macula frontali semilunari aut triangulari alba.

Hab.—New Grenada.

Body and tail light chocolate-brown, lighter upon head, neck, hands, and external surface of limbs; throat, belly, and internal surface of limbs grey; upon the forehead a triangular or semilunar white spot; face naked and black; chin and lips sparsely covered with thick, short, white hairs.

This species may be distinguished from the *marginatus* by the coloration. The young of that species, even at birth, is similar in coloration to the adult; the frontal spot is always white or grey, thus distinguishing it from the *Geoffroyii*. The name Mono zambo is stated by Isidore Geoffroy to signify Mulatto Monkey, from its color being somewhat similar to that of the hybrids between the Indians of Columbia and the negro. Skulls of the *Alouatta palliatus*, however, received from the Atrato expedition, are marked Mono zambo.

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
87	Columbia	♂	1.5	2.5	5	18	24	3	5	13.5	16	Academy	{ Mounted skin

## Genus II. BRACHYTELES, Spix.

Brachyteles, *Spix*, Sim. et Vesp., 1823, p. 36.

Eriodes, *Is. Geoff.*, Mem. du Mus., 1829, p. 121.

Corpus robustum; cranium rotundum; nares oblongæ, antrorsum versæ, septo tenui separatæ; manibus tetra aut pentadactylis; dentes primores æquales, lanarii breves.

Body heavy, facial angle about 60°; head more spherical than in the Sapa-jous; nostrils circular, more inferior than lateral; anterior thumbs wanting, or rudimentary, sometimes terminated by a small nail; tail longer than body; incisors equal; canines small, not exceeding the incisors in length; molars larger than incisors, quadrangular. Intermaxillaries articulating with nasal bones by a broad surface. Hair woolly.

I cannot agree with Isidore St. Hilaire that the description of this genus by Spix is incorrect; the peculiar position of the nostrils, which resemble more those of the *Quadrupana* of the Old World than any other of the American genera, the equality in the size of the incisors, shortness of the canines, and globular form of head appear to me sufficient generic distinctions. The length of pelage, and the question whether it may be soyeux or laineux does not appear to me to be of generic value.

## BRACHYTELES ARACHNOIDES, Gray.

Ateles arachnoides, *Geoff.*, Ann. du Mus., t. xiii. 1809, p. 89.

Ateles hypoxanthus, *Desm.*, Mammalogie, 1820, p. 75.

Brachyteles macrotarsus, *Spix*, Sim. et Vesp., 1823, p. 36.

Eriodes tuberifer, hemidactylus, and arachnoides, *Is. Geoff.*, Mem. du Mus., t. xvii. 1828, pp. 160, 161, 162.

Brachyteles arachnoides, *Gray*, Cat. of Brit. Mus., 1843, p. 10.

Mariki kupo and Macaco vernello. Native names.

Icones, Ann. du Mus., vol. xiii. Pr. 9. *Spix*, Sim. et Vesp., T. 27. *Max de Wied.*, Abbild. zur Brazil, vol. i. T. 1.

B. Cinereo flavescens; ad caudæ basin ochraceus; facie nuda; pollice aut nulla, aut brevis; ungue carente aut prædita.

1862.]

*Hab.*—Brazil.

General color yellowish brown, darker upon the occiput, upon the forehead a few long black hairs, buttocks, region of the anus and inferior basal portion of tail dark reddish brown.

I had long suspected that the three species of this genus described by Isidore St. Hilaire, were in reality one and the same species; no specific characters are manifest in their coloration, or skulls, the different species being based upon the development of the anterior thumbs, this member being absent in the *arachnoides*: replaced by a small nailless tubercle in the *tubifer*, and surmounted by a nail in the *hemidactylus*. In the *Magazin* of Messrs. Verreaux, 9 Place Royale, Paris. I found specimens having upon one hand the tubercle, and upon the other the nailed thumb, others with the tubercle upon one hand, but absent upon the other. Isidore St. Hilaire himself (*Cat. des Primates*, p. 51) expresses a doubt as to whether the *arachnoides* and *hemidactylus* are really distinct. In September and October, 1860, I was unable to find the *hemidactylus* in the Paris Museum, all the *Brachyteles* being labelled *Eriodes arachnoides*.

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
25	Brazil	♂	2	3.5	5	22	26	6	7	18	17?	Academy	{ Mount ed skin
597	"	♀	1.2	3	?	17.5	broken	3	4	11	11	"	

Skull of No. 597, young, occiput broken—Antro-posterior 3.8; occipito-frontal 3; bi-temporal 2; cranial capacity ?; facial angle 66.

*Lower jaw.*—Angle to symphysis 2; angle to condyle 1.3; angle to coronoid process 1.4; posterior molar to coronoid process .88.

## Genus III. LAGOTHRIX, Geoff.

*Lagothrix*, Geoff., Ann. du Mus., vol. xix. 1812, p. 106.

*Gastrimargus*, Spix, Sim. et Vesp., 1823, p. 39.

Caput obtusum, rotundatum; rostrum sima, manibus pentadactylis; dentes primores parvus, lanarii illo longioris.

Body heavy, head globular, muzzle of adult much flattened, anterior hands pentadactyl, incisors small and of unequal size, the superior median being largest; canines very large and strong, carinated on their posterior surfaces, and grooved anteriorly; anterior nasal foramen nearly circular.

This genus was founded by Geoffroy St. Hilaire, in his *Tableau des Quadrumanes* (*ante cit.*) Spix, eleven years after, in his elephantine work upon the *Quadrumana* and *Cheiroptera*, of Brazil, proposed for it the name *Gastrimargus*, from the great voracity of the only known species, which is said to exceed that of any others of the American *Quadrumana*. The skull can be readily distinguished from that of the *Sapajous* and *Brachyteles* by the mode of articulation of the nasal bones with the intermaxillaries. In the *Sapajous* no true articulation can be said to take place, the intermaxillaries terminating generally in a point a short distance below the intermaxillaries, though sometimes barely touching them; in the *Brachyteles* and *Lagothrix*, a broad, well-marked articulation takes place, in the former species perpendicular to the suture between the nasal bones, and in the latter parallel to it. The rami of the lower jaw are much broader than in either of the before mentioned genera, approaching in size and form those of the *Howlers*.

## LAGOTHRIX HUMBERTII, Geoff.

*Simia cana*, Humb., Recueil des Obs., vol. i. 1811, p. 354.

*Simia lagothrica*, " " " " " pp. 322 and 354.

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*Lagothrix cana* and *Humboldtii*, *Geoff.*, Ann. du Mus., vol. xix. 1812, p. 107.  
*Gastrimargus infumatus* et *olivaceus*, *Spix*, Sim. et Vesp., 1823, p. 39.  
*Cebus lagothrix*, *Fischer*, Synopsis, 1829, p. 41.  
*Lagothrix cappar*, *Lesson*, Species, 1840, p. 125.  
*Lagothrix poppigi* et *infumata*, *Schinz*, Synopsis, 1844, pp. 71 and 72.  
*Lagothrix Castelnau*, *Is. Geoff.* and *Deville*, Comptes Rendus, vol. xxvii. 1848, p. 496.

*Capparo*, *Humboldt*.

Icones, *Spix*, Sim. et Vesp., tab. 28 and 29.

*L.* Mas brunneus cum cana admixta; facie nuda et nigra; capite et manibus nigris; femoribus et cauda brunneo-fusca.

Fœmina olivacea; pilis capites niger.

Catulus olivaceo-canus; capite manibus et cauda infera nigro-fusco.

*Hab.*—Brazil, Bolivia, Venezuela, Peru.

Adult male, general color reddish brown, dashed with hoary gray, the hairs being brown at their bases, tipped with gray; the brown predominating upon the internal surface of limbs and perineal region; belly dark brown, sometimes black, terminal portion of tail and top of head black; face naked and black, upon the lips a few scattered white hairs;

Female, general color olive yellow or brown; head black.

Young, hoary grey, darker on belly and internal surface of limbs; hands and top of head black.

The great variety of coloration in this species resulting from age and sex has led to great confusion in its nomenclature. I have examined with great care specimens of the various so-called species, and believe them all to be one and the same. The collection at the Jardin des Plantes, contains specimens labelled *canus*, *Humboldtii*, and *Castelnau*, those of the *canus* (including the typical specimen, part of the spoils of Bonaparte from Portugal.) are, as may be seen by reference to the catalogue, (page 50,) all young males, and Isidore Geoffroy himself expresses a doubt as to its being distinct from the *Humboldtii*. A young specimen, (No. 28,) in the collection of the Academy, presented in 1857, the coloration of the *Castelnau*, answering perfectly the description given by Isidore Geoffroy and Deville; by exposure to light and the camphorated and arsenical vapors of the museum, the color has slightly faded, and the specimen now answers perfectly the description of the *canus*. The *L. poppigi* I have never seen, but the description by Schinz (*L. notæo castaneo fusco*; gastræo niger-rimo; facie nuda nigra rugosa, *Synopsis mammalium*, p. 72,) does not differ essentially from that of the adult *Humboldtii*.

Current No.	LOCALITY.	Sex.	From tip of nose to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
28	Brazil	♂	1	2.3	4.5	18.5	25.5	3.5	4	12.5	13	Academy	{ Mount- ed skin Skin
3238	Bolivia	♂	2	3.5	4.3	20	24	4	5.3	14	16	Smithsonian	

Skull of No. 3238, occiput broken—Antro-posterior?; occipito-frontal?; bi-temporal 2.2; bi-parietal 2.4; cranial capacity?; facial angle 50°.

Lower jaw.—Angle to symphysis 2.6; angle to condyle 1.95; angle to coronoid process 1.8; posterior molar to coronoid process 8.5.

#### Genus IV. ALUATTA, Lacépède.

*Simia* (parte) *Lin.*, Ed. xiii. 1788, p. 26.

*Cebus*, *Cuv.* and *Geoff.*, Magazin Encyclopedique, vol. i. 1795, p. 71.

*Aluatta*, *Lacépède*, Mem. de l'Institut, 1777, p. 489.

*Mycetes*, *Illiger*, Prodrömus, 1811, p. 70.

*Stentor*, *Geoff.*, Mem. du Mus., 1812, p. 107.

1862.]

Caput pyramidale, manibus pentadactylis; os hyoideum prominens, cavernosum.

Head pyramidal, facial angle about 50°, inferior maxillary large and massive, incisors small and equal, canines, and molars large; occipital bone with a well defined median ridge terminating superiorly in an osseous tubercle; body of hyoid bone very large and hollow, very apparent in the living animal, chin bearded, face naked.

Of all genera of American *Quadrupana*, the present is perhaps the most unattractive and even repulsive in appearance; a huge pyramidal head placed upon a thick unwieldy body, contrasts strongly with the globular heads and comparatively light bodies of the genera before enumerated. Its chief peculiarity, however, consists in the enormous development of the body of the hyoid bone; this is of an ovoid form and hollow; one in the collection of the Academy has a capacity of 5 cubic inches.\*

By means of this curious organ the voice of the animal is augmented to such a degree that it may be heard at a distance of three miles. I have been informed by persons residing at Panama, that the *senicula* loses its voice entirely in captivity. The same may be true of other species.

#### ALUATTA SENICULA, Lacépède.

*Simia seniculus*, Linn., Ed. xiii. 1788, p. 36.

*Aluatta seniculus*, Lacépède, Mem. de l'Inst., vol. iii. 1800, 1801, p. 489.

*Stentor seniculus*, Geoff., Ann. du Mus., vol. xix. 1812.

*Stentor chrysurus*, Is. Geoff., Mem. du Mus., vol. xvii. 1848, p. 166.

*Mycetes laniger*, et *auratus*, Gray, Ann. and Mag. of Nat. Hist., vol. xvi. 1845, p. 219, 220.

*Aluatte*, Buffon & Audebert.

*Aluatte*, Ouarine et Hurlleur, Latreille.

Royal monkey, Pennant.

Icones, Latreille, Les Singes, vol. ii. T. 115 and 116. Audebert, fam. 5, sect. 1, fig. 1. Guérin, Mag. de Zoologie, 1832, class 1, tom. vii.

A. Corpore fulvo-fusco aut aurescente; capite collo ante brachiis, femoribus et cauda castaneis; barba longa rufescente; facie pectoreque, nudis et nigris.

*Hab.*—Brazil, Equador, Venezuela and New Grenada.

Head, neck, limbs and tail, dark chestnut brown; back and sides golden yellow; beard in adult long, the hairs composing it being mostly golden yellow at their bases, and chestnut brown through the remainder of their length; face naked and black; chest naked, abdomen sparsely covered with long, brownish hairs.

The above description is taken from an adult male (No. 985) in the collection of the Academy. The young have the same general distribution of colors, though of a darker shade. Dr. Gray, in his paper upon the genus *Mycetes*, (Ann. and Mag. Nat. Hist., Oct. 1845, p. 219) lays great stress upon the texture of the hairs as a specific distinction. In the present species the hairs of the adult are soft to the touch, while those of the young are hard and rigid. In regard to the identity of this species with the *chrysurus* of Isidore Geoffroy, I was for some time in doubt, but the examination of a large number of specimens has convinced me that it is but a slight variety of the *senicula*; the skulls present no dissimilarity; the only external difference being that the apical third of the tail is similar in coloration to the back. In a suite of specimens from New Grenada, one has the terminal portion of the tail bright golden yellow; in the second, it is somewhat darker, and in the remaining two it has

\* A full and complete account of the anatomy of this curious organ and the adjacent parts may be found in the *Oeuvres* de Pierre Camper, Paris, 1803, 3 vols. 12mo., vol. 1, p. 76. Also in the *Histoire Naturelle des Singes*, Latreille, Paris, 1801, 2 vols., 12mo. vol. 2, p. 125.



he chestnut brown color of the senicula. Dr. Gray's *M. laniger* is undoubtedly of this species.

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
985	Brazil	♂	2.6	5	5.5	27	23	5	5.8	16.5	17	Academy	{ Mounted skin Skin much distorted
3242	{ New Granada	?	1.9	3.2	5	19.5	20	3.5	3.8	13	13	Smithsonian	

Skulls.—Current No. 578 A. N. S.—Antro-posterior 4.55; occipito-frontal 2.15; bi-temporal 2; bi-parietal 2.5; facial angle 43°; cranial capacity 4.25. Current No. 3424 Smithsonian.—Antro-posterior 4.3; occipito 2.9; bi-temporal 2; bi-parietal 2.5; facial angle 45°; cranial capacity 4.

*Lower Jaw*.—Current No. 578; angle to symphysis 3.2; angle to condyle 2.4; angle to coronoid process 2.25; posterior molar to coronoid process 1. Current No. 3424; angle to symphysis 3.1; angle to condyle 2.4; angle to coronoid process 2.25; posterior molar to coronoid process 1.

#### ALUATTA URSINA.

*Stentor ursinus* and *fuscus*, *Geoff.*, Ann. du Mus., tom. xix., 1812, p. 108.

*Simia ursina*, *flavicaudata* et *guariba*, *Humboldt*, Rec. des Obs., tom. i., 1811, p. 355.

*Mycetes bicolor*? *Gray*, Ann. and Mag. N. Hist., vol. xvi. 1845, p. 219.

Icon, *Humb.*, Rec. des Obs. T. xxx.

*Adultus fuscus, fulvus.*

*Catulus pilis nigris, apicibus fulvo-fuscis, artibus nigris aut fuscis.*

*Adult*.—General color yellowish brown or brownish yellow; hairs of shoulders annulated with black.

*Half grown*.—Body as in adult, limbs and tail very dark brown, approaching black.

*Young*.—General color black, tips of hairs of body yellowish brown, base of tail and anal region reddish brown.

This species, as well as the following, is remarkable for the great variety of coloration occasioned by age. The young at first sight appears of an intense black color; but upon a closer examination, the hairs, more especially of the back and sides of head, are found to be tipped with reddish brown. As the animal becomes older, the black gradually disappears, a yellowish brown color appearing in its place, until in the adult the only remains of the black are to be found in a few annulations in the hairs of the shoulders.

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
27	Brazil	♂	2.1	4.3	4.8	21	21	3.5	5	11.5	11	Academy	{ Mounted skin " " " "
571	"	♂	1.8	4	4.4	23	22	3.8	5	13	14	"	
57	"	♂	1.5	3	4	17	11	3	4	8	8.5	"	

Skull.—Antro-posterior 3.8; occipito-frontal 2.3; bi-temporal 1.85; bi-parietal 1.9; facial angle 50°; cranial capacity 3.75.

*Lower Jaw*.—Angle to symphysis 3; angle to condyle 2.05; angle to coronoid process 1.95; posterior molar to coronoid process 1.05.

1862.]

## ALUATTA NIGRA.

*Stentor niger et straminea*,\* *Geoff.*, Ann. du Mus. vol. xix., 1812, p. 108.

*Simia caraya*, *Humb.*, Rec. des Obs. vol i, 1811, p. 394.

*Mycetes barbatus*, *Spix*, Sim. et Vesp. 1811, p. 45.

Icon., *Spix*, T. xxxiii.

*Hab.*—Brazil, Paraguay et Bolivia.

A. Atræ; femina et juniores straminei nigro varii.

Adult.—Male entirely of a deep black color; hairs of occiput directed forward, meeting at right angles those of the forehead, which are directed backward.

Female and Young.—Pale straw color dashed with black.

The young of this species are at birth entirely of a pale straw color. About the period of the second dentition the hairs upon the medio-dorsal line become black at their bases; soon after, this change takes place upon other parts of the body, the black gradually taking the place of the straw color, until the entire body in the adult male is of an intense black color—the adult female having the coloration of the half grown male. Upon the forehead is a well marked semicircular ridge of hairs formed by the meeting at nearly right angles of the hairs of the forehead and occiput; the tips of these hairs in the female are black.

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ea	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
4619	Paraguay	♂	2.3	4	5.1	26	18.5	4	5.5	14.9	16	Smithsonian	Skin
3259	"	♀	2	3.5	5	24	22	3.8	5	12	14	"	"
808	Brazil	♂	2	4	5	24.5	26	4	5.5	14	16	Academy	Mount- ed skin
1943	"	♀	1.4	3	5	20	17	3.8	5	12.5	13.5	"	"

Skulls.—Current No. 4619 ♂; antro-posterior 5; occipito-frontal 3.2; bi-temporal 2.2; bi-parietal 2; cranial capacity ?; facial angle 40°. Current No. 5136 ♀; antro-posterior 4.1; occipito-frontal 2.8; bi-temporal 2; bi-parietal 2.05; cranial capacity 4.25; facial angle 45°.

*Lower Jaws.*—Current No. 4619; angle to symphysis 3.9; angle to condyle 3.1; angle to coronoid process 3; posterior molar to coronoid process 1.35. Current No. 5136; angle to symphysis 2.1; angle to condyle 2.35; angle to coronoid process 2.25; posterior molar to coronoid process 1.

## ALUATTA BEELZEBUL.

*Simia Beelzebul*, *Linn.*, Ed. xiii. 1785, p. 35.

*Mycetes rufimanus*, *Kuhl*, Beitrage, 1820, p. 31.

*Mycetes discolor*, *Spix*, Sim. et Vesp., 1823, p. 48.

*Mycetes villosus*? *Gray*, Ann. and Mag. of N. H., 1845, p. 220.

Icon., *Spix*, T. xxxiv.

*Hab.*—Brazil, Paraguay.

A. Nigra, pilis ad basin brunneis, manibus fuscis aut griseis.

Black, slightly dashed with yellow on belly and on internal surface of limbs; hairs of body brown at their bases and black at their apices; hands reddish-brown or grey.

This species resembles at first sight the niger or young ursina, but may be readily distinguished from the former by the brown tint of the bases of hairs of body; from the latter, by the length of the hairs and the total absence of the reddish-brown at their apices, which is always present in that species. Much stress has been laid on the coloration of the hands; this is very variable, being in some specimens reddish-brown, in others greyish, and in others nearly black.

\* Is. Geoffroy St. Hilaire's paper, though dated subsequently to that of Humboldt, must have been published anterior to it, and Humboldt quotes *Stentor niger*, Geoff. as a synonym. I have therefore retained Geoffroy's name.

Current No.	LOCALITY.	Sex.	From muzzle to				Tail	Length of		Length of		Owned by	Nature of Specimen.
			Eye	Ear	Occ.	Tail		Ant. hands	Post. hands	Ant. limbs.	Post. limbs.		
3255	Paraguay	♂	2	4	4.5	17.5	18.5	3.2	4.5	12	13	Smithsonian	Skin

Skull No. 3255, much broken.—Antro-posterior 4.3; occipito-frontal 2.4; bi-temporal 1.8; bi-parietal 1.85; facial angle ? cranial capacity ?.

*Lower Jaw*.—Angle to symphysis 3; angle to condyle 2.4; angle to coronoid process 2.3; posterior molar to coronoid process 1.05.

#### ALUATTA PALLIATA.

*Mycetes palliatus*, Gray, Proc. Zool. Soc., 1848, p. 138.

M. Beelzebul, Schott, Michler's Rep., 1862, p. 413.

Icon., Proc. Zool. Soc., 1848, T. vi.

A. Nigra, pilis ad basin fulvis, lateralibus longis.

*Hab*.—New Granada.

Head, limbs, and tail black; hairs of back and sides very long, forming a kind of mantle as in the *Colobus guereza*, of a yellowish-brown color, tipped with black; hairs of body black at their tips and yellowish-brown throughout the remainder of their length.

Of this rare species the Smithsonian collection contains four specimens, collected by the Atrato Expedition; the hairs of the mantle appear to be bright yellow in youth, becoming brown in the adult. From the great mutilation of the specimens I am unable to give other than approximate measurements.

Current Number	LOCALITY.	Muzzle to Tail.	Tail.	Ant. hands.	Post. hands.	Ant. limbs.	Post. limbs.	OWNED BY
3250	New Granada	19.5	20.8	4	5	13.5	12	Smithsonian.

Skull—Current No. 3423; antro-posterior 3.95; occipito frontal 2.8; bi-temporal 1.85; bi-parietal 1.95; cranial capacity 4 in.; facial angle 50°.

*Lower Jaw*.—Angle to symphysis 2.7; angle to condyle 2; angle to coronoid process 1.85; posterior molar to coronoid process .8.

#### Geographical distribution of the *Lagothrinæ*.

	Boliva.	Paraguay.	South Brazil.	North Brazil.	Peru.	Equador.	New Granada.	Venezuela.	Guiana.
Sapajou paniscus.....				*					*
“ ater.....								*	*
“ pentadactylus.....					*			*	*
“ Geoffroyi.....	*		*		*			*	*
“ Belzebuth.....				*		*		*	*
“ marginatus.....			*	*	*			*	*
“ hybridus.....			*	*	*			*	*
Brachyteles arachnoides.....			*		*			*	*
Lagothrix Humboldtii.....	*				*	*		*	*
Aluatta senicula.....				*		*	*	*	*
“ ursina.....				*		*	*	*	*
“ niger.....	*	*	*						
“ Beelzebul.....			*						
“ palliata.....							*		

*December 2d.*

The President, Mr. LEA, in the Chair.

Twenty-eight members present.

The following papers were presented for publication :

A Review of the Ferns of North America. By Elliott Coues.

Catalogue of the Miocene Shells of the Atlantic Slope of the United States. By T. A. Conrad.

Dr. I. I. Hayes made some remarks on some fragments of a supposed meteorite presented by him to the Academy. They were obtained from Savisavik, a little below Cape York, lat.  $76^{\circ}$  N. The mass was described by the Esquimaux as weighing several tons.

By resolution, the thanks of the Academy were tendered to Dr. I. I. Hayes for the very valuable series of specimens collected in his last Arctic Expedition and presented to the Academy.

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*December 9th.*

The President, Mr. LEA, in the Chair.

Nineteen members present.

The following papers were presented for publication :

Descriptions of new and recent Miocene Shells. By T. A. Conrad.

Remarks on some species of Paludina, Amnicola, Valvata and Melania. By James Lewis, M. D.

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*December 16th.*

The President, Mr. LEA, in the Chair.

Twenty members present.

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*December 23d.*

The President, Mr. LEA, in the Chair.

Twenty-three members present.

The following paper was presented for publication :

Description of Fossils from the Yellow Sandstone lying beneath the Burlington Limestone, &c. By Alexander Winchell."

Mr. Cassin communicated the fact that the Snow-Owl is at present unusually frequent in the vicinity of Philadelphia, more so than he had ever known it previously to be.

Dr. Hayes referred to his having discovered remains of the Musk Ox, in Greenland, from lat.  $78^{\circ}$  to  $78^{\circ} 20'$ , where the animal is now extinct. Specimens of these remains had been presented to the Academy. He also made some remarks on the extinction of the Esquimaux in Northern Greenland.

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*December 30th.*

The President, Mr. LEA, in the Chair.

Twenty-three members present.

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On report of the Committee, the paper read Nov. 4th, entitled, "On the Pedipalpes of North America, by Horatio C. Wood, M. D.," was ordered to be published in the Journal; and, on report of the respective Committees, the following papers were ordered to be published in the Proceedings:

**Synopsis of the Species of COLYMBETES inhabiting America, north of Mexico.**

BY JOHN L. LE CONTE, M. D.

The number of known species of Colymbetes, with the elytra transversely striate (*Cymatopterus Esch.*) has been so increased within a few years that a synoptic table, expressing the differences between them, is now desirable; for the purpose of avoiding the necessity of reference to scattered descriptions, I have completed the table by adding the characters of the species belonging to the other divisions of the genus. The measurements are in decimals of an inch.

A. Elytra reticulate; claws of hind tarsi not very unequal in size (except in sp. 8).

a. Body convex, very finely reticulated; anterior and middle tarsi of male very feebly dilated: *ILYBIUS* Er.

§ Base of thorax broadly rounded.

•55. Black, slightly bronzed, oval, not dilated at the middle, less obtuse behind; elytra with the usual pale spots; outer hind claw two-thirds as long as the inner one. Middle States . . . . . 1. *angularis* Lec.

•40—•45. Black, slightly bronzed, oval, very slightly dilated at the middle, less obtuse behind; elytra with the usual pale spots; outer hind claw three-fourths as long as the inner one. Middle, Southern and Western States, and Canada. *Dytiscus big.* Germ.; *Colymbetes fenestralis* || Say; var. *Il. pleuriticus* Lec. . . . . 2. *biguttulus* Lec.

•45. Black, slightly bronzed, oval, not dilated at the middle, scarcely less obtuse behind; elytra with the usual pale spots; the usual confused lines of punctures more distinct than in the two preceding species; outer hind claw three-fourths as long as the inner one. Oregon and Russian America. . . . . 3. *quadrimaculatus* Aubé.

•46. Var. ? Dark-bronzed color, a little more convex than No. 3, but with the lines of punctures on the elytra equally distinct; the anterior spot is longer than in No. 3. Methy; Robert Kennicott.

•42. Brownish-black, slightly bronzed, oval, slightly dilated at the middle, not less obtuse behind; thorax with the sides nearly straight; elytra with the anterior pale spot very small, the hind one wanting; lines of punctures visible only behind the middle. North Red River. . . . . 4. *fraterculus* Lec.

•37—•41. Black, slightly bronzed, oval, elongate, not dilated at the middle, somewhat less obtuse behind; elytra with the usual pale spots, the hind one quite large; lines of punctures visible only behind the middle. Nebraska. *Ilybius laramæus* Lec. . . . . 5. *laramæus* Lec.

•36. Black, slightly bronzed, elongate oval, not dilated at the middle, less obtuse behind; elytra with the usual pale spots not visible; confused lines of punctures quite distinct to the base. . . . . 6. *picipes* Kirby.

•36. Black, slightly bronzed, elongate oval, not dilated at the middle, not less obtuse behind; elytra with the pale spots very distinct; confused lines of punctures visible to the base; surface less convex and more finely reticulated than in *C. picipes*. . . . . 7. *ignarus* Lec.

§§ Base of thorax bisinuate, hind angles prolonged, acute.

•40. Elongate oval, less convex than usual, black, scarcely bronzed; series 1862.]

of elytral punctures distinct and regular, extending to the base; outer hind claw less than one-half as long as the inner one. Dacotah. 8. *sinuatus*.

b. Body slightly convex, elytra coarsely reticulated, anterior and middle tarsi strongly dilated: *MELADEMA* Lap.

•63. Elongate oval, black, thorax nearly three times as wide as long, sides nearly parallel behind, rounded in front; elytra a little wider than the thorax, and forming an angle with it. Lake Superior and Saskatchewan. *Agabus ang. Lec.* . . . . . 9. *angustus*.

B. Claws of hind tarsi very unequal.

A. Anterior and middle tarsi with three joints strongly dilated, and furnished with small cups beneath;

a. Elytra with numerous impressed transverse lines, *CYMATOPTERUS* Esch.

\* Legs black:

§ Sides of the thorax sinuous near the anterior angles, which are subacuminate.

•75. Elongate, gradually narrowed at each end, but less obtusely behind, black, nearly opaque; head and thorax finely sculptured, lines of elytra fine and approximate; front and base of antennæ obscure red. Kadjak.

10. *obscuratus Mann.*

§§ Sides of thorax rounded; anterior angles acute.

•74. Elongate oval, very slightly dilated behind the middle, above piceous, shining; sides of elytra, basal margin and suture anteriorly pale, transverse lines fine approximate; thorax pale piceous, with a large transverse dark cloud, sculpture fine and dense, head dark brown, front base of antennæ and two spots between the eyes pale; beneath very black. Saskatchewan.

11. *seminiger Lec.*

•64—•70. Elongate oval, shining, elytra cinereous brown, sides and basal margin pale, transverse striæ fine, but less dense than in the preceding; thorax black, with the sides and an interrupted transverse band pale brown, sculpture dense; head black, with two vertical spots, front labrum and base of antennæ pale; beneath very black. Lake Superior and Methy.

12. *longulus Lec.*

\*\* Legs brown or pale piceous; color above brown, shining, sometimes dark, sometimes pale; thorax with a dark transverse cloud;

§ Sides of thorax broadly rounded, or nearly straight.

•62. Elongate oval; thorax with sinuous rugosities, not connected together; lines of elytra deep and distant; legs very dark. San Diego, California ♀.

13. *strigosus Lec.*

•62. Elongate oval; thorax with very deep, dense and anastomosing rugosities; lines of elytra deep and approximate; legs pale. Methy ♀.

14. *exaratus Lec.*

•63. Elongate oval; thorax with finer anastomosing rugosities, deeper in ♀ than ♂; lines of elytra deep, moderately approximate; front and middle legs paler than hind legs. Middle States ♂ ♀. *Col. triseriatus Kirby.*

15. *sculptilis Harris.*

•64. Elongate oval, slightly dilated behind; thorax with fine, somewhat anastomosing, but not very dense rugosities; lines of elytra deep and approximate; legs pale, thighs somewhat darker than the tibiae. Oregon ♂.

16. *densus Lec.*

•62. Elongate oval, slightly dilated behind; thorax with fine and dense anastomosing rugosities; lines of elytra very deep and approximate; legs

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pale brown (sides of thorax more rounded than in *C. exaratus*). Russian America ♀. . . . . 17. *dolabratus* Payk.

•56. Elongate oval; thorax with extremely fine anastomosing rugosities, sides almost straight; lines of elytra moderate; legs pale brown, thighs slightly darker. Greenland ♂ ♀. . . . . 18. *groenlandicus* Aubé.

§§ Sides of thorax strongly rounded, sinuate near the anterior angles, which are strongly acuminate.

•60. Elongate oval; thorax feebly punctured towards the base, with scarcely perceptible rugosities; lines of elytra deep, moderately approximate; legs pale brown, thighs darker. Greenland ♀. . . . . 19. *drewseni* Lec.\*

b. Elytra not striate transversely: RANTUS Esch.

Thorax pale, with two dark spots placed transversely:

•47. Elongate oval, elytra irrorated with black and pale; prosternum and legs pale brown. Middle States and Canada. *Col. maculicollis* Aubé.

20. *binotatus* Harris.

•47. Elongate oval; elytra irrorated with black and pale; prosternum and hind legs black, or very dark brown. Oregon and Russian America.

21. *divisus* Aubé.

•41. Elliptical, moderately convex; thorax pale yellow, with the front and hind margins broadly black; elytra irrorated with black and pale. Lake Superior, Canada, Hudson's Bay Territory, Oregon. . . . . 22. *agilis* Aubé.

B. Front and middle tarsi of male very slightly dilated: COLYMBETES Clairv.

•50—53. Elliptical very slightly convex, above dark brown, shining; sides of thorax paler; elytra with a subbasal transverse line, three narrow vittæ on each, and the lateral margin pale. Middle and Southern States. *Dytiscus calidus* Fabr.; *Col. tæniolis* Say; *Hydaticus meridionalis* Mels.

23. *calidus* Aubé.

#### Note on the Species of BRACHINUS inhabiting the United States.

BY JOHN L. LE CONTE, M. D.

All the species of *Brachinus* found within our Territory are very similar in color; the head, thorax and legs are ferruginous, and the elytra are of a dark blue, blackish, or greenish-blue color; the under surface of the trunk, and the 3d and following joints of the antennæ, vary in color, according to species and individuals, being sometimes nearly black, sometimes of the same color as the head and thorax. The form and sculpture of the thorax differ very much in the various species, and it is upon the characters derived from that region of the body that I have relied principally in distinguishing the forms, which I consider as entitled to rank as species, in the table given below.

It may be alleged that the synoptic phrases are too short to enable the so-called species to be recognized; I can only say that as I have endeavored to express the essential differences between the forms that I have recognized, and as the forms, colors and sculpture, except as noted, are identical, any dilatation of the phrases would be mere surplusage.

I must also add that I consider the species of this genus very decidedly opinionative, and that I am only impelled to the publication of this note by the necessity of giving names to a certain number of recognized forms, and of placing as synonyms some which I formerly considered as distinct, but which increased collections have since shewn to be varieties.\*

\* I have dedicated this very curious species to Mr. Chr. Drewsen, the distinguished entomologist of Copenhagen, by whom it was sent to me, with several specimens of *C. groenlandicus*. 1862.]

- A. Large species, with the thorax punctured and the hind angles divergent; the elytra costate, gradually widened behind, with the humeri distinct, but rounded:

Thorax scarcely longer than wide; sides much rounded in front:

- 58. Antennæ and abdomen not infuscated. Southern and Western States.  
tormentarius Lec.

- 61. Trunk blackish-brown; middle of metathorax ferruginous; antennæ with the 4th and following joints darker. Southern States.

- 61. Thorax considerably longer than wide, sides less rounded than in the preceding; abdomen darker at the sides. Southern States. ?*B. deyrollii* Ferté. . . . . strenuus Lec.  
alternans Dej.

- B. Moderate sized species; elytra gradually widened behind, costate, with the humeri indistinct; antennæ and abdomen dark.

- 45—53. Thorax elongate, punctured, hind angles not prominent. Southern States. Var. *viridipennis* Dej.; *viridis* Lec.; *lecontei* Lec.

- 45. Thorax sparsely punctured, hind angles prominent. Southern and Western States. . . . . americanus Lec.  
perplexus Dej.

- C. Moderate, or rather large species; elytra but slightly wider behind, costate, with the humeri distinct; thorax sparsely and finely punctured, with the hind angles prominent; sides of abdomen a little darker:

- 45—55. Thorax very wide in front, very suddenly narrowed behind. Middle and Western States, as far as New Mexico. ballistarius Lec.

- 44—50. Thorax more gradually narrowed behind. Found in the whole of the Atlantic district. *cyanopterus* Lec.; var. *sufflans* Lec.; *perplexus* Lec.; *librator* Dej.; *similis* Lec. . . . . fumans Dej.

- D. Smaller species; elytra broad, wider behind, strongly costate, humeri distinct; thorax opaque, rugose and punctured, hind angles slightly prominent; abdomen not infuscated.

- 30. Thorax rather long; elytra glabrous, the grooves almost with single series of punctures. California and Arizona. Var. *lecontei* Motsch.

- 35. Thorax shorter, sparsely punctured; elytra pubescent at the sides. California. . . . . tschernikhii Mann.  
costipennis Motsch.

- 35. Thorax shorter, densely punctured; elytra punctulate, pubescent. California and Arizona. . . . . carinulatus Motsch.

- E. Smaller species; thorax usually sparsely punctured, not longer than wide, very strongly constricted behind; elytra wider behind, convex, humeri distinct.

- a. Hind angles of thorax very prominent:

- 40. Thorax rugous, almost opaque; elytra moderately costate; beneath dark ferruginous. New Mexico, Arizona and Lower California.

- 40. Thorax scarcely rugous, sparsely and strongly punctured; elytra strongly costate; abdomen scarcely darker at the sides. Kansas. . . . . fidelis Lec.

- 32—37. Thorax sparsely and finely punctured; elytra scarcely costate: antennæ and abdomen usually slightly infuscated. Middle, Western and Southern States. *conformis*† Lec.; *velox* Lec.; var. ?*cephalotes* Dej.

- 32—37. Thorax sparsely and finely punctured; elytra scarcely costate: antennæ and abdomen usually slightly infuscated. Middle, Western and Southern States. *conformis*† Lec.; *velox* Lec.; var. ?*cephalotes* Dej.  
cordicollis Dej.

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b. Hind angles of thorax moderately prominent :

·34—·37. Antennæ, tip of tibiæ, tarsi and trunk dark brown; thorax scarcely punctulate; elytra scarcely costate. Kansas. *stygicornis* Say.

c. Hind angles of thorax very slightly prominent :

·27—·35. Elytra scarcely costate; antennæ and abdomen not infuscated. Middle and Western States, Kansas. *cordicollis*† Lec. . *rejectus* Lec.

F. Smaller species; thorax longer than wide, convex, constricted behind, hind angles prominent; elytra, humeri distinct.

a. Epipleuræ as usual of the color of the elytra :

·29. Elytra oblong, scarcely dilated behind; abdomen not infuscated. Middle States. *Aptinus janth.* Dej. . . . . *janthinipennis* Lec.

·36. Elytra broader quadrate, dilated behind, slightly costate; trunk infuscated. Southern and Western States. . . . . *quadripennis* Dej.

·18—·25. Elytra dilated behind, not costate; abdomen dark brown. . . . . *medius* Lec.

b. Epipleuræ pale testaceous ;

·33—·39. Thorax less narrowed behind than usual; sides of metathorax and abdomen, and knees dark. Southern States and Arizona, as far as Colorado River. . . . . *lateralis* Dej.

G. Small species; thorax longer than wide, hind angles not prominent; elytra wider behind, humeri indistinct.

·23—·36. Thorax very broadly rounded on the sides in front; sides of abdomen dark. Middle and Southern States. *cephalotes*† Lec. . . . . *ovipennis* Lec.

a. Thorax more strongly rounded on the sides in front :

·30—·36. Abdomen dark brown. Middle, Southern and Western States. *patruelis* Lec. . . . . *conformis* Dej.

·21. Abdomen not infuscated. Middle States. . . . . *pumilio* Lec.

Contributions to Organic Morphology:—Containing the mathematical imitation of the egg of PLANORBIS CORNEUS and of EPIORNIS; and upon the resemblances between Mathematical, Acoustic, Electric, Optical and Organic Figures; with historical and other remarks.

BY JOHN WARNER, A.M.

#### PREFACE.

In a work published several years ago, I endeavored to make some contribution to the knowledge of Organic Morphology.\* Among other matter, the work contained the results of investigations made to determine the coincidence in form between sections of hen's eggs and a curve there proposed. In the present paper, it is designed to extend these investigations, and to notice some other subjects of interest. Some use will be made both of original and selected matter contained in the work referred to, and other citations will be added, which seem appropriate in treating a branch of science not yet possessing a classified and independent literature.

#### MORPHOLOGICAL LITERATURE.

Numerous authorities might be cited, bearing upon the general subject of our research, and containing information and suggestions worthy of study ;

\* Studies in Organic Morphology, by John Warner. J. B. Lippincott & Co., Philadelphia, 1857. 1862.]

but extensive reference to these authorities would be inconsistent with our present limits: many of them, either directly or indirectly, advocate the possibility of a mathematical explanation of the cause of organic forms.

Professor Bronn\* considers that there is an inconsistency in supposing the organic world alone to be derived from a direct act of creation, whilst all the rest is born and perishes from the effect of general forces eternally immanent in matter. He concludes that all species of animals and vegetables were originally created by a natural force, at present unknown—that they do not owe their origin to a successive transformation of a few primitive forms—and that this force held a most intimate and necessary relation to the forces and events which have controlled the development of the surface of the globe. He thinks that such a hypothetical force would be in entire harmony with the whole economy of nature, and that the hypothesis would not only permit the belief in a Creator presiding over the development of organic nature by means of an intermediate force, but that this conception is more sublime than the idea of a direct supervision, by the Creator, of the succession of plants and animals. Professor Bronn also considers the fundamental form of a plant to be that of an egg placed upright. Investigation of the relation between natural and mathematical ovoid forms might furnish a test for the correctness of this idea, or, if it is well founded, assist in explaining its application.

Some mathematical writers treat as an evident proposition the ultimate connection between mathematics and the explanation of natural processes.† Fechner undoubtedly encourages this idea, and even proposes, more or less definitely, the adoption of a mathematical classification in physiognomy, craniology, and ethnology.‡

Lotze, on the other hand, takes the opposite extreme. In one of his more skeptical passages he compares the attempt to discover the laws of organiza-

\* Essai d'une Réponse à la question de Prix, &c. Comptes Rendus, vol. 51, p. 511.

† The principles of mechanics must be of the greatest importance for all branches of natural science, (as Aristotle was aware,) because, according to our conception of the changes of the material world, they must be referred to motion. Dr. H. Burhenne, Grundriss der Hoheren Analysis, Cassel, 1849, p. 84.

Dr. Zeising, and others whom we have cited, refer at length to the works of Pythagoras, Plato, and Aristotle, in order to show that the ancients regarded numbers as in some mysterious sense the principia of the universe. The Pythagorean quaternary, as improved by Plato, consists of the celestial numbers 1, 3, 7, 9, of which the sum is 20, and of the terrestrial series 2, 4, 6, 8, whose sum is likewise 20. These two together make the sacred quaternary 40. The number 5, which is not in the quaternary, but is the middle of the whole series from 1 to 9, represents the *Nous*, or supreme intelligence. According to Montucla, these numbers and the idea of their mystic importance were derived from the Egyptians. The ancient Chinese also venerated the Pythagorean quaternary, and ascribed its invention to the emperor Fo-hi (2900 B. C.) Fo-hi was the inventor of the binary arithmetic, of which he left the notation in the Cova, or Figure of Eight. M. Huc relates that the Chinese still venerate a mysterious book, called the Book of Changes, *y-King*. The meaning of this book has long been lost. From M. Huc's description of the 64 whole and broken lines of this book, and from Leibnitz's description and interpretation of the Cova, I have little doubt that the *y-King* pertains to the arithmetical system recorded in the Cova. The tradition of the Chinese, that the *y-King* is capable of explaining all things, may, therefore, indicate that the ancient Chinese were not unaware of the importance of number in the order of the universe, and that their sages had conceived the idea of a mathematical explanation of Nature, as clearly as such an idea could be conceived in advance of the science of physical mathematics: possibly they progressed no further than to incorporate the Cova in their religious mysteries. Montucla, Histoire des Mathématiques, vol. i. p. 122. Chinese Empire, by M. Huc, London, 1855, vol. i. p. 124. Leibnitz, Mémoire de l'Acad. Française, vol. xviii. 1703, p. 85. Dr. H. Burhenne, Grundriss der Hoheren Analysis, Cassel, 1849, p. 84.

‡ Ueber die Mathematische Behandlung Organischer Gestalten und Processe. Verh. d. Koenigl. Sachs. Gesellsch. Mathematisch-Physische Kl., Jahrgang 1849.

Mr. Hay has published a method for defining geometrically the shape of the human head and the proportion of its parts. The method is founded on a system of triangles, of which the angles have certain ratios manifested in the vibrations of musical strings. See D. R. Hay on the Beautiful Head of Ancient Greek Art. Trans. Soc. of Arts, vol. i. part 2, New Series, 1847-8.

The same author has written several works on the Beautiful in Form. His Natural Principles of Beauty (London and Edinburgh, 1852) gives a concise explanation of his geometrical construction of the human figure. The same subject is differently treated by Dr. A. Zeising, Neue Lehre von den Proportionen des Menschlichen Koerpers; Leipzig, 1854. The student of Morphology will be interested in comparing with these works, Die aus der Arithmetik und Geometrie herausgeholtten Gruende zur Menschlichen Proportion; Georg Lichtensteger, Nuremberg, 1746.

tion by the study of organic forms, to the endeavor to decipher the principle or purpose of a complicated machine by the contemplation of its shadow.\* He discourages the notion that the shape of the egg is susceptible of a mathematical explanation. The form of the egg, he considers, is not the immediate product of a formative tendency, but the mechanical result of a twisting action of the oviduct, and gives as little hope of an explanation of the forming forces as, for example, the shape of a top does of comprehending the law of formation of the person who turned it.†

Meckel‡ accounts for the form of the egg in a similar manner. He cites Thienemann to show that when the egg is forced rapidly through the oviduct, in consequence of persistently chasing the hen, the egg is then deformed, being greatly elongated and without a hard shell. He also alludes to the experiments of M. St. Hilaire in proof of the fact that hen's eggs placed vertically during incubation either do not come to development or else produce monsters. On the whole, he appears to be of opinion that the form of the egg may not only have a mechanical origin, but may be important as a mechanical means in determining the form of the embryo.

#### OF MATHEMATICAL OVOIDS.

Fechner adopts the oval of Descartes, proposed by Steiner, as the true representative of the form of the egg.§ The elliptic spheroid he considers to be a rough approximation to the true form; but M. St. Hilaire states that out of six eggs of the *Epiornis*, sent to France, five were nearly true ellipsoids.¶ The other had a large and a small end. We shall now consider particularly the curve proposed by ourself to represent the longitudinal section of an egg. This curve belongs under a general formula which includes the ellipse. We shall principally consider a curve having an obtuse and an acute end, and which may be called the *hyper-ellipse*, and the solid generated by its revolution, the *hyper-ellipsoid*.¶

*Construction of the hyper-ellipse.*—Measure the length and thickness of the egg. Draw (Fig. 1, Plate 1) A B, H D, each equal to the length of the egg, and bisecting each other at right angles in C. Make D K equal to the half-thickness of the egg, and on H K describe a semicircle cutting A B in F. Then A B is the axis of the hyper-ellipse, and F is the focus.

Construct an ellipse (Fig. 2) with the semi-axes F A, F B equal respectively to the same distances in Fig. 1, and draw any radius vector F P.

In Fig. 3 draw B F, F A, as in Fig. 1, and make the angle A F P equal to twice the angle A F P of Fig. 2; also make F P equal to the same in Fig. 2. The point P is then a point of the hyper-ellipse. In a similar manner any required number of points may be found, and the curve traced through them by hand. Instead of beginning the construction at A, we may commence at B, making the angle B F P equal to twice the same of Fig. 2, and the radius F P the same.

\* Allgemeine Physiologie des Koerperlichen Lebens. Leipzig, 1851, p. 328.

† Ibid. p. 335. The labors of Haeckel and Wright in investigating the law of phylloaxis—although they do not prove mathematically the cause of phylloaxis, but rather pertain to its teleological significance—appear to me to contain remarkable applications of mathematics to the study of Organic Morphology, and to take much from the general force of Lotze's criticism. Haeckel ueber den Zusammenhang der Blattstellung mit dem Bau des dikotylen Holzringes. Monatsber. d. Koeln. Preuss. Ak. d. Wiss., Berlin, 1857, p. 105. Wright on the most thorough, uniform distribution of points about an Axis, Mathematical Monthly, April, 1859.

‡ Die Bildung der fuer partielle Furchung bestimmten Eier der Voegel, &c. Zeitschr. f. Wiss. Zoologie, vol. 3, 1851, p. 432.

§ We may refer the reader to Mr. Hay's Principles of Symmetrical Beauty, and to Purdie on Form and Sound (Edinburgh, 1859), for information concerning the composite ellipse—a figure which seems to offer or to suggest means for closely imitating the forms of various eggs.

¶ Note sur des ossements et des oeufs trouvés à Madagascar, dans des alluvions modernes, et provenant d'un oiseau gigantesque; par M. Isidore Geoffroy-Saint-Hilaire. Comptes Rendus, vols. xxxii. p. 101; xxxix. p. 833; xlii. p. 315, and xliii. p. 518.

¶ This curve may be termed the hyper-ellipse, because its radius vector is a power of the radius vector of an ellipse, taken from the focus, or because its radius is derived from the ellipse as in the following construction.

The curve can also be constructed by drawing  $F P$  from any assumed pole at  $F$ , at any angle with an assumed axis  $A B$ . Then, knowing the length and thickness of the egg and the angle  $A F P$ , the length  $F P$  can be calculated by the aid of a proper formula, hereafter given, and transferred to the drawing.

#### COMPARISON OF EGGS WITH THE HYPER-ELLIPSOID.

*Egg of Planorbis corneus.*—The example just given to show the construction of the hyper-ellipse (Fig. 3) presents a good imitation of the magnified drawing of an egg of *Planorbis corneus*.\* It is remarkable that the focus  $F$  of the theoretical egg falls, as nearly as can be readily observed, in the centre of the vitellus, according to the engraving given by Jacquemin. The magnified egg of the engraving measures, say, length 1.63 inches, thickness 1.31. The distance  $B F$  is found by calculation .45+.

*Egg of Epiornis.*—The cast of the egg of *Epiornis* belonging to the Academy of Natural Sciences in this city is, I doubt not, from the pointed egg described by M. St. Hilaire.† A longitudinal section of this cast was obtained by cutting a templet to fit closely around it, then tracing the form of the egg from the templet. The first section thus obtained was not quite symmetrical with respect to the long axis. A second section, taken on a plane at right angles to the plane of the first, was more nearly symmetrical. The cross-section of the cast measured so nearly circular, that the small difference in the diameter of the sections taken may be disregarded. For the purposes of calculation we have taken M. St. Hilaire's dimensions reduced to inches,—length 12.756, thickness 8.859.

Fig. 4 represents the theoretical egg on a scale of one-fourth. The following tables exhibit the dimensions of the two real sections and of the theoretical section. Each real section is divided by the axis into two parts not entirely symmetrical. The radii vectores of each part are given for various polar angles. The distance from the obtuse end of the egg to the line of greatest thickness is not involved in the construction of the theoretical ovoid. This distance as measured on the egg should be compared with the same as found by construction. In the tables it is designated by  $B' + \rho \cos \gamma$ .

TABLE I.

MEASURED VALUES FOR REAL EGG.

Designation.		Values of the radius vector for various polar angles.										
		0°	10°	20°	30°	40°	$\gamma$	70°	90°	110°	130°	180°
1st Real Section.	Part 1.	9.90	9.56	8.64	7.66	6.67	5.49	4.59	3.76	3.23	2.98	2.85
	Part 2.	9.90	9.37	8.42	7.47	6.60	5.49	4.65	3.85	3.31	3.02	2.85
2d Real Section.	Part 1.	9.90	9.52	8.62	7.56	6.63	5.49	4.62	3.82	3.32	3.07	2.85
	Part 2.	9.90	9.43	8.52	7.56	6.65	5.49	4.59	3.79	3.25	2.98	2.85

NOTE.—The distance from the large end of the egg to the greatest cross-section =  $B' + \rho \cos \gamma = 6$  inches. The radius for a polar angle of  $56^\circ 34'$  is 5.39, average of four dimensions.

\* Mémoire sur l'Histoire du *Planorbis corneus*, par Emile Jacquemin. Nova Acta Acad. C. Leopold. vol. xviii. p. 638.

† The agreement in size is satisfactory, and the egg is marked with the name of Dr. Warren, who relates that a cast of the pointed egg was presented to him. (Fossil Impressions, &c. Boston, 1854.) The length which he gives for the egg is incorrect. The mistake probably arose from a typographical error, which is corrected in Comptes Rendus, vol. xl. p. 519.

TABLE II.

CALCULATED VALUES FOR THEORETICAL EGG.

Designation.		Values of the radius vector for various polar angles.										
		0°	10°	20°	30°	40°	$\gamma$	70°	90°	110°	130°	180°
Ideal Section.	For both parts.	9.90	9.51	8.58	7.51	6.54	5.32	4.60	3.88	3.41	3.02	2.85

NOTE.—The length and thickness of the egg are the same for both tables, viz. : length 12.76—; thickness 8.86. The polar angle at the point of greatest thickness is designated by  $\gamma$ , but has not the same value in each table, being a measured value in Table I. and a calculated value ( $56^{\circ} 34'$ ) in Table II. The distance  $B' + \rho \cos \gamma$  for this angle is, by calculation, 5.79.

By these tables we perceive that the first part of the first section agrees very closely, from the apex to the widest part, with the theoretical curve. The second part is less satisfactory. The average real section would nowhere differ from the theoretical curve by much more than the thickness of the egg-shell (about 12-100 inch).

## ON THE SIGNIFICATION OF THESE COMPARISONS.

*Position of the Vitellus.*—A belief in the adaptability of polar formulæ to explain some processes of nature was somewhat vaguely expressed by Grandus. James Bernoulli seems to have been strongly, though vaguely, impressed with the idea of an important meaning in the logarithmic spiral. Moseley and Naumann have demonstrated its existence in several shells, and similar results have since been obtained.\* Possibly the mechanical properties of this spiral are involved among the causes which give the first direction to the windings of shells. Naumann suggests that all spirally wound conchylia may begin with a logarithmic spiral. The law of the growth of the animal may then, perhaps, be subsequently instrumental in determining the form of the shell.† Lotze says, in discussing the mathematical explanation of organic forms, that in pure mathematics it is not absolutely essential that the origin of co-ordinates be in any particular place, but where an explanation of the nature of phenomena is required, the origin must be taken where, in the Real, the centre of emanation of action resides; the direction and connection of the co-ordinates must correspond with those of the operating forces.‡

The position of the vitellus in the pole of the theoretical egg may, possibly, exhibit that coincidence of mathematical and organic system which is intended by Lotze. It would be desirable to have correct observations of the positions of different parts within the egg, in order to attempt the discovery

\* Grandus, A Collection of Geometrical Flowers: Abridged Phil. Trans., vol. vi. p. 67, 1723. Bernoulli, Leipzig Acts, 1692. Moseley, Phil. Trans., 1833. Naumann, Abh. d. Jablonowskischen Gesellschaft, Leipzig, 1846. Also Abh. d. Math. Phys. Kl. d. K. S. Gesellschaft, Leipzig, 1852. Sandberger, ueber die Spiralen von Ammonites, &c., Zeitschr. d. Deutsch. Geol. Gesellschaft., vol. x. 1858, p. 446.

† I am not aware to what extent the views of Moseley concerning the growth of shells have been adopted by naturalists. Naumann, as far as he expresses any opinion, seems to agree with Moseley on this subject. To me, Moseley's explanation of the growth of shells, and of the manner in which their mathematical properties suit the life and growth of the animal, appear very interesting and important, and, did our limits permit, would well deserve to be noticed here at length. From the paper of Sandberger's just cited, I am led to believe that the determination of the equations of the windings of shells is now recognized by scientific conchologists as a valuable descriptive method.

‡ Physiologie, p. 330.

whether any of these parts have a position remarkable in a mathematical point of view, and which might, therefore, possibly suggest something important in regard to further researches.\*

*Cubical contents.*—The volume of the hyper-ellipsoid is equal to the solidity of a prolate ellipsoid having the same length and thickness.† Hence it appears that a definite quantity of material fit for the composition of an egg might, considered geometrically without regard to other conditions, take the form of either an ellipsoid or hyper-ellipsoid egg; the length and the thickness being the same in each case. It seems probable that either form might suit the structure of those parts of the bird which anatomists believe to be most directly concerned in giving shape to the egg. I do not certainly know whether the same hen can lay eggs of both forms. Among several hyper-ellipsoid eggs, said to be from the same hen, was found one which most observers would probably consider ellipsoidal. A gentleman who once took much interest in the breeding of fowls states that, whilst engaged in this pursuit, he was able from the appearance of the eggs, but not judging alone by the shape and size, to recognize with considerable certainty the eggs of particular birds and of particular breeds. In his opinion, the eggs of the same hen would appear, to ordinary observation, to be of nearly the same size and shape: sometimes, however, an unusually large egg containing two yolks will be produced. My limited observation is, in general, in favor of the supposition of uniformity of size and shape among the eggs of the same individual. I have, besides measuring some hen's eggs, carefully inspected the eggs found in several nests of wild birds.

*Standard of comparison for shape.*—As far as I am aware, no mathematical standard of comparison for the shape of eggs has been fixed. Thus, for example, if we had an egg intermediate, as the term would generally be applied, between the ideal form above found for the egg of *Epiornis*, and a true ellipsoid having the same diameters, it would be left to the judgment alone to decide which ideal form should be preferred as a representative of the egg.

M. St. Hilaire does not give measurements to show the agreement between the ellipsoidal eggs of *Epiornis* and true ellipsoids. Of some of them, he says their resemblance to each other was so great that one might have readily been mistaken for the other. From this description I doubt whether these eggs resembled ellipsoids more nearly than the present egg of *Epiornis* resembles the hyper-ellipsoid.‡

#### RESEMBLANCES BETWEEN MATHEMATICAL, ACOUSTIC, ELECTRIC, OPTICAL AND ORGANIC FIGURES.

The mathematical laws of the propagation of light are shown to be particular cases of the more general laws of vibratory motion in any elastic medium composed of attracting and repelling molecules.§ It would, therefore, seem that forms similar to those shown in the polarization of light, and in other

\* I am not informed how far naturalists have considered this subject. Some experiments of my own, made on hen's eggs, in order to ascertain the relation between the size of the yolk and other dimensions of the egg, and also whether the centre of the yolk more nearly coincides with the centre of gravity of the egg or with the centre of the axis, resulted in gaining some preliminary experience in the method of observation, but did not establish any thing certain in regard to the object of research.

† The rule for computation is, Multiply the square of the thickness by the length, and the product by .5236. The result is the solidity.

‡ Since writing the above I have seen, in the collection of the Smithsonian Institution, the cast of an egg of *Epiornis* (the egg sent from Madagascar in 1850), but have not had an opportunity of closely examining it. The date indicates that it is from a cast of the ellipsoidal egg described by M. St. Hilaire in his first memoir, and which accompanied the egg we have endeavored to imitate in Fig. 4. Without a careful measurement of the cast, it would, in my opinion, be unsafe to conclude that the egg in question is more nearly ellipsoidal than its fellow is hyper-ellipsoidal.

§ Encyclopedia Britannica, Boston ed., art. Optics, p. 546.

optical experiments, might result from the vibrations of other substances which in their vibrations may follow the same or similar laws. This may possibly be the reason of some resemblances of the kind we shall now consider.

*Construction of the Hyperaster.*—Figures resembling star-fish may be derived from the ellipse by a construction similar to that given for Fig. 3. Both constructions can be included under a general mathematical formula.\* To construct the hyperaster with five points, make the ellipse (Fig. 5) with the semi-axis  $FB$  equal to the short radius  $FB$  (Fig. 6) of the star, and with the longer semi-axis  $FA$  equal to the long radius  $FA$  of the star. Then, beginning at  $B$ , proceed as for the construction of Fig. 3, *except* that the angle  $BFP$  of Fig. 6 is to be always taken equal to *two-fifths* of  $BFP$  in Fig. 5. When the radius  $FP$  of Fig. 5 has passed through a revolution of  $90^\circ$ , it will coincide with  $FA$ , and  $P$  will then fall upon  $A$ . During the same time, the radius  $F P$  of Fig. 6 will pass over two-fifths of  $90^\circ$ , or  $36^\circ$ , and will reach  $A$ . When the radius of Fig. 5 reaches  $FC$ , it will have passed over  $180^\circ$ , and in Fig. 6 the radius, then at  $C$ , will have passed over two-fifths of  $180^\circ$ , or  $72^\circ$ , which is the fifth part of the circumference of the circle. The arm  $BACF$  of the star is therefore derived from the semi-ellipse  $BAC$ . A repetition of the same process will derive the next arm of the star from the semi-ellipse  $CDB$ ; and so on, until the five arms of the star are completed.† By means of this construction, star-fish or other organic bodies resembling them can be imitated. Returning to Figs. 2 and 3, it will be observed that, starting at  $B$ , the entire Fig. 3 is generated from the semi-ellipse  $BAC$ , in the same way that the arm  $BACF$  of Fig. 6 is derived from the semi-ellipse  $BAC$ , Fig. 5. Viewed in this manner, the egg, Fig. 3, appears a one-armed star-fish. Whether or not this conception may have any significance in nature, it appears remarkable to find two different organic forms thus classed under the same mathematical formula. Some of the figures known as acoustic figures, produced by the vibration of elastic plates, can also be imitated. Figures resembling Fig. 6 are given by Chladni in his treatise. Possibly the acoustic figures might be produced on a scale sufficiently large to test their agreement with the mathematical figures, by measurement; and hence it could be, perhaps, determined whether these truly represent the former.

Interesting resemblances can be traced between the optical and acoustic figures, and between these and curves similar in their construction to those we have described, if not always precisely of the same construction. The following is of the same general construction as the previous. By taking the ellipse Fig. 2, and making the angle  $BFP$  in the derived figure always equal to *one-half* of the same in the ellipse, we derive a curve similar to Fig. 7. Figs. 8 and 9 represent an optical figure and an organic form, having a resemblance to this.‡

\* Studies in Organic Morphology, Formula 2, p. 32. We propose to call the curve whose equation is  $\rho = \frac{p}{1 - e \cos k\theta}$  the *elliptoaster*, because the equation resembles that of the ellipse, and the curve itself may represent a star. The name *hyperaster* may be given to the curve whose radius is a power or root of the radius of the elliptoaster.

† In actual constructions, it will be sufficient to derive one arm of the star, and then, by means of tracing-paper, to dispose five such arms around the centre  $F$ . Stars of any desired number of points may be thus constructed; the angle  $BFP$  of the star must be to the angle  $BFP$  of the ellipse as the number 2 is to the number of points in the star.

‡ See Encyclopedia Britannica, Boston ed., art. Optics, p. 672, for Fig. 9. For Fig. 8 see Zeitschr. für Wiss. Zoologie, Leipzig, 1854, vol. v. Plate XIV. Fig. 34. These resemblances could be followed to a greater extent. The writer has collected many drawings of mathematical lines, organic objects, optical, acoustic, and electric figures, but must omit further notice of them on the present occasion. By large collections of this kind, and by diligent comparison of their materials, something may, perhaps, be elicited which will establish a reliable foundation for the study of Organic Morphology as a mathematical science.

An electrical figure having a strong resemblance to an egg may be seen on Plate III. of Lichtenberg's figures.\*

M. Cornay considers electricity to be the radical universal generator. He endeavors to illustrate this idea by comparing positions assumed by electrically charged needles to the positions of parts of plants and animals. For this purpose he has numerous engravings.† His description of the circulation of the electric fluid, and of the effect of it in producing the nervation of leaves and the spiral arrangement of leaves around the trunk of the plant, reminds us of similar suggestions of Grandus to account for the disposition of the petals of a flower. But M. Cornay's resort to experiment to test his opinions is an important step in the right direction, for which he deserves the thanks of morphologists, although as yet his experiments cannot be considered conclusive proof of the correctness of his views.

#### EXPLANATION OF THE PREVIOUS CONSTRUCTIONS—CUBATURE OF THE HYPER-ELLIPSOID.‡

*Construction of the Hyper-ellipse and Hyperaster.*—Let (Fig. 3) the axis A B, or length of the egg, =  $2a$ , and the greatest double ordinate, or thickness of the egg, =  $2m$ . We have shown, in our work already referred to, that  $FA = a + \sqrt{a(a-m)}$  and  $FB = a - \sqrt{a(a-m)}$ : it is now required to find these distances by construction. By the construction given for Fig. 1,  $DK = m$ ,  $CD = a$ , therefore  $CK = a - m$ . But, by Geometry, C F is a mean proportional between C H and C K, that is, between  $a$  and  $a - m$ . Hence  $CF = \sqrt{a(a-m)}$ ; whence  $FA = CA + CF = a + \sqrt{a(a-m)}$ , and  $FB = CB - CF = a - \sqrt{a(a-m)}$ ; which was required.

We have further shown that the radius vector of the hyper-ellipse is equal to the radius vector of an ellipse referred to the centre, and in which the polar angle is one-half that of the hyper-ellipse. This is the ellipse shown in Fig. 2, and hence the construction before given for Fig. 3 is evident. By referring to our work, it will be seen that the hyperaster, Figs. 6 and 7, may also be constructed from an ellipse in a similar manner, taking care that their polar

\* Commentationes Societatis, &c., Goettingen, 1778, vol. i. For a curious resemblance to a tree, produced by the action of lightning, see Mr. Charles Tomlinson on Lightning Figures, Edinburgh New Phil. Journal, vol. xiv. No. 2, Oct. 1861, and vol. xv. No. 1, Jan. 1862.

† Principes de Physiologie et Eléments de Morphogénie Générale, par J. E. Cornay (de Rochefort), Paris, 1853, pp. 112, 191, 212—215. M. Cornay has labored earnestly and industriously to promote the knowledge of Morphology. Some important propositions which he confidently assumes appear to us still to want satisfactory proof. Thus, for example, because the shape of an insect agrees with the outline of a cluster of electrified needles, he appears to be satisfied that he has found in the action of electricity, or of some hypothetical fluid, the true cause of the organic form.

‡ For certain formulæ which will be necessary in this and the following investigations, see Studies in Organic Morphology, pp. 32, 33, 40, 41. The curves now to be discussed belong to the general form

$$\rho = \left( \frac{p}{1 - e \cos k \theta} \right)^n;$$

wherein  $p$  is the semi-parameter, and  $e$  the eccentricity, of an ellipse. For the hyper-ellipse,  $k = 1$ ,  $n = \frac{1}{2}$ . In Fig. 5,  $k = 5$ ,  $n = \frac{1}{2}$ . In Fig. 7,  $k = 4$ ,  $n = \frac{1}{2}$ . The equation  $\rho = \frac{p}{1 - e \cos k \theta}$

represents an immovable orbit substituted for an elliptical orbit revolving about its focus, Prop. XLIII. B. 1., Newton's Principia, and Wright's Commentary on the Principia, London, 1828, vol. ii. p. 245. Curves of the sort in question may be produced by revolving an ellipse, under various conditions, whilst a describing point revolves in the ellipse. Some years since, I exhibited to the Pottsville Scientific Association a mechanical arrangement for producing such figures. Suardis's Geometric Pen is also an interesting instrument for describing curves. The joints of the pen remind us of the joints in the limbs of animals, and furnish a hint as to a mathematical conception of the motion of the limbs. See Adams's Geometrical and Graphical Essays, London, 1813, p. 151.

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angle has the proper proportion to that of the ellipse, in order to derive the number of arms or rays desired.\*

*Cubature of the Hyper-ellipsoid.*—Let F, Fig. 10, be the pole, P M an infinitesimal arc, and P F M an elementary triangle of any plane curve, referred to the axis F N, which is also the axis of revolution for the solid.

The centre of gravity, G, of the elementary triangle P F M, is on D G, drawn parallel to the side P M, and so situated that F D is two-thirds of the radius F P,  $= \frac{2}{3} \rho$ . When the side P M vanishes, F P will coincide with F M, and the distance from F to G will then equal F D  $= \frac{2}{3} \rho$ , and the angles M F N, G F N, P F N will all be equal, and each  $= \theta$ . The distance G N will be F D  $\sin \theta = \frac{2}{3} \rho \sin \theta$ ; and the distance described by G during a revolution of the elementary triangle P F M about the axis F N will be F D  $2\pi = \frac{4}{3} \pi \rho \sin \theta$ . The area of the elementary triangle is, however,  $\frac{1}{2} \rho^2 d\theta$ , and the solidity of the conical sheet generated by a revolution of P F M, which is the differential of the solid of revolution, will be, by Guldin's Formula,

$$dV = \frac{4}{3} \pi \rho \sin \theta \cdot \frac{1}{2} \rho^2 d\theta = \frac{2}{3} \pi \rho^3 \sin \theta d\theta \dots \dots \dots (1)$$

In the present case this becomes

$$dV = \frac{2}{3} \pi \frac{\rho^{\frac{3}{2}} \sin \theta}{(1 - e \cos \theta)^{\frac{3}{2}}} d\theta = -\frac{4}{3} \pi \frac{P}{e} \left( \frac{-\rho^{\frac{1}{2}} e \sin \theta}{2(1 - e \cos \theta)^{\frac{3}{2}}} \right) d\theta :$$

in which last  $\frac{-\rho^{\frac{1}{2}} e \sin \theta}{2(1 - e \cos \theta)^{\frac{3}{2}}} d\theta$  is the differential of the radius vector  $\rho$ ;

so that we have, by substitution, for the solidity of the whole hyper-ellipsoid,

$$V = \int_{\theta=0}^{\theta=\pi} -\frac{4}{3} \pi \cdot \frac{P}{e} d\rho \dots \dots \dots (2)$$

If the radius for  $\theta = 0$  be denoted by  $\rho'$  and the radius for  $\theta = \pi$  by  $\rho''$ , this equation gives

$$V = \frac{4}{3} \pi \frac{P}{e} (\rho' - \rho'') \dots \dots \dots (3)$$

\* We may here call attention to the fact that the radius vector of the hyper-ellipse, for the extremity of the greatest ordinate, is  $\rho = \sqrt{a m}$ , that is, this radius is a mean proportional between the half-length and half-width of the figure. This is interesting because Dr. Zeising adopts the mean proportion as a general morphological law; but this proportion of itself cannot be satisfactory: we require some rule for knowing what objects or parts of objects are to be thus compared. As long as no such rule exists, the comparisons may often seem arbitrary. Dr. Zeising proposes, for the egg-curve, to divide the length into two parts, say  $a'$  the greater and  $m'$  the lesser; then  $m'$  will also represent the half-thickness, and we shall have the proportion  $a' + m' : a' :: a' : m'$ , whence  $a' = \sqrt{m'(a' + m')}$ . It is not, however, shown by him that this mean proportion is necessarily more significant in Morphology than  $\rho = \sqrt{a m}$  above mentioned (Neue Lehre, p. 228). Dr. Zeising's application (Neue Lehre, p. 361) of the extreme and mean ratio, or golden section, to the division of the circle in phyllotaxis, has received a remarkable confirmation as a law of nature, by the labors of Hanstein and Wright, before cited. His application of this ratio to the relations of the planetary system seem to me worthy of close study; but proof is required of a similar significance of this ratio in astronomy and in botany, before we can assume that there is an entire identity between the laws which regulate both the planetary and the phyllotactic systems. (Neue Lehre, p. 327. Normalverhältniss, &c., Leipzig, 1856, pp. 2, 43.)

But we have seen (Fig. 3) that  $\rho' = FA = a + \sqrt{a(a-m)}$  and  $\rho'' = FB = a - \sqrt{a(a-m)}$ ; hence  $\rho' - \rho'' = 2\sqrt{a(a-m)}$ . Further, in our former work, we have shown that  $p = \frac{m^2 a}{2a-m}$ , and  $e = 2 \frac{\sqrt{a(a-m)}}{2a-m}$ ; hence  $\frac{p}{e} = \frac{1}{2} \frac{m^2 a}{\sqrt{a(a-m)}}$ . Substituting these values of  $\rho' - \rho''$  and of  $\frac{p}{e}$  in equation (3), there results

$$V = \frac{4}{3} \pi m^2 a \dots \dots \dots (4)$$

which is the volume of a prolate ellipsoid whose semi-transverse axis is  $a$  and semi-conjugate  $m$ .

The further discussion of the hyper-ellipse has led us to some interesting formulæ, which, whether this curve is really important in Morphology or not, appear worthy of attention in a mathematical point of view. These formulæ we hope to present in a subsequent paper.

#### CONCLUDING REMARKS.

The coincidence in form between organic outlines and mathematical figures is a subject of difficult interpretation. It will, therefore, be sufficient for me, without expressing a confident opinion as to the meaning of such resemblances, to say that my study of the subject has induced the belief that all the resemblances of this kind which have been found are not mere accidental coincidences, but that some of them are the results of a mathematical arrangement in nature. The reason or the fitness of this arrangement, I am inclined to think, is explicable mathematically, at least to a greater extent than has been generally supposed, and the search for such an explanation I conceive to be a legitimate effort of science. I would, therefore, encourage the collection of drawings of organic objects and of mathematical figures, together with other materials for study, in order to combine facts as they appear, and prepare for the discussion of definite questions which may be suggested. Works or memoirs devoted to the measurement of organic products, constituents, and combinations, or of organic functions, as measured by phenomena of production, of motion or duration, or by the evolution or abstraction of force, may probably be useful in furnishing data for the study of the cause of organic forms. But we shall not prescribe rules in this respect. Of late years many researches of this kind have been made, and in several cases by naturalists or physiologists who have not only united mathematical ability to other acquirements, but have left the records of their labor in the shape of mathematical formulæ. Some of these formulæ may become useful in studying the cause of organic forms.

For some time the writer has been engaged in collecting materials of the kind described. The preparation of this paper was undertaken from a desire to render useful the labor incurred in the collection; but circumstances have prevented as full a treatment of the subject as we could have wished. Many of the authors cited deserve more attention than we have been able here to give to them, and others have been left unnoticed because our limits did not permit us to speak of them as they deserve. On another occasion we hope to return to our subject under more favorable circumstances.

In submitting this paper to the reader, I have endeavored to make the best selection of matter for general perusal, and to supply some desirable refer-

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ences for the use of students who have paid less attention than myself to the subject.\*

In concluding, I desire to express my thanks to several members of the Academy of Natural Sciences who have assisted and encouraged me, and especially to Dr. Jos. Leidy.

### A Review of the TERNs of North America.

BY ELLIOTT COUES.

Considerable difference has prevailed among ornithological writers with regard to the relationships of many of the North American *Sternine* with the representative species of Europe. Having at command a very extensive series of specimens from both continents, I have instituted a careful comparison of the more or less intimately related species, believing that the results of such an investigation would not prove unacceptable to ornithologists. While this has been the principal aim of the present paper, I have endeavored to present fairly the data tending to determine some other points of synonymy and relationship which even at this late day remain open to discussion; and to give such stages of plumage as are not already too well known to require notice. The paper is not to be considered in any sense as a monograph; I have endeavored to express its character in its title.

I am under particular obligations to Mr. G. N. Lawrence and Mr. D. G. Elliot, for the opportunity of examining several unique and typical specimens, and unusual stages of plumage, of which the museum of the Smithsonian Institution does not contain examples.

#### Family *LARIDÆ*.

#### Subfamily STERNINÆ.

#### Section STERNEÆ.

#### Genus GELOCHELIDON Brehm.

*Gelochelidon*, Brehm, Vög. Deutsch. 1830. Type *S. anglica*, Mont.

*Laropsis*, Wagler, Isis, 1832, p. 1225. Same type.

CHAR.—Bill shorter than the head, extremely robust, not very acute; its height at base nearly a third of its total length along culmen; prominence at symphysis well marked, but not very acute, situated so far back as to make the gonys equal in length to the rami, reckoning from the termination of the feathers on the side of the mandible. Culmen very convex; gonys straight; commissure gently curved. Wings exceedingly long, and acute; each feather a full inch longer than the next. Tail rather short, contained  $2\frac{1}{2}$  times in the wing; in form deeply emarginate, but its lateral feathers without the elongation of *Sterna*. Feet long and stout; tarsus a little shorter than the bill, exceeding the middle toe and claw. Hind toe well developed; inner shorter

\* Several authors not mentioned in our former work may here be briefly cited.

Borellus, De Motu Animalium.

Camper, Beobachtungen der Berlinischen Gesellschaft, vol. i. 1787.

Von dem Fluge der Voegel, Schriften der Berlinischen Gesellschaft, vol. ii. 1781, p. 214.

Mayer, Das aufrecht Stehen. Mueller's Archiv, vol. xx. 1853, p. 9.

Fick, Ueber die Gestaltung der Gelenkflaechen. Mueller's Archiv, 1853, vol. xx. p. 657.

Schuebler, Bedeutung der Mathematik fuer die Naturgeschichte. Jahreshette des Vereins fuer Vaterlandskunde, Stuttgart, 1849.

Dr. J. Aiken Meigs, Relation of Atomic Heat to Crystalline Form, vol. iii. Jour. Acad. Nat. Sc. Philadelphia, 1855-58, p. 105.

Prof. Popoff, Description de la Courbe fruitforme. Bulletin de la Société des Naturalistes de Moscou, 1859, part i. p. 283.

Zeising, Ueber die Metamorphosen in den Verhaeltnissen der menschlichen Gestalt. Acta Academicæ Cesareæ Leopoldino-Carolinæ, vol. xxvii. part ii.

than outer; interdigital membranes deeply incised, especially the inner. Tail and rump concolor with the back. Size moderate.

*Gelochelidon* is a well-marked generic form of the *Sterninæ*, embracing several species agreeing in their short, very robust bills, exceedingly long wings, lengthened tarsi, and short tail,—which latter never attains the deeply-forked shape of typical *Sternæ*. It differs in coloration above from most of the other genera of Terns, in having the pearl blue mantle continued over the rump and tail.

The name *Gelochelidon* was proposed by Brehm two years before Wagler instituted his genus *Laropis*. Both are founded upon the same type,—*S. anglica*, Mont.

GELOCHELIDON ANGLICA Bp. ex Mont.

*Sterna anglica*, Montagu, and of authors.

*Thalasseus anglicus*, Boie, Isis, 1822, p. 563.

*Laropis anglica*, Wagler, Isis, 1832, p. 1225.

*Gelochelidon anglica*, Bp. Comp. List, 1838, p. 61.

*Gelochelidon palustris*, Macgill., Man. Orn., 1842, ii. p. 237.

*Sterna aranea*, Wilson, Am. Orn. Lawrence, Gen. Rep., 1858, p. 859.

*Gelochelidon aranea*, Bonap., Comp. List, 1838, p. 61.

DIAG.—*Sterna* rostro breve, robustissimo, nigro; dorso cærulescente-periæto, uropygio caudaque concoloribus; remigibus primariis argentato-griseis, vix albo intus marginatis, nisi basin versus; corpore subtus albo, pedibus nigris.

*Habitat*.—Atlantic Coast of America, from Massachusetts southward. Europe.

This species differs from all the other Terns of North America, except *Sterna antillarum*, in having the rump and tail of the same color with the back. Its primaries differ from other species—though approaching nearest to *Thalasseus caspius*—in having the inner webs white for a comparatively short space; and the white is not pure, nor is there a very trenchant line of division between it and the dark portions of the feathers.

I have not a sufficient number of skins before me for a perfectly satisfactory comparison of the birds of the two continents, but, so far as I can judge, I am decidedly inclined to agree with Audubon in opinion, that no difference exists. I have minutely compared the specimens before me, and found them absolutely identical in every particular of size, form and color.

The American bird was first described by Wilson, under the name of *Sterna aranea*, that author, perhaps, considering it distinct from, but much more probably being unaware of the existence of, the European bird. It was very properly referred by subsequent American writers,—Nuttall, Audubon, and Bonaparte up to 1838,—to the latter. At that date, in his Comparative List, Bonaparte distinguishes it from the European bird under the name of *Gelochelidon aranea*, and his example has been generally followed by writers since that time.

Genus THALASSEUS Boie.

*Thalasseus*, Boie, Isis, 1822, 563. Type *S. caspia*, Pall.

*Hydroprogne*, Kaup, Sk. Ent. Eur. Thierw., 1829, 71. Same type.

*Sylochelidon*, Brehm, Vög. Deutsch. 1830. Same type.

*Helopus*, Wagler, Isis, 1832, 1224. Same type.

*Actochelidon*, Kaup, Sk. Ent. Eur. Thierw., 1829, 31. Type *S. cantiaça*, Gm.

CH.—Size very large, large, or moderate; general form more or less robust; a decided occipital crest. Bill as long as, or longer than, the head, robust, height at base a third to a fourth the length of culmen. Culmen variable in amount of curvature; position of the angle at symphysis variable. Wings moderately long (for this subfamily); pointed and acute; but the first primary not surpassing the second by as much as the latter surpasses the third. Tail moderate or short; in the type of the genus very short, being contained three times in the wing, and but moderately emarginate; in other species more

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elongated and more deeply forked, and contained only about twice in the wing. Feet short and stout, black; tarsi about two-thirds the bill, or rather less; as long as, or slightly longer than, the middle toe and claw. Webs moderately incised, the inner the most so. Hind toe very short.

This genus, as at present constituted, is chiefly distinguished from *Sterna* by its large size and general robust form, stout bill and feet, and (in typical species) much shorter and less forked tail. In the preceding diagnosis I have been obliged to define the genus with considerable latitude from the somewhat dissimilar types at present retained in it. Thus, if we take the *Th. caspius*, and *Th. cantiacus*, which may be considered as representing the two extremes of form, we shall find great discrepancies in such important features as shape and robustness of bill, amount of emargination of tail, &c.; and regarding these extremes alone, might well be inclined to separate them. Examination, however, of intermediate species, such as *T. regius* and *elegans*, of North America, *T. velox*, of Europe, &c., will show so gradual a transition in nearly every feature, from one extreme to the other, that it becomes exceedingly difficult to draw a line which shall naturally divide the group into two or more genera. In view of the above facts, I prefer, for the present at least, to retain the several species under a single genus, as they certainly do differ, markedly, from *Sterna* in important characteristics, although presenting the above discrepancies among themselves.

It is not impossible, however, that *T. caspius*, with one or two other very closely allied species from various parts of the world, may be, without impropriety, separated generically from the others. This species is typical of a group, all intimately allied, which are pre-eminently distinguished by their exceedingly large, high, robust bills, very stout feet, remarkably short tails,—the lateral feathers of which are scarcely at all elongated, and are not tapering nor acuminate,—and general large powerful form. The genus might, by the exclusion of this form, be greatly restricted, and much more rigidly defined.

Of the five synonyms given at the head of this article, all, with the exception of *Actochelidon*, (the type of which is *S. cantiaea*, Gm.) are based upon *S. caspius*, Pallas. Of these *Thalasseus*, of Boie, has priority in point of date, and is the name to be adopted for the genus. Boie's genus, however, is considered to be based upon *S. caspius*, merely from the fact of that species being the first mentioned, no particular type being indicated. In the event of the separation of *S. caspius* and its intimate allies, above suggested, it might be well to apply the name *Hydroprogne* to the restricted group, *Thalasseus* being used to designate the remaining species. In view of the very slight reasons for considering *Thalasseus* as having special reference to *S. caspius*, such a procedure would be hardly, if at all, an infringement on the rules of nomenclature, and would obviate the necessity of presenting *regia*, *elegans* and their congeners under a generic designation not before employed,—viz.: *Actochelidon*.

#### THALASSEUS CASPIUS Boie ex Pall.

*Sterna tschegrava*, Lepechin, Nov. Com. Pet. xiv. p. 500.

*Sterna caspia*, Pallas, Nov. Com. Pet. xiv. p. 582. Lawrence, Gen. Rep. Birds, 1838, p. 859, and of most authors.

*Thalasseus caspius*, Boie, Isis, 1822, p. 563.

*Hydroprogne caspia*, Kaup, Sk. Ent. Eur. Thierw., 1829, p. 91.

*Helopus caspius*, Wagler, Isis, 1832, p. 1224.

*Sylochelidon caspia*, Brehm, Bonaparte, Comp. List, 1838. Lawrence, Proc. N. Y. Lyc. Nat. Hist., 1850, v. 37.

*Sterna megarhynchos*, Meyer, Taschenb. Deuts., ii. p. 457.

DIAG.—T. rostro maximo, robustissimo, rubro; palpebris inferioribus albis; remigibus griseo-fuscis, suprâ argentatis, nec intus albis; caudâ breviorē, emarginatâ; pedibus validissimis, nigris, digito medio cum ungue tarso breviorē.

1862.]

*Habitat*.—In America, the interior of the Fur Countries; Hudson's Bay; Labrador; in winter ranging southward along the Atlantic Coast as far as New Jersey.

This species in all its stages of plumage is too well known to require any further description.

Quite a large series of American skins, of all ages, compared with two fully adult birds from Europe, constantly differ in size and proportion, as shown by the following measurements:

*Comparative measurements of American and European Birds.*

	American.	European.
Length of bill along culmen.....	2.75*	2.40
“ “ “ gape.....	4.00	3.55
Height “ at base.....	0.90	0.75
Width “ opposite nostrils.....	0.50	0.50
Length of wing from flexure.....	16.50	15.00
“ “ tarsus.....	1.75	1.65
“ “ middle toe and claw.....	1.65	1.55
“ “ tail.....	5.75	5.25

The above measurements indicate the average of the specimens from both countries before me, from which it will be seen that the American bird is decidedly the larger. While the bill is nearly a third of an inch longer, it is also especially remarkable for its great comparative height at the base, and its width at base being no greater than in the European bird, gives it quite a different shape. The next most patent difference lies in the length of wing from the flexure, in which the American bird surpasses the European by fully  $1\frac{1}{2}$  inches. Specimens of both, of course, differ among themselves to a degree; but the greatest variation in adult American skins is hardly half an inch. The wing of the adult European bird, indeed, hardly equals that of a young bird of the year from America; and it is well known how much smaller are the young of all Terns than the adults. The tarsi and toes of the two, as well as the tail, differ in a considerable degree, but not so markedly as do the bill and wings. I find no differences whatever in the color of the two birds.

With but two specimens of the European bird before me, I do not venture to formally separate from it its North American representative. But should these examples prove to represent fairly the characters of the European bird, and the discrepancies in size and proportion above pointed out prove constant, I should not hesitate to do so. In that event I would propose for our bird—in the absence of any very peculiar characters on which to base a name, and in view of the fact that it is the largest and most magnificent Tern of our continent—the name of THALASSEUS IMPERATOR.

The following would be its diagnosis:

*Th. Thalasseo caspio coloribus similis; sed omnino major, rostro etiam validiore, longiore, altiore nec latiore. Rostr. long. 2.75 poll.; alæ 16.50.*

The proper specific appellation of the Caspian Tern is not "*caspia* Pallas," but "*tschegrava* Lepechin," which latter name is proposed in the same work in which Pallas calls the bird "*caspia*," but has priority by several pages. As, however, the word is not only barbarous, but also exceedingly cacophonous, and especially as *caspia* has become so well established by common consent, I do not think it would be expedient to supersede Pallas' name, in view of the very slight priority of that of Lepechin.

THALASSEUS REGIUS Gambel.

*Sterna cayana*, Bon., 1828; Nutt., 1834; Aud., 1839 and 1844; but not of Latham.

\* Inches and hundredths.

*Sterna regia*, Gambel, Pr. A. N. S. Ph. iv. 1848, 128.

*Thalasseus regius*, Id. J. A. N. S. Ph. i. 2d ser. 1849, 228.

DIAG.—Thal. rostro magno, robusto, nec peracuto, aurantio-rubro; remige primâ internè albâ nec ad apicem extensâ marginatâ; pedibus nigris, medio digito cum ungue non tarso brevior. Long. rost. 2·60 poll.; alæ 14·50; tarsi 1·30.

Habitat.—South Atlantic Coast of America; Antilles in winter. California

A good series of this bird, collected in Jamaica, enables me to give its winter plumage, as well as that of the young of the year.

Winter Plumage.—Bill less brightly colored than in summer, its tip and cutting edges dull yellowish. Front white, crown variegated with black and white. the former color increasing on the occiput and nuchal crest, which latter, though shorter than in summer, is almost or quite unmixed with white. This black extends forwards on the sides of the head to the eye, which it includes. The tail is not pure white, as in summer, but is glossed over with the bluish of the mantle, which deepens towards the tips of the feathers into dusky plumbeous. Otherwise as in summer.

Young of the Year in August.—Bill considerably smaller and shorter than in the adult; its tip less acute, and its angles and ridges less sharply defined; mostly reddish-yellow, but light yellowish at tip. Crown much as in the adults in winter; but the occipital crest scarcely recognizable as such. Upper parts mostly white; but the pearl-gray of the adults appearing in irregular patches, and the whole back marked with small, irregularly-shaped, but well-defined spots of brown. On the tertials the brown occupies nearly the whole of each feather, a narrow edge only remaining white. Lesser wing coverts dusky plumbeous. Primaries much as in the adults, but the line of demarcation of the black and white wanting sharpness of definition. Tail basally white, but soon becoming plumbeous, then decidedly brownish, the extreme tips of the feathers again markedly white. Otherwise as in the adults.

The species is so distinct from any other of North America, that it hardly requires comparison. *Caspus* is most closely allied (except *elegans*) and has been confounded with it. But the differences between the two are very great. *Regius* is a much smaller bird, its wing two inches or more shorter. The bill is nearly or quite as long, but it is much slenderer and every way weaker. The tail is very decidedly longer and more forked, almost equalling in this respect *elegans* or *acutiflavus*. The feet, with the same relative proportions of tarsus and toes, are proportionally shorter. In color the two are quite similar, except in the primaries where a very marked difference is observable. The inner webs of *caspus* are wholly dull hoary plumbeous ash; while the inner web of *regius* has a very sharply defined white margin, as in *elegans* or *acutiflavus*, and *Sterna* generally.

But while there is thus no difficulty in separating it from its North American allies, the case is quite different from the Central and South American species, with which it is more or less intimately related. It was, up to 1848, confounded with *S. cayana*, Lath. (*S. cayanaensis*, Gm.) This error was first corrected by Gambel (l. c.), and a distinct name imposed. It is difficult, perhaps impossible, to determine to what species Latham's name is to be referred. His brief diagnosis is "St. griseâ, pennis rufo-marginatis, occipite nigro, corpore subtus albo. Habitat in Cayana. 16 pollices longa." This description is evidently that of a young bird. Gambel is inclined to consider it as "the immature plumage of one of the yellow-billed species of the Brazilian coast, figured by Lichtenstein, probably *S. magnirostris*." He further remarks that "young birds of our species would agree pretty well with the *erythrorhyncha*, of De Weid, as they are somewhat smaller and less proportioned."

There is a specimen in the Smithsonian collection, presented by Mr. Slater, from Jamaica. It was killed March 23d, and is in moult; probably, a young bird putting on its first spring livery, though still retaining its winter marks of 1862.]

white front, etc. At first sight it was referred to *T. regius*, but on closer examination several important discrepancies were observed. The bill, though just about as long as in *regius*, was very decidedly smaller, weaker, with the angle at symphysis less developed; it was of a clear straw-yellow, and in size and shape about intermediate between *regius* and *elegans*. The lateral tail feathers appear broader and rounded at their tip, instead of tapering and attenuated. An important difference is seen in the feet, the middle toe and claw being decidedly longer than the tarsus, instead of equal to it. Mr. Sclater did not label this bird, and I am equally uncertain what name to apply. It seems to be not at all improbable that it may be the *S. cayana*, of Latham, and, if so, would substantiate Gambel's position, for it is certainly not the bird he named *regia*.

THALASSEUS ELEGANS Gamb.

*Sterna elegans*, Gambel, Pr. A. N. S. Ph. iv. 1848, 129. Lawrence, Gen. Rep. Birds, 1858, 860. Atlas, pl. xciv.

*Thalasseus elegans*, Gambel, J. A. N. S. Ph. 2d ser. i. 1849, 228.

DIAG.—*Th. Thalasseo regio* similis; sed multo minor, rostro graciliore, digito medio cum ungue tarso brevior; corpore subtus rosaceo-albo.

*Habitat*.—Coast of California.

The most striking morphological character of this species, as compared with its nearest ally, *T. regia*, is the comparative length of the tarsus and toes. In *regia* the middle toe is, with the claw, just as long as the tarsus; while the same parts in *elegans* are very considerably shorter.

This beautiful species has been so accurately described by its discoverer, and its affinities so correctly indicated, that any further remarks upon these points would be *de trop*. It is as yet almost unknown in cabinets. A very fine specimen, in winter plumage, has been deposited in the Smithsonian by J. Hepburn, Esq., and is the original of the plate above cited. It agrees minutely with Gambel's description.

THALASSEUS ACUFLAVIDUS (Cabot).

*Sterna Boysii*, Nuttall, Man. Orn. ii. 1834, 276. Sed non Lath., 1790.

*Sterna canviaca*, Audubon, Orn. Biog. iii. 1835, 531. Id. B. A. vii. 1844, 87. Sed non Gmel., 1788.

*Sterna acuflavida*, Cabot, Proc. Bost. Soc. N. H., 1837, ii. 257. Lawr. Gen. Rep. 1858, 860.

*Thalasseus acuflavidus*, ——— ?

DIAG.—*T. Thalasseo cantiaco* staturâ, formâ, coloribusque omnino similis; sed margine albâ pogonii interni remigis primæ angustiore, nec in apicem pennæ porrectâ.

*Habitat*.—Atlantic Coast of North America, ranging into the Antilles in winter.

The young of the year is considerably smaller than the adult (wing  $\frac{1}{2}$  inch shorter) as is usual in this subfamily. The bill is shorter and weaker, and is without any very distinct definition of angles and ridges. It is brownish black, the extreme point only yellowish. The crown, front and nape are brownish black, variegated with white, the white touches very small on the front. The upper parts are as in the adults; but everywhere marked with irregularly-shaped, but well-defined spots and transverse bars of decided brownish black. There is no well formed occipital crest, until after the first moult. The primaries are like those of the adults. The tail, however, is very different. The feathers for three-fourths their length are of the color of the back; this color gradually deepens, until towards the tips it becomes brownish black,—each feather having a terminal irregular edge left whitish. The tail, in shape, is simply deeply emarginate, the outer feathers being but slightly longer than the second.

In winter the yellow tip of the bill of the adults decreases in extent and intensity of color; the front is white, either pure or speckled with black; the crown variegated with black and white; but the long occipital crest, which does

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not disappear at this season, remains of an unmixed brownish black. The lateral tail feathers are shorter. The bird otherwise as in summer.

At all seasons the yellow tip of the bill varies in extent, and it also presents a varying regularity and sharpness of division from the black. I am inclined to think that the extent of the yellow depends upon the age of the bird: its intensity upon the season. The longest yellow tip before me measures three-fourths of an inch, the shortest one-fourth. In a large series of specimens the tarsi and toes scarcely differ appreciably. The markings of the primaries, in their extent and disposition, are also remarkably constant. The variation in length of wing from flexure in adult summer birds is about half an inch. The tail varies somewhat in depth of fork, but is always less than in the species of *Sterna* proper.

A series of winter skins from Jamaica in, probably, their first moult, differ from adult examples from various points on the Atlantic Coast in being every way considerably smaller. The bills are about a third of an inch shorter than the average; and other parts differ proportionally.

The American Sandwich Tern was first separated from the European by Cabot, (l. c.) in 1847. Most of the points of difference, however, assigned by that writer, disappear when large series from both continents are compared. The difference in the measurements given exists equally in individuals of both species; for, as will be seen from the above remarks, specimens vary greatly in these respects. After an attentive examination of a large number of skins, I can appreciate no differences whatever in these respects; and in size and proportions, of bill as well as of the whole body, the two appear identical. Neither can distinctive characters be drawn from the yellow tip of the bill. In both species the line of union of the yellow and black is equally irregular, depending for its exact character on the age of the bird. In both, the yellow runs along the gonys, nearly or quite to the angle at the symphysis. It also extends, but in a less degree, along the ridge of the upper mandible, and even for a little way on the cutting edges of both mandibles. The outline of the yellow on the sides of the bill is also more usually concavo-convex than perfectly straight and perpendicular. The trenchant line of union, which existed in the specimen described by Cabot, must have been rather exceptional. I cannot appreciate any difference in the width of the bills of the two in the series before me. A discrepancy in the claws of the two does not exist as constant.

We are reduced, therefore, in separating the two birds, to the single remaining character given by Cabot,—that of the primaries. These parts in the American bird are not darker than those of the European, since their color depends on their age; but a decided difference in the white margins of the inner webs exists uniformly in all the specimens from either country that I have ever examined. In the European bird the white of the inner web of the first primary occupies at the base nearly the whole of the web, the dark portion being merely a narrow line along the shaft. This black portion widens but little as it runs along the feather, so that the white border extends quite broadly to the very tip of the feather, which it entirely occupies. In the American, on the contrary, the black portion is in its whole length wider, and, about one and a half inches from the tip becomes quite suddenly very decidedly broader, so much so as nearly to cut off the white, which latter continues forward a little further, but only as a very narrow bordering line, and finally disappears before it reaches the tip. The same holds good, though somewhat less markedly, of the second, third and fourth primaries. The following would therefore constitute the

*Differential diagnoses of the American and European Bird.*

*Th. cantiacus*.—White margins of inner web of outer three or four primaries wide, extending quite to tip, which it wholly occupies. Breadth of white portion  $1\frac{1}{2}$  inches from tip of first primary,  $\cdot 25$  of inch.

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*Th. acutiflavus*.—White margins of inner web of three or four outer primaries narrow, falling short of tip, which is wholly occupied by the black portion. Breadth of white margin  $1\frac{1}{2}$  inches from tip of first primary,  $\cdot 10$  of an inch.

#### Genus STERNA Linnæus.

*Sterna*, Linn., Syst. Nat. 1748. Type, *S. hirundo*, Linn.

*Thalassea*, Kaup, Sk. Ent. Eur. Theirw. 1829, p. 97. Type, *S. paradisea*, Brün.

*Hydrocecropis*, Boie, Isis, 1844, p. 178. Type, — ? (includes *S. paradisea*.)

*Sternula*, Boie, Isis, 1822, 563. Type, *S. minuta*, Linn.

CH.—Head without a decided occipital crest, but the feathers of the parts somewhat elongated; size moderate, or very small; general form slender and graceful. Bill about as long as, or slightly shorter than, the head, greatly exceeding the tarsus; of varying stoutness, but usually quite slender, very acute, the culmen gently curved, being slightly declinato-convex. Commissure gently curved; outline of rami a little concave, of gonys quite straight, the angle at symphysis well marked and acute, but not very prominent. Wings long and pointed. Tail of variable length and amount of forking, but always decidedly greatly forked; the lateral feathers elongated, slender and tapering, greatly surpassing the others. Tail contained in the wing of the type of the genus about  $1\frac{3}{4}$  times; in *arctica*  $1\frac{1}{2}$  times; while the tail of *paradisea* is but little less than the wing. Tarsus slender, slightly shorter than the middle toe and claw, slightly longer than the middle toe alone; much shorter than the bill, about equal to the distance between the projection at symphysis and the tip of the inferior mandible.

The genus *Sterna*, in the restricted acceptation in which it is employed by most modern authors, embraces quite numerous species, all more or less intimately related to *S. hirundo*. The group is one well defined, its species agreeing very closely in size, general form, pattern of coloration, and seasonal changes of plumage. Specific characters are generally found in the varying length and stoutness of bills and tarsi, amount of forking of the tail, markings of the primaries, and other less decided features of coloration.

*Sterna* proper has comparatively few synonyms, the principal of which are those given at the head of this article. *Thalassea*, Kaup, and *Hydrocecropis*, Boie, are strictly synonymous, while *Sternula*, Boie, is based upon a species differing but very slightly from the type, *S. hirundo*.

#### "STERNA TRUDEAUI Aud."

*Sterna Trudeaui*, Audubon, Orn. Biog. v. 1839, 125. Lawr. Gen. Rep. Birds, 1858, 861.

I have before me a typical specimen of *Sterna Trudeaui*, belonging to J. P. Giraud, Jr., the one from which was drawn up the description in the General Report, and supposed to be also the original of Audubon's plate and description. As these are the chief descriptions of the bird which have ever appeared, and as, I believe, the specimen is the only one known to exist, it may fairly be considered to embody all that is at present known of the species. From the peculiar characters presented by it, as well as by the species which succeeds, — to both of which attach, for various obvious reasons, doubts as to validity, — it may be of advantage to examine somewhat closely into its characters, to determine if possible whether they be distinct from each other; and in that case in what they differ from *S. Forsteri*.

The bill is quite stout at the base, both as regards height and width, and tapers regularly to an acute point, the culmen being but slightly arcuate. It is precisely the length of that of an adult *Forsteri*, and also of a supposed *Havelli*.\*

\* The specimens of "*Havelli*" referred to, are those furnished by Mr. Lawrence, and so labelled by him.

It is bright yellow at the tip for exactly the same distance as is the bill of "*Havelli*," but the base, for nearly a third of the length of the bill, appears to have been in life bright orange yellow, so that only the middle of the bill is left black; whereas, in "*Havelli*," the bill is black from its yellow tip quite to the base of the upper mandible, and only a small space on the under mandible is left yellow. The front and crown are white, passing into light pearl blue on the nape, exactly as in "*Havelli*;" the circumocular fascia also exists, but it is somewhat narrower than in that species. The other upper parts are of exactly the shade of *Forsteri* or "*Havelli*;" but this color extends around the sides of the neck quite to the throat, and occupies the whole under parts of the bird, not even excepting the under tail-coverts, whereas in "*Havelli*" and *Forsteri*, the color of the same parts is nearly or quite pure white. The rump is white, as in both those species. The tail is elongated;—exactly intermediate between a full plumaged summer *Forsteri* and "*Havelli*;" it has precisely the color of the latter, the inner web of the lateral feather being somewhat lighter than in the former. The wings, in their markings and length, are identical with those of either *Forsteri* or "*Havelli*;" the tarsi and toes are fractionally of the same length, and appear of about the same color in the dried skin.

The differences therefore between "*Havelli*" and "*Trudeaui*," lie entirely in the following features: 1st. The bases of both mandibles are orange yellow for nearly half their length in "*Trudeaui*," while in "*Havelli*" a very small portion of the under mandible only is light colored. 2d. The color of the back extends undiluted over the whole under parts of "*Trudeaui*," while the same parts in "*Havelli*" are white.

The greater slenderness of the bill, and the shorter tarsi, given by Audubon as characteristic of "*Trudeaui*," in comparison with "*Havelli*," do not exist, provided the specimens before me exhibit the characters of the latter. Indeed, a comparison of fourteen specimens of *Forsteri*, three of "*Havelli*," and the single "*Trudeaui*," shows the three to be surprisingly similar in every detail of size and proportions; the bills and tarsi particularly, hardly differing as much in length as do these parts in different individuals of *hirundo* or *macroura*.

Should the color of the bill and of the under parts of "*Trudeaui*,"—more particularly the latter—prove constant, they would be abundantly sufficient to separate it from any other species. The only question is, whether the specimen under consideration is not in an entirely accidental and abnormal state of plumage, to be placed in the same category with albinism, melanism, &c. Although Audubon states that he saw other individuals like the present specimen, it appears to be the only one ever actually examined. The question is one of great interest, but one of which, unfortunately, we are no nearer the positive solution than we were twenty years ago; and I am therefore obliged *rem in medio relinquare*.

"*STERNA HAVELLI* Aud."

*Sterna Havelli*, Audubon, Orn. Biog. v. 1839, 122. Lawrence, Gen. Rep. Birds, 1858, 861.

So accurate a description of the winter plumage—the only one known—of this supposed species has been given by its discoverer, that it is unnecessary here to repeat it. A discussion of the essential characters assigned to it, to discover exactly what are its claims to specific distinction, may be given.

It is not a little singular that, of a species recognized for more than twenty years, the nuptial plumage should be still quite unknown. I am not aware that a specimen which could be referred to this species has ever been taken in spring or summer. There can be no doubt, however, that at that season it obtains the black pileum common to all the species of the genus,—with, probably, not even the exception of "*Trudeaui*." A specimen before me, which agrees more closely than any other with Audubon's plate and description, has the crown and occiput very noticeably variegated with black; this color, indeed.

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being almost unmixed with white on the extreme nape. The front alone is white. The character, therefore, of a black ocular fascia, and white crown, cannot be considered as diagnostic of the adult full-plumaged bird.

The chief, and, indeed, the only point to be examined, is the relationship of this species with the *S. Forsteri*,—winter specimens of which agree very closely with it. In discussing this question, it must be borne in mind that Audubon was entirely unacquainted with *S. Forsteri*, or at least did not recognize its claims to specific validity, as distinct from *S. hirundo*. Indeed, if we compare Audubon's description of his "*Havelli*" with a winter specimen of *S. Forsteri* it will be found that they correspond minutely in every particular of size, form and colors; and the characters given apply as well to the one as to the other. For, though summer specimens of *Forsteri* are quite different in the elongation of the tail, color of bill, black pileum, &c., yet in winter these features are quite changed, the tail becoming shortened, the bill blackened, and the pileum restricted to a circumocular fascia. Basing an argument, therefore, upon these data, "*S. Havelli*, Aud.," might, without the slightest impropriety, be reckoned as a synonym of *S. Forsteri*.

Three Terns, obligingly furnished for examination by Mr. Lawrence, and labelled by him "*Havelli*," differ in some respect from any winter skins of *Forsteri* which have as yet fallen under my observation. Their size and proportions, length of tarsi, elongation of tail, &c., are quite identical. The most perfect of these,—evidently an adult bird in full winter plumage,—has a stout bill, almost black, its tip for more than a fourth of an inch bright yellow. The bill in fact looks something like that of *Thalasseus cantianus* or *acutirostris*. There is a well-defined lateral stripe on the head; the whole crown is pure white, and even on the nape there are no traces of black, that part being light pearl color, much as the back. But the most distinctive feature of this specimen is that the tail is entirely very light pearl, the inner web of the lateral feather being scarcely, if at all, darker than the outer. A second specimen, a younger bird apparently, and evidently, from the ragged dull brown condition of its primaries, in moult, has the same decided character of tail as has the first one. The bill is even stouter at the base, and the extreme point only is slightly yellowish. The whole crown is variegated with black and white, the former being left nearly pure on the nape. The third specimen is quite like the last, but the inner web of the lateral feather is quite decidedly dusky, showing an approach to *S. Forsteri*. It will be noticed that where these three specimens are quite identical with each other, in size and proportions, they differ among themselves in colors, both of bill and feathers, and show quite a gradation towards *S. Forsteri*.

From the above remarks it will be seen that the question really hinges upon the following point, as yet not positively determined: Does the *S. Forsteri* in winter, when fully adult, ever acquire a very broad bright yellow tip to its otherwise wholly black bill, and lose entirely the dark character of the inner web of its exterior tail feather?

Now it is well known, that the younger a Forster's Tern is, the darker is the inner web of the lateral feather; and the natural inference from this fact is, that with increasing age the inner web may become nearly or even quite as light as the outer. With regard to the broad yellow tip of the bill, it will be noticed, that of the three specimens purporting to be "*S. Havelli*," each one varies in this particular; so that it would be quite impossible to consider it as diagnostic. Therefore, though unable to prove the point incontrovertably, I am decidedly of opinion that *Sterna* "*Havelli*," is merely the adult winter plumage of *S. Forsteri*, and not a distinct species.

#### STERNA FORSTERI Nuttall.

*Sterna hirundo*, Sw. et Rich., F. B. A., 1831, ii. 412, nec Linn.

*Sterna Forsteri*, Nuttall, Man. Orn., 1834, ii. p. 274 (in note to *S. hirundo*), and of authors.

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**DIAG.**—*S. Sternæ hirundini* similis: sed rostro longiore, valdè robustiore, tarsis longioribus, validioribus; caudâ magis productâ, perlaceâ, rectrice laterali pogonio interno fusco-griseo, externo albo.

**Habitat.**—Very extensively distributed over North America. Atlantic Coast and Gulf of Mexico. Fur countries. Great Lakes and Rivers. Texas. Utah. California.

In view of the considerations presented in the two preceding articles, it may be well to look somewhat carefully into the characters of the present species.

**Adult, spring plumage.**—Bill orange-yellow, black for nearly its terminal half, the extreme points of both mandibles yellowish; robust, deep at the base; culmen markedly declinato-convex, eminence at symphysis well developed; in total length from one to two-tenths of an inch longer than in *S. hirundo*. The black pileum does not extend so far down on the sides of the head as it does in *hirundo*, barely embracing the eye (the lower lid of which is white), and leaving a considerably wider white space between the eye and commissural edge of superior maxilla than in *hirundo*. The color of the back hardly differs appreciably from that species; it is perhaps a shade lighter. The wings are comparatively considerably shorter than in *hirundo*, being absolutely a little less, though *Forsteri* is a larger bird. They are very light colored, being strongly silvered with the peculiar hoariness common to most of the species of the genus; this lighter color is very observable even on the coverts. The outer web of the first primary is not black, but silvery like the others; all the primaries want the very decided white space on the inner webs which exists in *hirundo* and *macroura*; there are indications of it, indeed, on the three or four outer primaries, but the others are a nearly uniform dusky-gray, moderately hoary. The entire under parts are white, with scarcely a trace of the plumbeous which is so evident in *hirundo*, and amounts to so decided a color in *macroura*. The tail is a slightly lighter shade of the color of the mantle, separated from the latter for a short space by the decidedly white rump. The lateral feathers are much more lengthened than in *hirundo*, the elongation generally quite equalling that of *macroura*, and sometimes even exceeding it. These two lateral feathers are white on the outer web, dusky-gray on the inner. This being exactly the reverse of *hirundo*, and a very noticeable feature, was the first to draw attention to the bird, and this character being so tangible and convenient, writers have perhaps laid too much stress upon it, to the exclusion of others, quite as evident and more important. The feet are bright orange, tinged with vermillion; the tarsus shorter than the middle toe and claw; the feet longer and stouter, by over .10 of an inch, than the same parts in *hirundo*.

When the primaries become old, *i e.*, at the approach of the spring or autumn moult, before the species begins to put on its complete summer or winter livery, the primaries lose their beautiful silvering, and become plain brown, their shafts inclining to decided yellow. They have then also distinct white spaces on their inner webs, nearly as well marked as in *hirundo* or *macroura*.

**Adult, winter plumage.**—The bill loses the bright orange-yellow which exists in summer, the black encroaching upon it, so that it becomes almost wholly dusky. The base of the under mandible in dried skins appears as if it might have been flesh-colored in life. The feet also lose their bright color, and incline to a dusky-yellowish. The black pileum is more or less mixed with white, the white predominating on the forehead so as to leave it nearly pure; there is always considerable black left on the nape, and also a broad band on the side of the head, embracing the eye, and reaching to the nape behind, exactly as represented in Audubon's plate of *S. Hareli*. The long lateral tail feathers become greatly shortened, so as to be but scarcely, if at all, longer than those of *hirundo* during the breeding season. The color of the inner webs becomes darker, though it does not extend so far towards the base of the feather; sometimes it invades the outer web also, towards the tip.

**Young of the year, before the first moult.**—Bill every way considerably smaller, 1862.]

shorter and weaker than that of the adult, and wanting its very acute tip, and sharply-defined ridges and angles; brownish-black, fading into dull flesh-color at the base of the under mandible. Front white, but the crown and nape show considerable traces of the black that is to appear, which is now mixed with a good deal of light-brown. The pearl-blue of the back and wing coverts is everywhere interrupted by irregular patches of light grayish-brown, showing a tendency to become transverse bars; this grayish-brown on the tertials deepens into brownish-black, and occupies nearly the whole extent of each feather. The primaries differ from those of the adult in having less of the silvery gloss, and the inner white spaces are more marked, being in fact much like those of the adult *hirundo*. The rump and under parts are pure white. The tail intensifies, so to speak, its adult characters as regards color; and, independently of any other feature, will always serve to identify the species. It is deeply emarginate, but the lateral feather is not greatly produced, surpassing the second by scarcely more than the latter surpasses the third. Its inner web for an inch or so from the tip, and both webs of the other feathers, are quite decidedly grayish-black; the intensity of this color, and also its extent, decreasing successively on each feather from without inwards, so that the central pair scarcely deepen their color at the tips. The outer web of the lateral feather generally stays pretty uninterruptedly white, but sometimes is just at the tip invaded by the darker color of its inner web.

The preceding descriptions embrace all the well characterized stages of plumage of this species which are known to me, though there are, of course, intermediates in great variety between those given. It is indeed a little remarkable, the number of specimens in immature or winter plumage which find their way into collections. Of the numerous examples before me, just one-half are in this state, all showing white fronts, and the usual deep black band through the eye. There would seem to be something peculiar in the habitat of this species, to cause it to differ so remarkably from its allies *hirundo* and *macroura* in this respect. I have purposely gone considerably into detail regarding these immature stages, because of the great similarity which exists between the species, and the same ages of "*S. Havelli*," if, indeed, the latter be really distinct from it. The question of the relationship of the two has been fully discussed under the head of "*S. Havelli*."

*Sterna Forsteri* affords a good illustration of a species, bearing so intimate a general resemblance to another, as to be confounded with it at first glance, and yet when carefully examined proving to be totally distinct. It is perfectly easy to separate it from the *hirundo* by its characters of bill, wings, tail or feet, either of which taken alone would identify it. The following table will exhibit at a glance the distinctive features of our three most intimately allied species, between which, it will be observed, there is a complete and gradual transition in almost every respect.

*Differential Diagnoses of S. Forsteri, hirundo and macroura.*

*S. Forsteri*.—Bill (average) 1·60 along culmen; depth at base ·40; robust. Bill orange-yellow, nearly its terminal half black. White space between eye and cutting edge of upper mandible broad. Under parts white. Outer web of first primary silvery; the inner webs also of the others strongly hoary, without well-defined white spaces. Tail bluish-pearl, like the back, its lateral feather greatly produced (average nearly 7 inches in length); its outer web white, inner the color of the rest of the tail. Legs long and stout; length of tarsus (average) rather over ·90 of an inch; orange-yellow, tinged with vermilion. Length of tarsus, middle toe and claw 2 inches.

*S. hirundo*.—Bill (average) 1·45 along culmen; depth at base ·33; moderate. Bill vermilion-red; its terminal third black. White space between eye and cutting edge of upper mandible narrower than in *Forsteri*. Under parts lightly washed with plumbeous, fading into white on the throat and abdomen. Outer

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web of first primary black; inner webs of the others somewhat hoary, with well defined white spaces. Tail white, different from the back, its lateral feather moderately produced (average 6 inches in length); its outer web grayish-dusky, inner white. Legs moderate; length of tarsus about .80 of an inch; light vermilion-red. Length of tarsus, middle toe and claw 1.75 inches.

*S. macroura*.—Bill (average) 1.30 along culmen; depth at base .30; slender. Bill wholly deep carmine-red. White space between eye and cutting edge of upper mandible narrower than in *hirundo*. Under parts decidedly plumbeous, extending from vent to throat, both of which become abruptly white. Primaries as in *hirundo*. Tail with the elongation of *Forsteri*, or rather exceeding it (average 7.50 inches), and the color of *hirundo*. Legs very short and slender: length of tarsus (average) .65 of an inch; deep vermilion, almost lake. Length of tarsus, middle toe and claw, about 1.50 inches.

*Comparison of the young of the year of S. Forsteri and hirundo*.—The bill and feet constantly present differences proportional to those which exist in the adults, as regards length and stoutness. The bill of *hirundo* is more decidedly yellowish at the base of the lower mandible than in that of *Forsteri*; and the feet are clear yellow instead of being tinged with dusky. The mottled and variegated crown and upper parts are much the same in both; and the markings of the quills quite identical. The tail, however, differs remarkably. In *hirundo* the outer webs of all the feathers are dusky-gray. In *Forsteri* the reverse is the case. The difference is even more marked than in the adults.

There is little to be said with regard to the bibliography of this species. In 1831 Swainson and Richardson describe it, calling it *S. hirundo*, but noticing the discrepancies which exist in the tail and feet. In 1834, Nuttall seizes upon these differences in a note under *S. hirundo*, and suggests for the species the name of *S. Forsteri*, in the event of its proving distinct. The citation "*S. hirundo*, Rich., nec Linn." is, I believe, the only synonym of this well-marked species, unless, indeed, it be necessary to refer to it the two preceding species.

I append the detailed measurements of several specimens of this species, which will serve to show within what limits it varies in size and proportions.

Cat. No.	Locality.	Sex.	Wing.	Tail length.	Depth of fork.	Bill length.	Height at base.	Tarsus.	Middle toe and claw.
24274	New Jersey.	♂	10.00	6.90	4.00	1.65	0.40	0.24	1.15
12692	" "	×	9.50	7.70	5.00	1.58	0.40	0.21	1.10
11624	" "	×	10.10	6.75	3.60	1.64	0.40	0.20	1.15
4928	Florida.	♀	10.30	5.00	2.30	1.50	0.35	0.25	1.14
.....	"	×	9.75	7.00	4.10	1.60	0.40	0.25	1.05
9973	Sac Valley.	♂	9.70	6.90	4.00	1.56	0.40	0.20	1.10
13473	Utah.	♂	9.70	7.70	4.70	1.56	0.40	0.23	1.08
.....	California.	×	10.30	7.20	3.70	1.55	0.38	0.22	1.15
4317	Louisiana.	×	10.20	6.60	3.55	1.54	0.35	0.20	1.08

#### STERNA HIRUNDO Linn.

*Hirundo marina*, Ray, Syn., p. 131.

*Sterna major*, Brisson, Ornithologie, p. 113.

*Sterna hirundo*, Linnæus, Syst. Nat., i. 1766, 227; et auct. Fab. Fabric. et Rich. exceptis.

*Hydrocecropis hirundo*, Boie, Isis, 1844, p. 179.

?*Sterna fluviatilis*, Naumann, Isis, 1820, fide Temm.

*Sterna marina*, Eyton, Cat. Brit. Birds, 1836, p. 55.

*Sterna Wilsoni*, Bonaparte, Comp. List., 1838, p. 61, et auct. Amer. recent. = *S. hirundo ex America*.

"Great or Common Tern," Latham and English authors. "Hirondelle-de-1862.]

mere pierre-garin," Buffon and French authors. "Gemeine, oder Rothfüßiger Meerschwalbe," Bechstein, Meyer and German authors. "Wilson's Tern," Bonaparte, and most later American authors.

*Habitat*.—Sea Coasts of Europe, part of Asia and America, ascending rivers and bays to a considerable distance.

This species has been so long known that any description of its characters, or changes of plumage are unnecessary. Temminck says that the adults in winter do not lose the black of the crown, "elle est seulement plus terne." If this be so, the species forms an exception to the general rule among Terns, that at this season the front becomes nearly white, the crown variegated with black and white, or the black still further reduced to a circumocular fascia.

Comparisons of this species with *S. Forsteri* and *macroura*, its most intimate allies, will be found under the head of the former.

The common Terns of Europe and America were considered identical by all writers up to the year 1838. At that date they were separated by Bonaparte; and American authors, with the exception of Audubon, have generally followed his example. I am little pleased to be obliged to refer to a European species, an American bird which has been judged distinct by high authority, but such a procedure seems unavoidable in the present instance. I am not aware that any distinctive characters have ever been assigned to our bird. Bonaparte, in instituting the species, gives no description, as, indeed, is the case with several other species founded in the same work, with regard to which he appears to have relied, for means of separating them from their European allies, rather upon some theory of geographical distribution, than upon any discrepancies presented by the birds themselves. I have very carefully compared a series of skins from both continents, and neither in size, form or color, have I been able to detect the slightest differences; and consequently, until some one is more fortunate than myself in detecting valid specific characters, I must refer the American bird to the old Linnæan *S. hirundo*.

Below are offered the detailed measurements of five American and European birds, taken at random from a large series. It will be observed that in no respect do the dimensions of the birds from the two continents present greater differences than are found in the various examples from either.

A.—*S. hirundo ex Europâ.*

Cat. No.	Sex.	Locality.	Wing.	Tail.		Bill.		Tarsus.	Middle toe and claw.
				Outer feather.	Depth of fork.	Length.	Height at base.		
9559	♀	Europe.	10.30*	5.70	2.65	1.38	0.33	0.81	0.97
24280	♀	Holland.	9.80	5.60	2.60	1.51	1.31	0.78	0.90
21680	♀	Hungary.	10.80	6.20	2.70	1.45	0.36	0.80	0.90
23444	♀	"	10.60	5.90	2.70	1.45	0.32	0.84	0.96
23445	♀	"	10.80	6.50	3.00	1.35	0.31	0.80	0.90

B.—*S. hirundo ex Americâ.*

Cat. No.	Sex.	Locality.	Wing.	Tail.		Bill.		Tarsus.	Middle toe and claw.
				Outer feather.	Depth of fork.	Length.	Height at base.		
18224	♀	Labrador.	11.00	6.50	3.10	1.50	0.32	0.84	0.98
22287	♀	Massachus'tts	10.40	5.90	3.02	1.41	0.31	0.78	0.93
1149	♀	Cape May, N.J.	10.60	6.40	2.85	1.36	0.31	0.78	0.93
20811	♀	Hudson's Bay	10.40	5.90	2.85	1.50	0.32	0.78	0.95
12474	♀	Utah.	10.50	6.00	2.50	1.51	0.35	0.80	0.95

\* Inches and hundredths.

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For a species so long known, the present has remarkably few synonyms. That of *S. Wilsoni* is the one which has been most firmly established. I quote *S. flaviatilis* with a query on the authority of Temminck. This author, and also Degland, unhesitatingly refer it to the present species, while by some very recent authors\* it is regarded as distinct. Eyton, in calling the bird *S. marina*, derives his authority for the specific name from the *Hirundo marina*, of Ray's Synopsis, p. 131. Brisson's *Sterna major* probably also refers to this species, but though both these latter names have priority over Linnæus' appellation, they are to be disregarded, as neither of their authors were binomialists.

STERNA MACROURA Naumann.

*Sterna hirundo*, Faber, Prod. 1822, p. 88. Fabricius, Faun. Grœnl. 1780, p. 105. Nec Linn. nec Richards.

*Sterna macroura*, Naum., Isis, 1819, p. 1847. Degland, Ornith. Europ. 1849, p. 344. Lawrence, Gen. Rep. Birds, 1858, p. 862.

*Sterna arctica*, Temm., Man. Orn. 1820, ii., 742, et auct. pleriq.

*Sterna nitzschii*, Kaup, Isis, 1824, p. 153, secundum Gray.

? *Sterna brachytarsa*, Graba, fide Gray.

DIAG.—*St.* rostro gracile, rubro; pedibus brevissimis, rubris; corpore toto cærulescente-plumbeo, subtus dilutiore; caudâ, uropygio, tectricibusque caudalibus inferioribus albis; rectrice laterali valdè elongatâ, pogonio externo griseo-fusco.

*Habitat*.—Europe. Atlantic Coast of North America from Massachusetts northward. Interior of Arctic America, (Hudson's Bay, Great Slave Lake.) Semi-arctic Straits.

Examination of a very large series of this species shows it to be subject to great variations in some respects. These are especially noticeable in the bill and tail. The largest bill in the series measures 1.40 inches along the culmen; the smallest (from Nova Scotia) only 1.08,—the difference being over .30 of an inch. The average length of bill is about 1.30. The tail varies in length quite as remarkably, the difference between two equally adult individuals being more than  $1\frac{1}{2}$  inches. The color of the bill is pretty constant,—a uniform deep lake. Sometimes, however, it acquires a dusky tip, but never the decided black space which exists in *S. hirundo* and *Forsteri*. The bill is much smaller, and every way more delicately shaped than in those species. The under parts are nearly uniform in color. This is very decided, scarcely if at all lighter than the back, (very different from the slight wash of *hirundo*,) and extends in full intensity quite from the throat to the vent,—the under tail coverts being pure white, in marked contrast. The under surface of the wings do not share the general color of the body, but are pure white. The feet are exceedingly short, and hardly vary appreciably. Their color is carmine, not so deep as the bill, but still not of the vermilion or coral red of those of *hirundo*.

The distinctive features of this species and the *S. hirundo*, will be found under the head of *S. Forsteri*. They are so many, and so well marked, that it is difficult to conceive how the two species were ever confounded. The differences between it and *S. Pilei*, the next most closely allied species, are given under the head of the latter. There is no other North American species with which the present requires comparison.

I have carefully examined a large series of examples from both continents, and have been unable to detect the slightest discrepancies. This is one of the species of which, so far as I am aware, American and European specimens have never been separated by any writer.

Temminck's name of *arctica* has until recently been very generally applied to this bird; but that of Naumann must supersede it. Temminck admits that Naumann named the bird *macroura* before he called it *arctica*, but insists upon

\* Des Murs. Traite Générale d'Ocologie Ornithologique, p. 551.

the adoption of his name upon the following grounds: "Le nom de *macroura* ne convient point à ma *St. arctica*; elle a seulement une queue un peu plus longue que *St. hirundo*, tandis que nous avons en Europe et à l'étranger des Sternes à queue très longue, et que *St. Dougalli* a une queue extraordinairement longue, dépassant les ailes souvent de plus de deux pouces." The fact, however, of there existing other Terns with tails as long or longer than the species to which the name *macroura* was applied, would hardly be recognized by ornithologists as a valid excuse for setting aside a prior designation. Temminck's description is very accurate, but the dimensions given, ("13 pouces 6 ou 8 lignes") is considerably below the average.

I regret that I have never seen the immature or winter plumage of this species; the more so, since, so far as I can discover, no description of these stages has been given by any American writer. They were unknown to Temminck. Degland\* says that the winter plumage differs from that of summer only in the black of the crown being variegated with white. The same author describes the young before the first moult as resembling those of *S. hirundo*; but being a little smaller, the tarsus notably shorter, the bill slenderer and brown, with the base and cutting edge of the mandibles yellowish red. His description in other points does not differ materially from *S. hirundo*.

Degland also speaks of the occurrence of a hybrid of this species, and the *S. hirundo*, partaking in a varying degree of the characters of either parent. Though I have never met with a specimen which I could not unhesitatingly refer to one or the other species, it seems not at all improbable that hybrids should really occur.

The *Sterna hirundo* of the authors quoted in the synonymy undoubtedly refers to the present species. Though in the description of *S. nitzschii* of Kaup there are some discrepancies, I follow Gray in assigning it as a synonym. I have never had an opportunity of examining *S. brachytarsa* of Graba, but quote it entirely upon the authority of Gray.

#### STERNA PIKEI, Lawrence.

*Sterna Pikei*, Lawr. Ann. N. Y. Lyc. N. H., vi. 1853, 3. Id. Gen. Rep. Birds, 1858, 863. Atlas, pl. xciv.

DIAG.—(*Adultus, vestitu hyemali*?) *S.* rostro tenue, fuscесcente-rubro; fronte albo griseoque variegato; occipite nigro; dorso alisque griseo-cærulescentibus; uropygio albo; caudâ valde elongatâ, forficatâ, rectrice laterali pogonio externo fuscâ; corpore subtus albo; pedibus rubris.

*Habitat*.—Coast of California.

I have before me the type of *Sterna Pikei*, the original of Mr. Lawrence's descriptions (l. c.) obligingly furnished by that gentleman for examination. This specimen, the only one known to exist in any cabinet, is unfortunately in immature or winter plumage, and in rather poor condition. The species is a very strongly-marked one, differing widely from any other of North America, not only in colors, but in form and proportions. In size it is considerably smaller than *S. macroura*, the wing being one inch or more shorter than in the average of that species; the tarsi and toes a very little less. The bill measures 1.12 inches; it is remarkably slender, its height at base being only .25 of an inch—just about equal to that of *antillarum*. The color is quite undefinable in the specimen before me, but, as remarked by Mr. Lawrence, is probably deep carmine in life. The whitish front, becoming more and more mixed with grayish black towards the occiput, together with the plumbeous lesser wing coverts, are evidently those of an immature bird, probably of its first winter. The black of the occiput is quite pure, and extends on the sides of the head far enough to embrace the eyes. The marking of the primaries and secondaries are precisely those of *S. macroura*, and the color of the back and wings is much the same.

\* Ornith. Europ. 1849, ii. p. 345.

The tail is very long. I do not mean, however, that the lateral tail feathers are greatly produced, as in *macroura* and *paradisea*, (though that is not improbably the case in the summer plumage) for the depth of the fork is not greater comparatively, than in *hirundo*; but the whole tail is produced, the central feathers being absolutely as long as in *macroura*, which is a larger bird. The outer web of the lateral tail feather is very dark colored,—even more so than is that of *macroura*,—and the outer webs of the other feathers are shaded with grayish; but in the adult it is probable that the colors will be the same with those of the last-named species. A striking feature of *Pikei* is the pure white of the whole under parts, of the rump, and of the neck behind between the black pileum and the back, there being not the slightest trace of the plumbeous wash, so conspicuous in *macroura*, *hirundo*, etc. The species in this respect agrees with *S. paradisea*, and, like that species, may perhaps, during the breeding season, acquire a rosy tint on the under parts.

I regard this species as intermediate between *S. macroura* and *paradisea*, though most closely allied to the former. In the foregoing remarks the differences between the two have been pointed out. With the latter—*S. paradisea*—it agrees in several particulars: slenderness of bill, color of under parts and of feet, &c. It is at once to be distinguished by its much darker colored upper parts, different markings of primaries, pure white rump, slenderer and smaller bill and feet, greater elongation of central tail feathers, &c.

The acquisition of perfect specimens of various stages of this interesting Tern, of whose changes of plumage we can only judge by analogy, and with whose habits we are entirely unacquainted, is a particular desideratum in North American Ornithology.

#### STERNA PARADISEA Brünn.

*Sterna paradisea*, Brünnich, Orn. Bor. 1764, p. 46, and of recent authors. Lawrence, Gen. Rep. 1858, 863.

*Sterna Dougalli*, Montagu, Orn. Dict. Suppl. 1813, and of most authors, including Audubon and Nuttall.

*Sterna Macdougalli*, Macgillivray, Man. Ora. ii. p. 233.

*Thalassea Dougalli*, Kaup.

*Hydrocecropis Dougalli*, Boie, Isis, 1844, p. 179.

DIAG.—(nupt. temp. ad.) S. rostro tenue, nigro, basin versus rubescente, pedibus rubro-aurantiis; caudâ longissimâ, valdè forficatâ, fere albidâ, remigibus omnibus internè albo-marginatis ad apices ipsas; corpore suprâ perlaceo, subtus rosaceo-albo.

*Habitat*.—Atlantic coasts of Europe and America.

In a number of equally adult examples, I find that the color of the bill varies: in most the black extends nearly or quite to the base, in others fully the basal third of the bill is reddish. The extreme points of both mandibles are yellowish. The color of the mantle is lighter than that of any other species; the tail, exceedingly long and tapering, is of so light a pearly blue as to be almost white. A most striking feature of coloration of this species consists in the well-defined, broad white inner margins of all the primaries extending quite around the tips of the feathers, on to the outer webs on the first and second primaries. Immature and winter specimens have the bill brownish black; the front white; the crown and nape dull black, variegated with white. The lateral tail feathers want the great elongation and attenuation they acquire during the breeding season, the tail being no more deeply forked than that of *Forsteri*, or even of *hirundo*.

This species is so distinct in characters, that a comparison with any other is needless.

The American bird has never, I believe, been separated from the European. The specimens I have compared appear identical in every respect.

1862.]

## STERNA ANTILLARUM Coues ex Lesson.

*Sterna minuta*, Wilson, 1813; Bonaparte, 1828; Audubon, 1838; sed non Linnaei, 1776.

*Sterna argentea*, Nuttall, Man. Orn. 1834, ii. 280; sed non Princip. Maxim. quæ species Braziliensis.

*Sterna frenata*, Gambel, Pr. A. N. S. Ph. 1848, iv. 128.

*Sternula antillarum*, Lesson, Descriptions de Mammifères et d'oiseaux récemment de couverts, &c., Paris, 1847, p. 256. Adultus.

*Sternula melanorhyncha*, Lesson, op. et loc. cit. Juvenis.

DIAG.—*S. Sternæ minutæ* similis, ejusdemque staturæ; sed rostro brevior et valde gracilior, vittâ frontale angustior, dorso, uropygio, caudâque suprâ concoloribus, cærulescentibus-perlaceis.

Habitat.—Atlantic coast of North America, from Labrador to Texas, and ranging further south into the Antilles. Great lakes and rivers of interior of North America. Not on the Pacific coast?

The bill of this species, as usual in the subfamily, varies somewhat in length; but the longest bills before me do not equal the shortest of the European bird. The slenderness of the bill, which is very marked in comparison with its transatlantic congener, is constantly preserved. The black tip of the bill, usually from one and a half to two-tenths of an inch in length, is sometimes reduced to a mere point; but it is very rarely wanting altogether. The white frontal lunula varies within narrow limits, probably widening somewhat with increasing age; but it never, I believe, attains the ordinary breadth of that of the European. The neck behind, between the black pileum and the back, is a somewhat lighter shade than the latter, but the difference is scarcely noticeable. The pearl gray of the back and wings extends unchanged on the rump, upper coverts, and the inner tail feathers quite to their tips; but the outer vanes of the lateral tail feathers, and their bases, are white. As described by most authors, the two outer primaries in the great majority of adult spring birds are black, their shafts white, their inner webs broadly bordered with white, except toward the tips; but specimens frequently occur which have the three or four outer primaries of this color. This is, without doubt, merely a seasonal feature, and one quite independent of sex or age; for all the specimens bearing this character of primaries are adult birds, labelled as having been taken in July and August. At this season of the year they have finished the duties of incubation, and are about to put on the perfect winter dress, as the ragged and dilapidated condition of their plumage testifies. It is well known that allied species of Terns, such as *S. hirundo*, *Forsteri*, etc., towards the close of the summer, at the approach of the moult, entirely lose the delicate silvery hoariness with which the primaries are glossed over during the breeding season—these parts becoming of a plain, dull, brownish tint. The change in the present species is precisely analogous.

The young of the year, taken in July and August, differ greatly from the adults. The bill, though as stout at the base, is much shorter, less acute at the tip, and wants the sharply-defined angle at the symphysis. It is brownish black, the base of the under mandible dusky flesh color. The forehead is mostly white. The crown and occiput are variegated with brownish black and white, the former color mostly aggregated into a postocular patch. The back and wing coverts are lightly washed over with the pearl gray of the adults; but this color is greatly obscured, and its continuity interrupted by dark brown crescentic or hastate spots, one or more on each feather, which give the upper parts a mottled appearance. The primaries are all grayish black, growing successively lighter, and more and more glossed with silvery, from without inwards; the inner webs of all bordered with white. This white is broadest on the outer primary, but falls considerably short of the tip; it grows narrower, but at the same time longer, on the others, until on the inner ones it goes quite around the tip to the

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outer web. The tail is not deeply forked, but simply emarginate, the difference being about that which attains between the adult and young of *Hirundo horreorum*. I have never seen it of quite the shape figured by Audubon; but in his plate it is very accurately colored.

This species is so very distinct from *S. minuta*, that it is a little singular that they should ever have been confounded. The following are the

*Differential Diagnoses of the American and European birds.*

*S. minuta*.—Bill along the culmen 1.20 inches, height at base .27; width of frontal lunula .40. Rump, upper tail coverts and tail pure white, in marked contrast to the pearl blue of the back and wings.

*S. antillarum*.—Bill along culmen 1.05 inches, height at base .25; width of frontal lunula .30. Pearl blue of upper parts continued uninterruptedly on to the rump, tail coverts and tail.

These differences are all I can discover between the two species; quite enough, however, to permanently separate them. Nuttall states that the "Silvery Tern is about 9½ to 10 inches long; the European species 8 to 8½ only." It is difficult to determine the exact length of a species from dried skins; but in this case it is certain that no such difference exists. In fact, judging from the wings and tarsi,—parts which do not change in dimensions in drying,—the two are nearly or quite identical in size; and I am sure that the difference, if any, is not greater than is found between individuals of either species. Both appear to range from eight to nine inches in length. I cannot appreciate the difference in the color of the upper parts mentioned by Nuttall.

But, while our pretty little Tern thus rejoices in unimpeachable claims to specific distinction, it has not been equally fortunate in retaining for any length of time undisputed possession of a title of its own. By the earlier writers on North American Ornithology it was confounded with the European bird, and called *Sterna minuta*, Linn. Nuttall, in 1834, was the first to vindicate its claims to specific distinction from its European analogue. This author, however, while he gives correctly enough its essential characters, commits the grave error of referring it to the Brazilian *S. argentea* of Prince Maximilian,—quite a different bird. Nuttall appears to have made the mistake in this wise. He evidently never examined a specimen of *S. argentea*; for he says, "That our bird is that of Brazil we have no further evidence than the slight notice of Temminck." Now Temminck's\* remark is as follows: "Cette espèce,"—*S. minuta*,—"est absolument la même dans l'Amerique septentrionale. Les voyageurs au Brésil ont aussi trouvé dans ces contrées une petite hirondelle-de-mer modelée sur les formes de la nôtre. Mais elle forme une espèce distincte, bien caractérisée par son bec plus robuste, qui est entièrement d'un beau jaune clair; les distributions des couleurs offrent aussi quelques disparités. Le prince de Nieuweid indique cette espèce sous le nom de *Sterna argentea*. Voy. v. i. p. 67." With only this brief indication to guide him, and impressed with the different distribution of the colors of the upper parts of *S. minuta* and *antillarum*, Nuttall might readily overlook the discrepancies mentioned in the size of the bill, and in this manner refer the American bird to the Brazilian.

In the Proceedings of the Philadelphia Academy for 1848, Dr. Gambel points out the distinctive features of the present species and the *S. argentea*, and our bird being thus left without a name, he applies to it the exceedingly appropriate one of *S. frenata*, by which it has been known from that date up to the present time. I am therefore very reluctant to supersede it by any other; but the *Sterna antillarum* of Lesson undoubtedly refers to the present species, and has priority in point of date. Lesson's description (vide op. cit.) is essentially as follows: "Differs from *S. minuta* in its shorter bill, of orange color, tipped with black; the white frontal band narrower. Two outer quills bordered with

\* Man. d'Orn. vol. ii. p. 753.

black; tarsi orange. Lives on the banks of the Guadalupe." Here, it will be noticed, that though the characters are so brief, the peculiar features of bill and frontal lunula are given with such precision, that there can be no doubt of the propriety of referring the description to the species now under consideration.

Immediately following the description of the *S. antillarum*, there is instituted (l. c.) a *Sternula melanorhyncha*, Less., with substantially the following characters: "A little stouter than the preceding; differs from it and *S. minuta* in the straight and black bill. The white front of small extent. Black of head above extends to middle of neck. Black of sinciput mixed with white; lower neck white above, the gray of the upper part of the body washed with brownish. Tail short, little forked; the lateral feathers tipped with slender filaments. Tail pale grayish white, the outer quills broadly margined with brown." It is evident from almost every paragraph of this description, more particularly the mention of the black bill, the sinciput mixed with white, and the upper parts washed with brownish, that Lesson had in view an immature or winter Tern. The habitat given is the same as that of the preceding,—*antillarum*,—and I have but little doubt that the description is that of the young bird of the species now under consideration, in which the characters are almost exactly as given by Lesson. Indeed, a specimen before me agrees exactly with the description, even to the lateral tail feathers tipped with slender filaments,—said filaments being the termination of the shaft of the feather, from which the web has been worn away. I therefore quote *Sternula melanorhyncha*, Less., as a synonym of the present species.

#### Genus HYDROCHELIDON Boie.

*Hydrochelidon*, Boie, Isis, 1822, p. 563. Type *S. nigra* Linn.

*Viralva*, Leach, Stephen's Zool. 1826, xiii. p. 166. Same type.

*Pelodes*, Kaup, Sk. Ent. Eur. Thierw. 1826, 107. Type *Sterna leucopareia*, Natterer.

Чл.—Bill a little shorter than the head, longer than the middle toe and claw; very delicate, slender, acute; culmen and commissure decidedly declinato-convex, the amount of curvature increasing towards the tip; outline of rami and gonys both concave, the former most so: the angle separating them prominent and very acute. Wings exceedingly long, pointed, of same color as back, without distinct markings on either web. Tail rather short, contained  $2\frac{1}{2}$  times in the wings, only moderately emarginate, (much as in *Gelochelidon*,) the lateral feathers but little exceeding the next, not tapering and acuminate; all the feathers broad and rounded. Feet slender and short; tarsi much abbreviated, rather less than the middle toe alone. Toes moderately long; the webs rather narrow, and very deeply incised. Size small, general form delicate; colors mostly black, the wings and tail plumbeous.

A genus distinguished from *Sterna* proper chiefly by its very slender attenuated bill, with its decurved tip: its short tail, of a very different shape; its deeply incised interdigital webs and its very peculiar style of coloration. Other differences, however, will be noted in the preceding diagnosis. North America contains but a single representative,—the young of which was described by Wilson as *S. plumbea*, but which is in all probability identical with the well-known European *H. fissipes*. Other closely-allied species of Europe are the *H. nigra*, (of Linnæus= *H. leucoptera* of most authors), and *H. hybrida* (of Pallas = *H. leucopareia* of most authors.)

The principal synonym of *Hydrochelidon* is *Viralva* of Leach, (1826,) based upon the same type. *Pelodes* of Kaup, 1829, founded upon *H. leucopareia*, is also strictly a synonym of *Hydrochelidon*.

#### HYDROCHELIDON FISSIPES G. R. Gr. ex Linn.

*Sterna fissipes*, Linn. Syst. Nat. i. 1766, 228. Not of Pallas.

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*Hydrochelidon fissipes*, G. R. Gray. Gen. Birds, iii. 1849, 660.

*Sterna nigra*, Brisson, and of authors. Not of Linn.

*Hydrochelidon nigra*, Boie, Isis, 1822, p. 563.

*Viralva nigra*, Leach, Steph. Gen. Zool. 1826, xiii. p. 167.

*Sterna nœvia*, Linnæus, S. N. i. 1766, 228. Young.

*Sterna plumbea*, Wilson, Am. Orn. vii. 1813, 83, pl. lx. Young.

*Hydrochelidon plumbea*, Lawrence, Gen. Rep. 1858, 864.

*Habitat*.—Europe. North America generally, both on the sea-coast, and in the interior.

This species in all its changes of plumage is too well known to require any descriptions.

I have critically compared quite a series of European and American specimens, in all stages of plumage, but have been entirely unable to detect the slightest discrepancies between the birds of the two continents. The specimens before me are all absolutely identical in size and relative proportions of different parts; and the colors of those of the same age correspond minutely. There do not appear to exist the slightest characters upon which to base specific distinction.

The first distinctive name applied to the American bird was *plumbea*, of Wilson, based upon the immature bird, he probably, however, not recognizing it as the young, or desiring to separate it from the European species. The birds of the two continents were first formally separated by Bonaparte, in 1833, in his Comparative List, and his example has been followed by the majority of subsequent American authors.

To G. R. Gray, I believe, is due the credit of elucidating the synonymy of this, as well as of the other species of the genus, which was in a state of great confusion. The proper name of the present species appears to be *fissipes*, Linn., the name *nigra*, Linn., usually applied to it, really referring to the white-winged black Tern of Europe, of which *leucoptera* is the most firmly established synonym. Mr. Gray has also shown that the proper name of the whiskered Tern usually given as *leucopareia* Natterer, is *hybrida* of Pallas.

#### Genus HALIPLANA Wagler.

*Onychoprion*, Wagler, Isis, 1832, p. 277. Type *S. serrata*, Forster.

*Haliplana*, Wagler, Isis, 1832, p. 1224. Type *S. fuliginosa*, Gm.

CA.—Bill as long as the head, but little less than the tarsus and middle toe together, perfectly straight, stout, especially at base, where it is nearly as broad as high, tip rather acute. Culmen but very slightly convex; gonys about straight, so ascending as to make the commissure nearly straight; rami slightly convex, the prominence between them and the gonys illy developed, not acute. Nostrils somewhat more anterior than in *Sterna*, not nearly so much so as in *Anous*, in a decided, but rather irregularly-defined sulcus, which terminates a little beyond the middle of the bill in several longitudinal striæ. Outline of feathers at base of bill much as in *Sterna*. Wings exceedingly long, pointed, but the first primary scarcely surpassing the second. Tail very long, deeply forked, the feathers broader and stiffer than in *Sterna*, not so regularly tapering, but still quite acuminate at their tips. Legs rather long for this subfamily: the length chiefly apparent by a greater denudation of the tibia. Toes rather short; the middle with its claw exceeding the tarsus but slightly. Size moderate; general form slender and graceful. Bicolor.

A genus distinguished from *Sterna* by several important characters. In the shape of the bill, position of nostrils, proportions of primaries, color to some extent, there is an evident approach to *Anous*. It is, however, decidedly to be referred to the typical *Sternæ*, rather than to the *Megalopteræ*.

Wagler's *Onychoprion* is based upon the *S. serrata* of Forster; while his *Haliplana* has as type *S. fuliginosa*, Gm. The former of these species—*S. serrata*—1862.]

is in all probability identical with *fuliginosa*, and is at all events strictly congeneric with it. This being the case, perhaps *Onychoprion* ought to be employed for the genus; as it is instituted several pages in advance of *Haliplana*. But, as the conflicting names are by the same author, and bear the same date, I have preferred to adopt *Haliplana*, which, besides being based upon the old and well-known type *fuliginosa*, has the merit of being much more euphonious.

HALIPLANA FULIGINOSA Wagl. ex Gm.

*Sterna fuliginosa*, Gml. S. N., 1788, i. 605, et auct.

*Haliplana fuliginosa*, Wagler, Isis, 1832, p. 1224.

*Onychoprion fuliginosa*, Gould, Introd. B. aust., 1848, 113.

*Sterna serrata*, Forster, Descrip. Anim. 1844, 276. Adult.

*Onychoprion serrata*, Wagler, Isis, 1832, p. 277.

*Sterna oahuensis*, Bloxham, Voy. Blonde, 1826, p. 251. Fide Cass.

*Sterna guttata*, Forster, Descript. Anim. 1844, p. 211. Juv.

*Anous Pherminieri*, Lesson, Descr. de Mammifères et d'oiseaux, &c., 1847, p. 255. Juv.

DIAG.—H. bicolor, corpore suprâ, rostro, pedibus, remigibusque nigris; corpore subtus, fronte et rectrici laterali nisi apicem versus, albis.—(*Adultus*).

Minor; rostre graciliore; caudâ minus forficatâ; corpore toto brunnescenti-nigro, subtus dilutiore, abdomine tectricibusque caudalibus inferioribus griseo-albis; tectricibus alarum latè albo-terminatis.—(*Juvenis*).

The plumage of the young of the year of this species differs so remarkably from that of the adult, that I have above contrasted the diagnoses of the two ages. While the plumage of the adult is well known, a description of that of the young may not be here out of place.

(*Young of the year*).—The bill is much smaller and weaker than that of the adult; its upper mandible black; its lower, together with the eyes and feet, are dusky red. The whole body is a uniform brownish or fuliginous black,—this color deepening on the primaries, growing lighter on the under parts, until on the abdomen and under tail coverts it is dull grayish white. The wing coverts and scapulars are all broadly tipped with white, giving a very marked spotted appearance to the parts. The feathers of the back, rump and upper tail coverts are narrowly margined with dull rufous, which gives a transversely waved appearance to the parts. The tail is uniformly of much the color of the wings: all the feathers at their extreme tips fading into light brown.

The above description is taken from a bird in the collection of the U. S. Exploring Expedition, under Captain Wilkes, U. S. N., taken at Hendin Island. It is labelled "*S. fuliginosa*, Gm. juv.," by Mr. Cassin. I have carefully compared the series of adults in the same collection, and cannot find that they differ in the least from specimens from the West Indies and Southern States.

Upon the above-described state of plumage of *Haliplana fuliginosa* is based, I take it, the *Anous Pherminieri* of Lesson. ("Descriptions de Mammifères et d'oiseaux récemment découverts," 1847, page 255.) A condensed translation of this author's description is as follows: "Length 24 cent. Bill black above, red on the lower mandible; tarsi red. Plumage uniform dusky black beneath, the lower belly and under tail coverts white, washed with gray; above blackish brown, dark and uniform on the head and neck, enamelled with transverse white spots on the greater wing coverts, and rayed with rufous on the back, rump and wing coverts." It will be seen that this description corresponds in the minutest particulars, which render it but little if at all doubtful, what bird he had under consideration. His specimens came from the Antilles near the Guadeloupe.

I have also quoted, as a synonym of the young, *S. guttata* of Forster. This author (*loco citato*) says: "*S. caudâ forficatâ corpore fuliginoso, dorso tectricibusque albomaculatis, pedibus nigris*,"—and a part of his further description is: "*Corpus magnitudine circiter Sternæ hirundinis*." . . .

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omne fuliginosum; abdomine circa anum albicante; fronte fusco-cinerea." The dimensions are given as length 14 inches; bill 1.50; tarsus and toes 2.75. This description in all respects applies very exactly to a stage of plumage a little more adult than that characterized as *Anous l'herminieri*, in which the under parts have become lighter, and there are signs of the white front.

*Sterna serrata*, of the same author (page 276), is to be referred to *S. fuliginosa*, provided the Pacific bird be the same as the Antilles and Florida, which we have no reason to doubt. I quote *S. oahuensis* on the authority of Mr. Cassin, not having an opportunity of consulting the reference.

#### Section MEGALOPTERÆ.

If the preceding groups which have been considered as genera—and they are so held by the majority of modern writers—be really such, then the *Anous stolidus* is entitled to more than generic separation from the other representatives of the subfamily. The discrepancies in every particular of form, as well as of pattern of coloration, are very marked and decided. In the following diagnosis are given the characters which present themselves in the *Anous stolidus*; my want of familiarity with exotic forms preventing me from distinguishing with accuracy the features of the section from those that are strictly characteristic of its typical genus.

#### Genus ANOUS Leach.

*Anous*, Leach, Stephens' Gen. Zool. 1826, 139. Type *S. stolidus*, L.  
*Megalopterus*, Boie, Isis, 1826, 980. Same type.

SN.—Bill greatly exceeding the tarsus, rather longer than the middle toe and claw, as long as the head, moderately robust, depressed at the base, where it is very broad (as broad as high), compressed in the rest of its extent, tapering to the rather acute, attenuated and somewhat decurved tip. Culmen about straight for half its length, regularly decurved towards the tip, rounded, and towards the base very broad and flat. Commissure about straight to near the tip, where it is regularly declinato-convex. Outline of both rami and gonyes concave, former most so; the prominence which separates them being illy defined and not acute. Both mandibles marked with numerous more or less distinct longitudinal striæ; their cutting edges inflected. Nostrils situated far forwards, their anterior extremity nearly half way to the tip of the bill, in a deep sulcus formed by the rounded culmen and a prominent broad ridge which runs from the base of the upper mandible, along its cutting edge to beyond the nostrils, where it gradually becomes lost. Just above the base of this ridge there is a small but distinct triangular fossa, separated by an oblique stria from the large nasal sulcus. Outline of feathers at base of bill very peculiar; those on the culmen have a broadly convex outline, and reach considerably beyond the lateral feathers, which latter slope rapidly backwards with a slightly convex outline. This is the reverse of *Sterna*, in which the feathers reach far forwards on the sides of the upper mandible, and recede on the culmen to form an acute angle. Wings only moderately long for this subfamily, not very acute, the first primary scarcely surpassing the second; all the primaries slightly falcate, very broad almost to their rounded tips; unicolor. Tail exceedingly long, more than half the wing; rounded, the lateral feathers regularly much graduated; all the feathers broad at the base, tapering to their somewhat acuminate tips, their shafts stiffened. Tarsi moderately stout, exceedingly short, much less than the middle toe without the claw. Lateral toes very long, the inner especially, which is but little shorter than the outer. Hind toe well developed. Interdigital membranes very long and full, their margins even, unincised. Size moderate; general form stout; nearly unicolor; colors very dark.

#### ANOUS STOLIDUS (Linn.)

*Passer stultus*, Ray, Syn. 154, fide Leach.  
1862.]

*Gavia fusca*, Brisson, Ornith. pl. xviii. fig. 2.

*Sterna stolidus*, Linn., S. N. 1766, i. 227, et auct. antiq.

*Anous stolidus*, G. R. Gray, Gen. Birds, 1849, iii. 661, et auct. recent.

*Megalopterus stolidus*, Keys, et Blas., Wirb. Eur. 1840, 98.

*Anous niger*, Stephens, Gen. Zool. 1826, xiii. 140.

A comparison of the Floridan bird with that from the South Pacific, collected by Wilkes' Exploring Expedition, shows some differences of color, form and size, which, though not great, are well marked and quite constant in all the specimens I have examined. The bill of the Pacific bird is of the same length as that of the American, but is higher at the base, which gives it a somewhat different shape. The toes are considerably longer, while the tarsus is of just the same length; making a different relative length of tarsus and toes. The wing is from a half to three-fourths of an inch longer; the tail is very decidedly longer, the difference being quite an inch. The central tail feathers are half an inch shorter than the lateral feathers in the Pacific bird; while in the American the emargination is much less, only about a fourth of an inch. The differences in color are slight. The American bird has the occiput bluish plumbeous, which fades into pure white on the crown anteriorly; while the Pacific bird has the occiput darker, and the crown ashy white instead of pure. The sides of the head and neck all round, in the American bird, have a bluish plumbeous wash, notably different from the general fuliginous, which is entirely wanting in the Pacific bird. The feet of the American bird appear much darker in the dried skin.

Mr. Cassin, in the Ornithology of the Expedition, remarks upon these differences in the following words: "Numerous specimens from the shores and islands of the Pacific Ocean present, with some degree of uniformity, small and apparently unimportant differences from others from the Atlantic coast of North America. The bill appears to be larger in the latter, and a slight dissimilarity is observable in the colors. On careful comparison, however, we are not inclined to consider the bird of the Pacific as possessing characters sufficient to justify a distinct specific designation; but venture to suggest that further examination of specimens from localities in the two great oceans, and especially of the various immature plumages, is yet desirable."

I tabulate the differences between the two, leaving it to future investigation to determine their constancy and value.

#### *American Bird.*

Length of wing 10·00 to 10·50 inches.

Length of tail about 6·00.

Height of bill at base ·38.

Length of tarsus 1·00.

Length of middle toe and claw 1·45.

Middle toe and claw 1·45 hundredths of tarsus.

Central tail feathers but slightly shorter than the next.

Occiput bluish plumbeous, becoming pure white on the front. Sides of head and neck all round with a decided wash of bluish plumbeous. Feet nearly black in dried skin.

The difference in color appears very slight. I attach more importance to the discrepancies in size and proportions. If the Pacific bird be really distinct from the American, it has probably yet to receive a name; for it is very different from the various species of *Anous* mostly described by Mr. Gould. In that event, it may be called a *ANOUS FRATER*.

In the preceding pages are noticed all the Terns which are known to inhabit

#### *Pacific Bird.*

Length of wing 11·00 to 11·25.

Length of tail about 7·00.

Height of bill at base ·43.

Length of tarsus 1·00 (same).

Length of middle toe and claw 1·60.

Middle toe and claw 1·60 hundredths of tarsus.

Central tail feathers ·50 of an inch shorter than next.

Occiput brownish ash, becoming ashy white (not pure) on the front. Sides of head and neck not notably different from general fuliginous. Feet reddish brown in dried skin.

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North America. The fact of the writer's being actively engaged in professional duties at a Military Hospital while committing to paper the results of his investigations, will be a sufficient excuse for any evidences of hasty composition which may be apparent.

### Catalogue of the MIOCENE SHELLS of the Atlantic Slope.

BY T. A. CONRAD.

In the Miocene or Upper Tertiary formation of the Atlantic Slope there have been collected about five hundred and eighty species of shells,—two hundred and seventy-two of which are Conchifera and three hundred and nine Gasteropoda. The most northern limit of this formation appears to be in Gloucester County, New Jersey, and it underlies the eastern portions of Delaware, Maryland, Virginia, North and South Carolina. I have included in the Miocene formation that portion of the South Carolina Tertiary referred to the Pliocene period by Tuomey and Holmes, because I can discover no line of demarcation by which these tertiary strata can be divided into two distinct groups. The extinct species common to South Carolina and the more Northern States are numerous, and the fauna can only be regarded as that of one geological era. Some few of the species described by Tuomey and Holmes from the South Carolina Tertiary occur also in New Jersey, at the most northern boundary of the Miocene. The per centage of recent species in South Carolina, it appears to me, should be greatly reduced,—and I would reject from the list as many as eighteen, consisting of the following shells: *Busycon canaliculatum*, *B. perversum*, *Strephona literata*, *Littorina irrorata*, *Natica canrena*, *Dolium galea*, *Fasciolaria gigantea*, *F. distans*, *Pholas costata*, *P. oblongata*, *Petricola pholadiformis*, *Solen ensis*, *Lucina divaricata*, *L. Pennsylvanica*, *Cardium magnum*, *Mactra similis*, *Yoldia limatula*, *Strigilla fluxuosa*. It may be that all the species are extinct, but I have not had an opportunity of comparing all those doubtful shells with the recent forms. *Natica heros* and *N. duplicata*, Say, have fossil analogues in Maryland so closely resembling them that I find no essential difference; but the shells of this doubtful character are not more than thirty in number out of five hundred and eighty-one species. Near the coast, a Post-Pliocene or Pleistocene formation rests immediately on the Miocene, replete with existing forms, but as a group resembling that of more Southern latitudes on the coast of the United States. There is no intermingling of extinct species between these two formations, and the passage is almost as abrupt as between the Eocene and Miocene.

The final subsidence of the Eocene appears to have been accompanied by such an alteration of climate or other conditions as to have given origin to a totally distinct terrestrial and marine fauna, the latter existing on an Eocene and Cretaceous bed, extending from New Jersey to South Carolina inclusive, and which appears to have been generally extinct and above the sea during the existence of the European Pliocene faunas.

#### *Works referred to.*

- C. Miocene Foss.* Conrad, Medial Tertiary or Miocene Fossils of the U. S.  
*C. Foss. Shells of Tert. Form.* Conrad, Fossil Shells of the Tertiary Formations of the United States. 1832.  
*Trans. Amer. Philos. Soc.* Transactions of the American Philosophical Society of Philadelphia, vol. ix. n. s. 1845; vol. vi. n. s. 1839.  
*Sūlim. Journ.* American Journal of Science and Arts.  
*Journ. A. N. S.* Journal of the Academy of Natural Sciences of Philadelphia.  
*Proceed. A. N. S.* Proceedings ditto.  
 1862.]

*Plioc. Foss. S. C.* Pliocene Fossils of South Carolina.  
*Bullet. Nat. Inst.* Bulletin of the National Institution.  
*Emmons, Geol. N. C.* Geology of North Carolina.

*MURICIDÆ.*

MUREX, Lin.

M. globosus, Emmons, Geol. N. C. 247, 105a.

Subgenus PRERORYTIS, Conrad.

Fusiform; six prominent recurved foliated ribs; aperture ovate; channel closed.

M. umbrifer, C. Tert. Foss. 17, 3, 1. Emmons, Geol. N. C. 247, 104x.

*M. sexcostata*, Emmons, Geol. N. C. 248, 106.

TYPHIS, Montfort.

T. acuticosta, C. Journ. A. N. S. vi. 217, 9, 1. 1829.

TROPHON, Mont.

T. (Fusus) tetricus, C. Tert. Foss. 18, 3, 6. Foss. Med. Tert. pl. 46, fig. 4.

*FUSINÆ.*

FUSUS.

Subgenus SCALASPIRA, Conrad.

Fusus strumosus, C. Tert. Foss. 18, 3, 4. Foss. Med. Tert. pl. 49, fig. 3.

NEPTUNEA, Bolten.

N. (Fusus) devexa, C. Foss. Med. Tert. pl. 49, fig. 8. Proceed. A. N. S. i. 309.

N. (Fusus) exilis, C. Tert. Foss. 17, 3, 2. Mioc. Foss. pl. 49, fig. 1. Tuomey and Holmes, Plioc. Foss. S. C. 150, 30, 5. Emmons, Geol. N. C. 251, 111a?

N. (Fusus) equalis, Emmons, Geol. N. C. 251, 11.

N. (Fusus) filosa, C. Proceed. A. N. S. 1863.

N. (Fusus) lamellosa, Emmons, Geol. N. C. 251, 112.

N. (Fusus) parilis, C. Tert. Foss. 18, 4, 2. Foss. Med. Tert. pl. 49, fig. 5.

N. (Fusus) rustica, C. Tert. Foss. 18, 4, 1.

*Fusus errans*, C. Journ. A. N. S. vi. 223.

N. (Fusus) trossula, C. Tert. Foss. 18, 3, 5. Foss. Med. Tert. pl. 46, fig. 6.

*FASCIOLARIIDÆ.*

BUSYCON, Bolten.

B. alveatum, C. Proceed. A. N. S. 1862, 533.

B. adversarium, C. Proceed. 1863.

*B. perversum*, Tuomey and Holmes, (not Lam.,) Plioc. Foss. S. C. 145, 29, 3.

B. carinatum, C. Proc. A. N. S. 1862, 286.

B. (Pyrula) carica? Tuomey and Holmes, Plioc. Foss. S. C. 145, 29, 1.

B. (Fulgur) contrarium, C. Sill. Journ. xxxix. 387. Miocene Foss. pl. 45, f. 11.

*B. perversum*, Emmons, (not Lam.,) Geol. N. C. 249, 107.

B. (Fulgur) coronatum, C. Bullet. Nat. Inst. 187. Mioc. Foss. pl. 46, f. 1.

*Pyrula canaliculata*, Lyell, (not Lam.,) Man. Geol. 172, 151.

B. canaliferum, C.

*Busycon canaliculatum*, Tuomey and Holmes, (not Lam.,) Plioc. Foss. S. C. 145, 29, 2.*B. Carolinensis*, Emmons, Geol. N. C. 249, 108.

B. (Cassidulus) Carolinense, Tuomey and Holmes, Plioc. Foss. S. C. 147, 30, 1.

B. (Pyrula) excavatum, C. Sill. Journ. xxxix. 387. Miocene Foss. pl. 45, f. 12.

*Cassidulus Carolinensis?* Tuomey and Holmes, Plioc. Foss. S. C. 147, 30, 1.

B. filosum, C. Proceed. A. N. S. 1862, 286.

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- B. (Fulgur) fusiforme, C. Bullet. Nat. Inst. 187. Miocene Foss. 82, 46, 3.  
 B. (Fulgur) incile, C. Sillim. Journ. xxiii. 343.  
*Busycon Conradi*, Tuomey and Holmes, Plioc. Foss. S. C. 174, 29, 4.  
 B. (Fulgur) maximum, C. Miocene Foss. pl. 47.  
 B. (Fulgur) rugosum, C. Proceed. A. N. S. i. 307. Miocene Foss. pl. 46, f. 4.  
 B. scalaris, C.  
 B. (Fulgur) tuberculatum, C. Bullet. Nat. Inst. 185. Miocene Foss. pl. 46, f. 2.  
*B. canaliculatum*, Tuomey and Holmes, (not Lam.,) Plioc. Foss. S. C. 146, 29.  
 B. scalarispira, C. Proceed. 1862, 584.  
 B. striatum, C. ib.  
 B. Tritonis, Proceed. 1862, 583.

## FASCIOLARIA, Lam.

- F. alternata, Emmons, Geol. N. C. 253.  
 F. gigantea? Tuomey and Holmes, Plioc. Foss. S. C. 152, 30, 9.  
 F. nodulosa, Emmons, Geol. N. C. 253, 116.  
 F. Tuomeyi, Holmes, Pliocene Foss. S. C. 152, 30, 10.  
 F? parvula, H. C. Lea, Trans. Amer. Philos. Soc. ix. 270, 37, 94.  
 F. rhomboidea, Rogers, Trans. Philos. Soc. vi. 307, 30, 3.  
*F. distans*, Tuomey and Holmes, (not Lam.,) Pliocene Foss. 151, 30, 7, 8.  
 Emmons, Geol. N. C. 253, 113.  
 F. Sparrowi, Emmons, Geol. N. C. 253, 115.  
 F. Woodii, Gabb, Journ. A. N. S. (second series.) iv. 375, 67, 7.

## Subgenus TEREBRASPIRA, Conrad.

Spire elevated, terebriform; columella three-plaited, the plates interior.

- F. acuta, Emmons, Geol. N. C. 254, 17.  
 F. elegans, Emmons, Geol. N. C. 252, 114. Proceed. A. N. S. 1862, 286.

## Subgenus LYROSOMA, Conrad.

- F. (Fusus) sulcosa, C. Journ. A. N. S. vi. (1829.) 220, 9, 8. Proceed. A. N. S. 1862, 286.

## PERISTERIA, Mörch.

- P. (Bucc.) filicata, C. Proceed. A. N. S. i. 326.  
*Fusus cannabinus*? C. " " "  
*Colus cinereus*, Tuomey and Holmes, Pliocene Foss. S. C. 150, 30, 6.

## PLEUROTOMIDÆ.

## SURCULA, Gray.

- S. (Pleurotoma) biscatenaria, C. Journ. A. N. S. vii. 140.  
*Pleurotoma catenata*, C. Journ. A. N. S. vi. 223, 9, 13.  
 S. (Pleurotoma) bella-crenata, C. Journ. A. N. S. viii. 185.  
 S. (Pleurotoma) communis, C. Journ. A. N. S. vi. 224, 9, 23.  
 S. engonata, C. Proceed. A. N. S. 1862, 285.  
 S. (Pleurotoma) gracilis, C. Journ. A. N. S. vi. 225, 9, 10.  
*S. (Pleurot.) incilifera*, C. ib. vii. 140.  
 S. (Pleurotoma) Marylandica, C. Journ. A. N. S. viii. 185.  
 S. nodulifera, C. Proceed. A. N. S. 1862, 285.  
 S. (Pleurotoma) parva, C. Journ. A. N. S. vi. 225, 9, 18.  
 S. (Pleurotoma) rotifera, C. Journ. A. N. S. vi. 224, 9, 9.  
 S. rugata, C. Proceed. A. N. S. 1862, 285.  
 S. (Pleurotoma) tricatenaia, C. Journ. A. N. S. vii. 139.  
 S. (Pleurotoma) Virginiana, C. vii. 138.

## DRILLIA, Gray.

- D. arata, C. Proceed. A. N. S. 1862, 285.  
 D. bella, C. Proceed. A. N. S. 1862, 285.

- D. *distans*, C. Proceed. A. N. S. 1862, 285.  
 D. (Pleurot.) *dissimilis*, C. Journ. A. N. S. vi. 224, 9, 11.  
*Fusus pygmaeus*? H. C. Lea, Philos. Trans. ix. 270, 37, 95.  
 D. (Pleurot.) *eburnea*, C. Proceed. A. N. S. 1862, 285.  
 D. (Pleurot.) *elegans*, Emmons, Geol. N. C. 265, 146.  
 D. (Pleurot.) *flexuosa*, ib. 148.  
 D. *impressa*, C. Proceed. A. N. S. 1862, 285.  
 D. (Pleurot.) *limatula*, C. Journ. A. N. S. vi. 224, 9, 12.  
 D. (Pleurot.) *lunata*, H. C. Lea, Philos. Trans. new series, pl. 37, fig. 93.  
 Tuomey and Holmes, Plioc. Foss. 132, 27, 16, (Turris.)  
*P. lunata*, Emmons, Geol. N. C. 264, 144.  
 D. (Pleurot.) *multipecta*, C. Proceed. A. N. S. i. 326.  
 D. (Pleurot.) *pyrenoides*, C. Journ. A. N. S. vii. 139.  
 D. (Pleurot.) *tuberculata*, Emmons, Geol. N. C. 265, 147.

## MANGELIA.

- M. *Virginiana*, C. Proceed. A. N. S. 1862, 286.

## TRITONIIDÆ.

BURSA, Bolten. RANELLA, Lam.

Subgenus EUPLEURA, H. and A. Adams.

- Bursa (Ranella) *caudata*, Say, Journ. A. N. S. ii. 236, 1822.  
*Apollon caudata*, Tuomey and Holmes, Plioc. Foss. S. C. 142, 28, 15.

## BUCCINIDÆ.

## TRITIA, Risso.

- T. (Bucc.) *altilis*, C. Tert. Foss. 19, 4, 6.  
 T. (Fusus) *anomala*, H. C. Lea, Trans. Philos. Soc. ix. pl. 37, fig. 97.  
 T. (Bucc.) *arata*, Say, Journ. A. N. S. iv. 127, 7, 4.  
 T. (Bucc.) *bidentata*, Emmons, Geol. N. C. 257, 126.  
 T. (Bucc.) *bilix*, C. Proceed. A. N. S. i. 308.  
 T. (Bucc.) *fossulata*, C. Proceed. A. N. S. i. 308.  
 T. (Nassa) *impressa*, H. C. Lea, Philos. Trans. ix. pl. 37, fig. 100.  
 T. (Bucc.) *harpuloides*, C. Proceed. A. N. S. i. 326.  
 T. (Bucc.) *interrupta*, C. Sillim. Journ. xli. 345, 2, 2.  
 T. *irrorata*, C. *Buccinum obsoletum*, Tuomey and Holmes, (not Say,) Plioc.  
 Foss. S. C. 135, 28, 5.  
 T. (Bucc.) *moniliformis*, Emmons, Geol. N. C. 256, 125.  
 T. (Bucc.) *multilunata*, Emmons, Geol. N. C. 256, 124.  
 T. (Bucc.) *multirugata*, C. Sillim. Journ. xli. 345. Emmons, Geol. N. C. 255,  
 121. Tuomey and Holmes, Plioc. Foss. S. C. 133, 28, 2.  
 T. (Bucc.) *porcina*, Say, Journ. A. N. S. iv. 126. Tuomey and Holmes, Plioc.  
 Foss. S. C. 133, 28, 1. Emmons, Geol. N. C. 256, 122.  
 T. (Bucc.) *prærupta*, C. Proceed. A. N. S. i. 308.  
 T. *scalaris*, C. Proceed. A. N. S. 1862, 286.  
 T. (Bucc.) *sexdentata*, C. Proceed. A. N. S. i. 308.  
 T. (Nassa) *trivittata*? Say, Journ. A. N. S. ii. 231. Tuomey and Holmes, Plioc.  
 Foss. S. C. 135, 28, 4.  
 T. (Bucc.) *Tuomeyi*, H. C. Lea, Philos. Trans. ix. pl. 37, fig. 97.  
 T. (Bucc.) *laqueata*, C. Tert. Foss. 19, 4, 5.

## Subgenus BULLIOPSIS, Conrad.

- T. (Buccinum) *integra*, C. Bullet. Nat. Inst. No. 2, 194, 2, 5.  
*Buc. pusillum*? H. C. Lea, Trans. Philos. Soc. ix. pl. 37, fig. 98.  
 T? (Fusus) *anomala*, Trans. Amer. Philos. Soc. ix. 271, 37, 96, (young shell.)  
 T. *Marylandica*, C. Proceed. A. N. S. 1862, 287.

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T. *ovata*, C. Proceed. A. N. S. 1862, 287.

T. (*Fusus*) *pygmæa*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 270, 37, 95, (young shell.)

T. (*Nassa*) *quadrata*, C. Journ. A. N. S. vi. 226. Proceed. A. N. S. 1862, 287.

#### PURPURIDÆ.

CRONIA? H. and A. Adams.

C. (*Purpura*) *tridentata*, Tuomey and Holmes, Plioc. Foss. S. C. 137, 28, 9.

*Cantharus Cumberlandianus*, Gabb, Journ. A. N. S. (2d series,) iv. 375, 67, 6.

ECPHORA, Conrad.

E. (*Fusus*) *4-costatus*, Say, Journ. A. N. S. iv. 127. Proceed. A. N. S. i. 319.  
Miocene Foss. 84, 48, 2.

#### OLIVIDÆ.

DACTYLUS, Klein.

D? (*Oliva*) *ancillariformis*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 274, 37, 105.

D. (*Oliva*) *canaliculatus*, H. C. Lea, Trans. Philos. Soc. ix. pl. 37, fig. 194.  
Emmons, Geol. N. C. 259.

D. *Carolinensis*, C. Proceed. A. N. S. 1862, 584.

*Oliva litterata*, C. (not Lam.) Sillim. Journ. xli. 345, 2, 1.

*Strephona litterata*, Tuomey and Holmes, Plioc. Foss. S. C. 140, 23, 13.  
Emmons, Geol. N. C. 259, 130.

Subgenus STREPHONA, Browne.

D. *eboreus*, C. Proceed. A. N. S. 1862, 287.

D. (*Oliva*) *idonea*, C. Sillim. Journ. xli. 344. Proceed. A. N. S. 1863.

Subgenus OLIVELLA.

D. (*Oliva*) *duplicatus*, C. Proceed. A. N. S. i. 309. Emmons, Geol. N. C. 131a?

#### VOLUTIDÆ.

VOLUTA, Lam.

V. *solitaria*, C. Journ. A. N. S. vi. 218.

V. *Trenholmii*, Tuomey and Holmes, Pliocene Foss. S. C. 128, 27, 7.

V. *obtusa*, Emmons, Geol. N. C. 263, 141.

Subgenus VOLUTIFUSUS, Conrad.

V. *mutabilis*, C.

*Fasciolaria mutabilis*, C. Journ. A. N. S. vii. 135. Sill. Journ. xli. 346, 2, 7.

V. *mutabilis*, Tuomey and Holmes, Plioc. Foss. S. C. 128, 27, 5. Emmons,  
Geol. N. C. 262.

MEGOPTYGMA, Conrad.

Fusiform; smooth or entire; beak sinuous; plaits very large, the upper one very thick, suboblique.

M. (*Voluta*) *sinuosa*, Gabb, Proceed. A. N. S. Nov. 1861, 367.

PLEIOPTYGMA, Conrad.

Subfusiform; aperture long; columella with very oblique plaits, numerous, alternated in size, or irregular, the largest being the second one from above.

P. (*Mitra*) *Carolinensis*, C. Sillim. Journ. xli. 345. Tuomey and Holmes, Pliocene Foss. S. C. 129, 27, 9. Emmons, Geol. N. C. 260, 132.

PORCELLANA, Adams.

Subgenus VOLUTELLA, Swains.

P. (*Marginella*) *conulus*, H. C. Lea, Trans. Am. Phil. Soc. ix. 273, 37, 102.

P. *distans*, C. n. s.

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- P. olivæformis*, Tuomey and Holmes, Plioc. Foss. S. C. 131, 27, 12.  
*Marginella olivæformis*, Emmons, Geol. N. C. 261, 133.

Subgenus GLABELLA, Swains.

- P.* (Marg.) *constricta*, Emmons, Geol. N. C. 261, 135.  
*P.* (Marg.) *denticulata*, C. Journ. A. N. S. vi. 225, 9, 21.  
*P.* (Marg.) *eburneola*, C. Journ. A. N. S. vii. 141.  
*P.* (Marg.) *exilis*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 274, 37, 103.  
*P.* (Marg.) *inflexa*, Emmons, Geol. N. C. 261, 137.  
*P.* (Marg.) *limatula*, C. Journ. A. N. S. vii. 140. Miocene Foss. pl. 47, f. 11.  
 Tuomey and Holmes, Plioc. Foss. S. C. 130, 27, 10. Emmons, Geol.  
 N. C. 261, 134.  
*P.* (Marg.) *ovata*, Emmons, Geol. N. C. 261, 136.

Subgenus PORCELLANELLA, Conrad.

- P. bella*, C. Proceed. A. N. S. 1863.

ERATO? Risso.

- E. lævis*, Emmons, Geol. N. C. 262, 139.

COLUMBELLINÆ.

AMYCLA, H. and A. Adams.

Subgenus ASTYRIS, H. and A. Adams.

- A. granulifera*, C. Proceed. A. N. S. 1862, 287.  
*A. communis*, C. Proceed. A. N. S. 1862, 287.  
*A. reticulata*, C. " " " 287.

CASSIDIDÆ.

SEMICASSIS, Klein.

- S.* (Cassis) *cæolata*, C. Journ. A. N. S. vi. 218, 9, 14.

SCONSIA, Gray.

- S.* (Cassis) *Hodgii*, C. Sillim. Journ. xli. 346, 2, 10.  
*Galeodia Hodgii*, Tuomey and Holmes, Plioc. Foss. S. C. 138, 28, 10. Em-  
 mons, Geol. N. C. 257, 128.

DOLIIDÆ.

DOLIUM.

- D. galea*? Lam. Tuomey and Holmes, Pliocene Foss. S. C. 139, 28, 11.  
*D?* *octocostatum*, Emmons, Geol. N. C. 258, 129.

SYCOTYPUS, Browne. FICUS, Rousseau.

- S.* (Pyrula) *reticulata*? Lam. Tuomey and Holmes, Plioc. Foss. S. C. 149, 30, 3.

NATICIDÆ.

NATICA.

- N. plicatella*, Conrad. *N. canrena*, C. (not Lam.,) Sill. Journ. xli. 344. Tuomey and Holmes, Pliocene Foss. S. C. 115, 25, 17. Emmons, Geol. N. C. 267, 152.  
*N. Caroliniana*, C. Sill. Journ. xli. 346, 2, 8. Tuomey and Holmes, Pliocene Foss. S. C. 116, 25, 18.  
*N. (Natica) hemicrypta*, Gabb, Journ. A. N. S. (2d series,) iv. 375, 67, 5.  
*N. sphærulea* and *crassilabrum*, (immature or doubtful sp.,) H. C. Lea, Trans. Amer. Philos. Soc. ix. 254, 36, 52.

NEVERITA, Risso.

- N. (Natica) duplicata*? Say, Tuomey and Holmes, Pliocene Foss. S. C. 114, 25, 16. Emmons, Geol. N. C. 266, 150.

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*N. percallosa*, C. Sill. Journ. xli. 348. Emmons, Geol. N. C. 267, 151.

Subgenus *LUNATIA*, Gray.

*N. catenoides*, Wood, British Crag. Moll. 141, 16, 10.

*N. (Natica) heros*, Conrad, (not Say,) Tuomey and Holmes, Pliocene Foss. S. C. 114, 25, 15. Emmons, Geol. N. C. 267, 149.

*N. (Natica) interna*, Say, Journ. A. N. S. iv. 125, 7, 2.

*N. (Natica) perspectiva*, Rogers, Trans. Philos. Soc. vi. 36, 3.

*SIGARETUS*, Lam.

Subgenus *NATICINA*, Gray.

*S. (Natica) fragilis*, C. Journ. A. N. S. vi. 222, 9, 3. Emmons, Geol. N. C. 267, 153.

*N. aperta*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 36, f. 51.

*SCALARIDÆ*.

*SCALA*, Klein.

*S. aretata*, C. n. s.

*S. (Scalaria) aciculata*, H. C. Lea, Trans. Philos. Soc. pl. 36, f. 65.

*S. (Scalaria) clathrus?* Lam. Tuomey and Holmes, Pliocene Foss. S. C. 124, 26, 15.

*S. (Scalaria) curta*, Emmons, Geol. N. C. 271, 165.

*S. distans*, C. n. s.

*S. (Scalaria) micropleura*, H. C. Lea, Trans. Amer. Philos. Soc. pl. 36, f. 67.

*S. (Scalaria) microstoma*, H. C. Lea, ib. f. 68.

*S. (Scalaria) procera*, C. Proceed. A. N. S. i. 326.

*S. (Scalaria) multistriata?* Say. Tuomey and Holmes, Pliocene Foss. S. C. 120, 26, 14. Emmons, Geol. N. C. 271, 164.

Subgenus *STHENORYTIS*, Conrad.

Ovate, thick; whorls partially united; ribs very thick, distant, recurved; large whorl without a plate at base; not umbilicated.

*S. (Scalaria) expansa*, C. Bullet. Nat. Inst. No. 2, 194, 2, 3.

*S. (Scalaria) pachypleura*, C. Journ. A. N. S. viii. 186.

*S. cornigera?* H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 36, f. 66.

*PYRAMIDELLIDÆ*.

*TEREBRA*, Brug.

Subgenus *Acus*, Humph.

*T. (Cerithium) Carolinensis*, C. Sill. Journ. xli. 345.

*T. (Cerith.) clavulus*, H. C. Lea, Trans. Amer. Phil. Soc. ix. pl. 37, f. 89.

*T. curvilirata*, C. Proceed. A. N. S. i. 327.

*T. indenta*, C.

*T. (Cerith.) dislocata*, C. (not Say,) Sill. Journ. xli. 343.

*T. neglecta*, Emmons, Geol. N. C. 258.

*T. simplex*, C. Journ. A. N. S. vii. 226, 9, 22.

*T. subilirata*, C. n. s.

*T. unilineata*, C. Sill. Journ. xli. 345, 2, 4. Tuomey and Holmes, Plioc. Foss. S. C. 258, 129. Emmons, Geol. N. C. 258, 129.

*OBELISCUS*, Humph.

*O. (Pyramidella) arenosa*, C. Proceed. A. N. S. i. 309. Emmons, Geol. N. C. 268, 154.

*P. suturalis*, H. C. Lea, Philos. Trans. ix. pl. 36, f. 63, (young shell.)

*O. (Pyram.) reticulata*, Emmons, Geol. N. C. 268, 155.

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## ODOSTOMIA, Fleming.

- O? (*Actæon*) *glans*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 36, f. 58.  
 O? (*Cerithium*) *curtum*, H. C. Lea, ib. 268, 17, 90.  
 O. (*Cerithium*) *dedælium*, H. C. Lea, ib. 269, 37, 91.  
 O. (*Pasithea*) *granulata*, H. C. Lea, 268, 36, 54.  
 O? (*Pasithea*) *lævigata*, H. C. Lea, ib. 35, 47.  
 O? (*Actæon*) *nitens*, H. C. Lea, ib. 36, 60.  
 O. (*Pasithea*) *ovulum*, H. C. Lea, 269, 35, 48, (young shell.)  
 O. (*Actæon*) *turbinata*, H. C. Lea, ib. 36, 56.  
 O? (*Pasithea*) *turbinopsis*, H. C. Lea, ib. 253, 35, 50.  
 O? (*Actæon*) *sculpta*, H. C. Lea, ib. 36, 59.

## TURBONILLA, Risso.

- T. (*Turritella*) *perlaqueata*, C. Journ. A. N. S. vii. 189.  
 T. (*Chemnitzia*) *reticulata*, Emmons, Geol. N. C. 269, 156a.

## AURICULINA, Gray.

- A. (*Pasithea*) *eburnea*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 251, 35, 46.  
 A. (*Pasithea*) *exarata*, H. C. Lea, ib. 35, 44.  
 A. (*Odostomea*) *limnæa*, C. Proceed. A. N. S. i. 20.  
 A. (*Pasithea*) *ornata*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 253.  
 A. (*Pasithea*) *subula*, H. C. Lea, Philos. Soc. ix. 251, 35, 45.

## EULIMIDÆ.

## NISO, Risso.

- N. (*Bonellia*) *lineata*, C. Journ. A. N. S. viii. 188.  
*Actæon simplex*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 36, f. 62.

## EULIMA, Risso.

- E. *eborea*, C. Proceed. A. N. S. iii. 26, f. 21.  
*Pasithea lævigata*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 252, 35, 47.  
 Emmons, Geol. N. C. 268, 157.  
 E. *migrans*, C. Proceed. A. N. S. iii. 26, f. 22.  
*E. subulata*, Emmons, Geol. N. C. 268, 158.

## CERITHIOPSIDÆ.

## CERITHIOPSIS.

- C. (*Cerithium*) *annulatum*, Emmons, Geol. N. C. 269, 161.  
 C. (*Cerithium*) *clavulus*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 268, 37, 89.  
 C. (*Chemnitzia*) *Emmonsii*, C. Emmons, Geol. N. C. 268, 160.

## SOLARIDÆ.

## ARCHITECTONICA, Bolten.

## Subgenus PHILLIPPIA, Gray.

- A. (*Solarium*) *trilineata*, C. Journ. A. N. S. viii. 31.  
 A. (*Solarium*) *nupera*, C. Journ. A. N. S. vii. 141.  
 A. *perspectiva*? Lin., Tuomey and Holmes, Plioc. Foss. S. C. 120, 26, 6.

## CONIDÆ.

## CONUS, Lin.

- C. *adversarius*, C. Sill. Journ. xli. 345, 2. 3. Tuomey and Holmes, Plioc. Foss. S. C. 131, 27, 14. Emmons, Geol. N. C. 263, 142.  
 C. *diluvianus*, Green, Trans. Albany Institute (1830), i. 124, 3, 2.  
 C. *Marylandicus*, Green, Trans. Albany Institute (1830), 124.

## CELATOCONUS, Conrad.

- C. (*Buc.*) *protractus*, C. Proceed. A. N. S. i. 308.

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## CYPRÆIDÆ.

## CYPRÆA, Lin.

## Subgenus ARICIA, Gray.

*C. Carolinensis*, C. Sill, Journ. xli. 346, 2, 6. Tuomey and Holmes, Pliocene Foss. S. C. 126, 27, 1. Emmons, Geol. N. C. 260, 131.

*C. annulifera*, C. n. s.

*C. pediculus*? Emmons, Geol. N. C. 260.

## CANCELLARIDÆ.

## CANCELLARIA, Lam.

*C. alternata*, C. Journ. A. N. S. vii. 155.

*C. Carolinensis*, C.

*C. reticulata*, Emmons (not Lam.), Geol. N. C. 255, 119.

*C. depressa*, Tuomey and Holmes, Pliocene Foss. S. C. 142, 28, 16.

*C. venusta*, Tuomey and Holmes, Pliocene Foss. S. C. 144, 28, 18.

*C. engonata*, C. Journ. A. N. S. viii. 188.

*C. lunata*, Journ. A. N. S. vi. 222, 9, 4.

*C. perspectiva*, C. Journ. A. N. S. vii. 136.

*C. plagiostoma*, C. ib. vii. 136.

*C. scalarina*, C. n. s.

## Subgenus TRIGONOSTOMA, Blainville.

*F. (Cancellaria) biplicifera*, C. Journ. A. N. S. viii. 187.

## CERITHIIDÆ.

## CERITHIUM.

## Subgenus SICHA, Hinds.

*C. moniliferum*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 37, f. 92. Emmons, Geol. N. C. 269, 159.

## TRIFORIS.

*T. (Cerith.) bicostatus*, Emmons, Geol. N. C. 270, 162.

## MELANIDÆ.

## LITTORINA, Ferrusac.

*L. Carolinensis*, C.

*L. irrorata*, Tuomey and Holmes (not Say), Pliocene Foss. S. C. 26, 5.

*L. lineata*, Emmons, Geol. N. C. 271, 170.

## PALUDINIDÆ.

## VIVIPARA, Lam.

*V. (Turbo) glabra*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 37, f. 87.

*V. subglobosa*, Emmons, Geol. N. C. 273, 186.

## TURRITELLIDÆ.

## TURRITELLA, Lam.

*T. æquistriata*, C. Proceed., 1862, 584.

*T. alticostata*, C. Journ. A. N. S. vii. 144.

*T. (Terebellum) Burdenii*, Tuomey and Holmes, Plioc. Foss. S. C. 122, 26, 11.

*T. (Terebellum) constrictum*, Emmons, Geol. N. C. 270.

*T. Cumberlandia*, C. Proceed. A. N. S. 1862, 584.

*T. exaltata*, C. ib. 1, 32. Tuomey and Holmes, 121, 26, 8.

*T. fluxionalis*, Rogers, Trans. Philos. Soc. vi. 371.

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- T. (*Terebellum*) *striatum*, Tuomey and Holmes, *Plioc. Foss. S. C.* 120, 26, 7.  
 T. *indenta*, C. Journ. Proceed. A. N. S. viii. 188.  
 T. *octonaria*, C. *ib.* vii. 144.  
 T. *plebeia*, Say, *ib.* iv. 125 ; vii. 125, 7, 1.  
 T. *quadristriata*, Rogers, *Trans. Amer. Phil. Soc.* v. 331 ; and vi. 377, 24, 2.  
 T. *secta*, C. Proceed. A. N. S. vii. 268.  
 T. *terstriata*, Rogers, *Trans. Amer. Philos. Soc.* v. 331 ; and vi. 377, 24, 1.  
 T. *terebriformis*, C. n. s.  
 T. *variabilis*, C. Journ. A. N. S. vi. 221.

## VERMETIDÆ.

## VERMETUS, Adans.

- V. *Carolinensis*, C. Proceed. A. N. S. 1862.  
 V. *lumbricalis*, C. (not Lam.) *Sillim. Journ.* xxviii. 109.  
 V. (*Serpula*) *convolutus*, H. C. Lea, *Trans. Amer. Philos. Soc.* ix. pl. 34, f. 1.

## ANGUINELLA, Conrad.

- A. *Virginiana*, C. *Miocene Foss.* 77, 44, 4.  
*Vermetus Virginicus*, D'Orbig. *Prodrom.* iii. 48.

## PETALOCONCHUS, H. C. Lea.

- P. *sculpturatus*, H. C. Lea, *Trans. Amer. Philos. Soc.* ix. pl. 34, f. 3. Tuomey and Holmes, *Plioc. Foss. S. C.* 123, 26, 13. Emmons, *Geol. N. C.* 271, 169.  
*Serpula anguina*, H. C. Lea (young shell), *Trans. Amer. Philos. Soc.* ix. pl. 34, f. 2.

## CECIDÆ.

## CÆCUM, Gray.

- C. *annulatum*, Emmons, *Geol. N. C.* 274, 190.

## CALYPTRIDÆ.

## CRUCIBULUM, Schum.

- C. (*Dispotæa*) *constrictum*, C. *Bullet. Nat. Inst.* 194, 1, 2. *Miocene Foss.* 80, 45, 4.  
 C. (*Dispotæa*) *costatum*, Say, *Sillim. Journ.* 11, 40.  
 C. (*Dispotæa*) *costatum*, Say, *Journ. A. N. S.* iv. 132. C. *Miocene Foss.* 79, 45, 2. Tuomey and Holmes, *Plioc. Foss. S. C.* 107, 25, 4.  
*Calyptrea pileolus*, H. C. Lea, *Transactions American Philos. Soc.* ix. 248, f. 35, 38.  
 C. (*Dispotæa*) *dumosum*, C. *Sillim. Journ.* xli. 346, 2, 9. *Miocene Foss.* 80. Tuomey and Holmes, *Plioc. Foss. S. C.* 109, 25, 6.  
 C. (*Dispotæa*) *grande*, Say, *Journal Acad. Nat. Sci.* iv. 130, 7, 6. C. *Miocene Foss.* 79.  
 C. (*Dispotæa*) *multilineatum*, C. *Sill. Journ.* xli. 346, 2, 8. *Miocene Foss.* 80. Tuomey and Holmes, *Plioc. Foss. S. C.* 107, 25, 7.  
 C. (*Dispotæa*) *ramosum*, C. *Journ. A. N. S.* viii. 187. *Miocene Foss.* 79, 45, 3. Tuomey and Holmes, *Plioc. Foss. S. C.* 108, 25, 5. Emmons, *Geol. N. C.* 275, 191.

## TROCHITA.

- T. (*Infundibulum*) *centralis*, C. *Sill. Journ.* xli. 348. *Miocene Foss.* 80, 45, 5. Tuomey and Holmes, *Plioc. Foss. S. C.* 109, 25, 8. Emmons, *Geol. N. C.* 276, 193.  
 T. (*Infundibulum*) *concentrica*, H. C. Lea, *Trans. Amer. Philos. Soc.* ix. pl. 35, f. 39.

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- T. (*Infundibulum*) *perarmata*, C. Proceed. A. N. S. i. 31. Miocene Foss. 80, 45, 4.

## CRYPTA, Humphreys.

- C. *convexa*? Say, Journ. A. N. S. ii. 227.  
 C. (*Crepidula*) *costata*, Morton, Journ. A. N. S. vi. 115, 7, 2, 3. Tuomey and Holmes, Plioc. Foss. S. C. 112, 25, 11.  
 C. (*Crepidula*) *cornucopia*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 35, f. 41.  
 C. (*Crepidula*) *cymbæformis*, C. Proceed. A. N. S. ii. 173. Miocene Foss. pl. 45, f. 7.  
 C. (*Crepidula*) *densata*, C. Proceed. A. N. S. i. 311. Miocene Foss. pl. 45, f. 9.  
 C. (*Crepidula*) *fornicata*? Say, Journ. A. N. S. ii. 225. C. Miocene Foss. pl. 45, f. 10. Tuomey and Holmes, Plioc. Foss. S. C. 110, 25, 9. Emmons, Geol. N. C. 276, 194.  
 C. (*Crepidula*) *glauca*? Say, Journ. A. N. S. ii. 226.  
 C. (*Crepidula*) *lamina*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 35, f. 42.  
 C. (*Crepidula*) *plana*? Say, Journ. A. N. S. ii. 226. Tuomey and Holmes, Plioc. Foss. S. C. iii. 25, 12. Emmons, Geol. N. C. 276.  
 C. (*Crepidula*) *ponderosa*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 249, 35, 40.  
 C. (*Crepidula*) *spinosa*, C. Proceed. A. N. S. i, 307. Miocene Foss. pl. 45, f. 8.

## COCHLOLEPAS, Klein.

- C. (*Hipponyx*) *Bullii*, Tuomey and Holmes, Plioc. Foss. S. C. 112, 25, 13.

## TURBINIDÆ.

## MONILIA, Swains.

- M. (*Monodonta*) *exoluta*, C. Proceed. A. N. S. i. 309.

Subgenus *LEIOTROCHUS*, Conrad.

- Polished, entire, without umbilicus; base of columella with two denticles.  
 M. *distans*, C. Proceed. A. N. S. 1862, 288.  
 M. (*Trochus*) *eborea*, Wagner, Journ. A. N. S. viii, 52, 1, 5.  
 M? (*Turbo*) *caperatus*, C. Journ. A. N. S. vii. 140.  
 M. (*Monodonta*) *Kiawahensis*, Tuomey and Holmes, Plioc. Foss. S. C. 116, 26, 1.

## ZIZYPHINUS, Gray.

- Z. (*Trochus*) *aratus*, H. C. Lea, Philos. Trans. ix. pl. 37, fig. 85.  
 Z. (*Trochus*) *armillatus*, Tuomey and Holmes, Pliocene Foss. S. C. 118, 26, 3.  
 Z. (*Trochus*) *armillas*, H. C. Lea, Philos. Trans. ix. pl. 37, f. 81.  
 Z. (*Trochus*) *bellus*, C. Journ. A. N. S. vii. 137.  
 Z. (*Trochus*) *conus*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 37, f. 82.  
 Z. (*Trochus*) *gemma*, Tuomey and Holmes, Plioc. Foss. S. C. 118, 26, 4.  
 Z. (*Trochus*) *humilis*, C. Journ. A. N. S. vi. 219, 9, 5.  
 Z. (*Trochus*) *labrosus*, C. ib. vii. 138.  
 Z. (*Trochus*) *lens*, H. C. Lea, Trans. Amer. Philos. Soc. pl. 37, f. 83.  
 Z. (*Trochus*) *Mitchelli*, C. Journ. A. N. S. vii. 137.  
 Z. (*Trochus*) *peralveatus*, C. Journ. A. N. S. viii. 187. Proceed. A. N. S. iii. 21, 1, 25.  
 Z. (*Trochus*) *philanthropus*, C. ib. 137. Tuomey and Holmes, Geol. S. C. 117, 26, 2. Emmons, Geol. N. C. 272, 167.  
 Z. (*Trochus*) *Ruffinii*, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 37, 86.  
 Z. (*Trochus*) *reclusus*, C. Journ. A. N. S. vi. 219, 9, 6.  
 Z. (*Trochus*) *torquatus*, H. C. Lea, Trans. Amer. Philos. Soc. pl. 37, f. 84.  
 Z. (*Trochus*) *arenosus*, C. Emmons, Geol. N. C. 272, 168.

## CEMORIA, Leach.

- C. *oblonga*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 247, 35, 37. 1862.]

## PATELLA.

P? acinaces, H. C. Lea, Trans. Amer. Philos. Soc. ix. 247, 35, 36.

## CHITON.

C. transenna, H. C. Lea, Trans. Amer. Philos. Soc. ix. 246, 35, 35.

## UMBONIIDÆ.

## UMBONIUM, Link. ROTELLA, Lam.

U? (Rotella) subconica, H. C. Lea, Trans. ix. 263, 36, 77.

carinata, ib. 78.

lenticularis, ib. 79.

umbilicata, ib. 80.

## CARINORBIS, Conrad.

C. (Delphinula) arenosus, C. Proceed. A. N. S. iii. 20.

C. (Delphinula) costulatus, H. C. Lea, Trans. Amer. Philos. Soc. ix. 260, 36, 69.

C. distans, C. Proceed. A. N. S. 1862, 288.

C. (Delphinula) lyra, C. Journ. A. N. S. vii. 141. Proceed. iii. 20, 1, 27.

*Delp. globulus*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 262, 36, 74.

C? ———, Emmons, Geol. N. C. 258, 181.

C. (Delphinula) quadricostata, Emmons, Geol. N. C. 269, 180.

## FISSURELLIDÆ.

## FISSURELLA, Lam.

F. alticosta, C. Journ. A. N. S. vii. 142.

F. catilliformis, Rogers, Trans. Amer. Philos. Soc. v. 332; and vi. 377, 26, 1.

F. Griscomi, C. Miocene Foss. 78, 44, 8.

F. Marylandica, C. Proceed. A. N. S. i. 31. Miocene Foss. 79, 45, 1.

F. nassula, C. Miocene Foss. 78, 44, 6.

F. redimicula, Say, Journ. A. N. S. iv. 8, 1. Miocene Foss. 78. Tuomey and Holmes, Plioc. Foss. 113, 25, 14.

## DENTALIDÆ.

## DENTALIUM.

D. attenuatum, Say, Journ. A. N. S. iv. 154, 8, 3. Tuomey and Holmes, Pliocene Foss. S. C. 105, 25, 1.

D. Carolinense, C. Proceed. A. N. S. 1862.

D. duodecenaria, C. Emmons, Geol. N. C. 274, 188.

D. thallus, C. Journ. A. N. S. vii. 142. Tuomey and Holmes, Pliocene Foss. 106, 25, 3. Emmons, Geol. N. C. 274, 189.

D. pliocenum, Tuomey and Holmes, Pliocene Foss. 105, 25, 2.

## TORNATELLIDÆ.

## ACTÆON, Montf.

A. angulatus, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 37, f. 57.

A. glans, H. C. Lea, ib. 58.

A. globosus, H. C. Lea, ib. pl. 37, f. 55.

A. melanoides, C. Journ. A. N. S. vi. 227.

A. novellus, C. ib. vii. 142.

A. ovoides, C. ib. 226.

A. sculptus, H. C. Lea, Trans. Amer. Philos. Soc. ix. pl. 37, f. 59.

A. ? turbinatus, H. C. Lea, ib. f. 56.

## CYLICHNIDÆ.

## VOLVULA, Adams.

V. (Orula) iota, C. Proceed. A. N. S. i. 309.

## BULLIDÆ.

## BULLA.

- B. cylindrus*, H. C. Lea, Trans. Amer. Philos. Soc. pl. 35, f. 43.  
*B. subspissa*, C. Proceed. A. N. S. iii. 20.

## TORNATINA, H. and A. Adams.

- T. cylindrica*, Emmons, Geol. N. C. 272, 182.

## AURICULIDÆ.

## MELAMPUS, Montf.

## Subgenus ENSIPHORUS, Conrad.

- M. longidens*, C. Proceed. A. N. S. 1862, 584.

## CONCHIFERA.

## PHOLADIDÆ.

## PHOLAS, Lin.

- P. arcuata*, C. Proceed. Nat. Inst. 187 (1841). *P. acuminata*, C. Miocene Foss. 77, 44, 2. *P. costata*, Tuomey and Holmes, (not Lam.,) Plioc. Foss. S. C. 102, 24, 4.  
*P. producta*, C. *P. oblongata*, Tuomey and Holmes, (not Say,) Plioc. Foss. S. C. 103, 24, 5.  
*P?* *rhomboidea*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 235, 34, 7.

## TEREDO.

- T. calamus*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 234, 34, 4.  
*T. fistula*, ib. 5.

## GASTROCHÆNA, Lam.

- G. ligula*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 234, 34, 6.

## SOLENIIDÆ.

## ENSIS, Shum.

- E. (Solen) ensiformis*, C. Proceed. A. N. S. i. 326.  
*E. (Solen) directus*, C. ib. 325.  
*S. ensis*, Tuomey and Holmes, (not Lin.,) Plioc. Foss. 101, 24, 3.  
*E. (Solen) magnodentatus*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 236, 34, 8.

## SILICUARIA, Schum.

- S. equalis*, C. *Solecirtus subteres*. Emmons, (not Con.,) Geol. N. C. 299, 228a.  
*S. Carolinensis*, C. *Cultellus Caribæus*, C. (not Lam.,) Miocene Foss. 75, 43, 1.  
*Solecirtus Caribæus*, Tuomey and Holmes, (not Lam.,) Plioc. Foss. S. C. 99, 23, 12, 13. Emmons, Geol. N. C. 299, 228a.

## SAXICAVIDÆ.

## SAXICAVA, Fleurian de Bellevue.

- S. bilineata*, C. Miocene Foss. 18, 10, 4.  
*S. (Hidella) lancea*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 242, 24.  
*S. pectorosa*, C. Sillim. Journ. xxiii. 130. Miocene Foss. 18, 10, 3.  
*S. rugosa?* Lam., Bullet. Nat. Inst. 187.

## GLYCIMERIS, Klein.

- G. (Panop.) Americana*, C. Miocene Foss. 4, 2.  
*G. (Panop.) dubia*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 236, 34, 9.  
*G. (Panop.) Goldfussii*, Wagner, Journ. A. N. S. viii. 52, 8, 3.

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*G. (Panop.) porrecta?* C.

*G. (Panop.) porrecta*, C. Miocene Foss. 71, 41, 2, 1842.

*G. (Panop.) reflexa*, Say, Journ. A. N. S. iv. 153, 13, 4. Miocene Foss. 5, 3, 4.  
Tuomey and Holmes, Plioc. Foss. S. C. 100, 24, 1. Emmons, Geol. N. C. 300, 229.

## PARAMYA, Conrad.

*P. (Myalina) subovata*, C. Miocene Foss. 65, 36, 4.

## MYIDÆ.

## MYA, Lin.

*M. corpulenta*, C. Miocene Foss. 68, 39, 1.

*M. producta*, C. ib. 1, 1, 1.

*M. reflexa*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 234, 34, 10.

## CORBULIDÆ.

## CORBULA, Brug.

*C. cuneata*, Say, Journ. A. N. S. iv. 152, 13, 3. C. Miocene Foss. 5, 3, 2.  
Tuomey and Holmes, Plioc. Foss. S. C. 75, 20, 11.

*C. elevata*, C. Miocene Foss. 7, 4, 3.

*C. idonea*, C. Sillim. Journ. xxiii. 341. Miocene Foss. 6, 10, 6.

*C. inæqualis*, Say, Journ. A. N. S. iv. 3, 2. C. ib. 6, 3, 3. Tuomey and Holmes,  
Plioc. Foss. S. C. 76, 20, 12.

## ANATINIDÆ.

## PERIPLOMA, Schum.

*P. (Anatina) antiqua*, C. Journ. A. N. S. vii. 130. Miocene Foss. 16, 8, 3.

*P. alta*, C. Proceed. 1862, 585.

## THRACIA.

*T? transversa*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 237, 34, 11.

## PHOLADOMYA, Sowerby.

## Subgenus MARGARITARIA, Conrad.

*P. abrupta*, C. Foss. Shells of Tert. Form. 26, 12. Miocene Foss. 3, 1, 4. Tuomey and Holmes, Plioc. Foss. S. C. 101, 22, 2. Emmons, Geol. N. C. 300, 231.

## PANDORA, Soland.

*P. crassidens*, C. Miocene Foss. 2, 1, 2.

## PANDORELLA, Conrad.

Elongated; a triangular fosset under the beak; no cardinal teeth.

*P. (Pandora) arenosa*, C. Journ. A. N. S. vi. 131.

## MACTRIDÆ.

## MACTRA, Lin. SCISSODESMA, Gray.

*M. (Mactra) delumbis*, C. Foss. Shells of Tert. Form. 26, 11. Miocene Foss. 27, 15, 1.

*M. ponderosa*, C. Journ. A. N. S. vi. 228, 10, 5. Miocene Foss. 25, 14, 1.

*M. subponderosa*, D'Orbig. Prodrom. iii. 100.

## HEMIMACTRA, Swains. SPIZULA, Gray.

*H. (Mactra) congesta*, C. Sill. Journ. xxiii. 340. C. Miocene Foss. 27, 15, 2.  
Tuomey and Holmes, Plioc. Foss. 98, 23, 10. Emmons, Geol. N. C. 298.

*H. (Mactra) modicella*, C. Sill. Journ. xxiii. 340. Miocene Shells, 25, 13, 3.

*H. (Mactra) medialis*, C. n. s.

*H. (Mactra) similis?* Say, Journ. A. N. S. ii. 309. Emmons, Geol. N. C. 298.  
Tuomey and Holmes, Plioc. Foss. S. C. 97, 23, 8.

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## MULINIA, Gray.

- M. (*Mactra*) *crassidens*, C. Sill. Journ. xli. 346, 2, 11. C. Mioc. Foss. 69, 39, 5.  
 M. (*Mactra*) *triquetra*, C. Sillim. Journ. xli. 346, 2, 11. Miocene Foss. 69, 39, 3.

## RANGIA, Desmoulins.

## Subgenus PERISSODOX, Conrad.

- R. (*Mactra*) *clathrodonta*, C. Sillim. Journ. xxiii. 340.  
*Gnathodon Grayi*, Miocene Foss. 23, 13, 1. Tuomey and Holmes, Plioc. Foss. S. C. 99, 23, 2. Emmons, Geol. N. C. 298, 226a.  
*G. minor*, Tuomey and Holmes, (not Conrad,) Plioc. Foss. S. C. 99, 23, 2.  
*Gnathodon cuneatus*, Tuomey and Holmes, Post Pliocene Foss. S. C. (pars.)  
 R. (*Gnath.*) *minor*, C. Sill. Journ. xli. 347, 2, 14. Miocene Foss. 69, 39, 6.

## LUTRARIINÆ.

## STANDELLA, Gray.

- S. (*Mactra*) *congesta*, C. Miocene Foss. 27, 15, 2. Tuomey and Holmes, Plioc. Foss. S. C. 98, 23, 10. Emmons, Geol. N. C. 298.  
 S. (*Mactra*) *lateralis*, Say, Journ. A. N. S. ii. 309. Tuomey and Holmes, Plioc. Foss. S. C. 97, 23, 9. Emmons, Geol. N. C. 298, 227.  
 S. (*Mactra*) *fragilis*? Chemnitz.  
*Mactra oblongata*, Say, Tuomey and Holmes, Plioc. Foss. S. C. 96, 23, 7. Emmons, Geol. N. C. 298.  
 S. (*Mactra*) *subparilis*, Sill. Journ. xli. pl. 2, f. 12. Miocene Foss. 69, 39, 4.

## TELLINIDÆ.

## PSAMMOCOLA, Blain.

- P? *lucinoides*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 234, 34, 16.  
 P? *pleiocena*, Tuomey and Holmes, Plioc. Foss. S. C. 91, 22, 8.

## TELLINA, Lin.

## Subgenus ANGULUS, Mühl.

- T. *polita*? Say, Journ. A. N. S. ii. 276, 65, 2. Tuomey and Holmes, Plioc. Foss. S. C. 91, 22, 6.  
 T. *declivis*, Say, Journ. A. N. S. vii. 131. C. Miocene Foss. 35, 19, 1.

## Subgenus PERONÆDERMA, Mörch.

- T. *alternata*? Say, Journ. A. N. S. ii. 275. Tuomey and Holmes, Plioc. Foss. S. C. 91, 22, 6.  
 T. *arctata*, C. Miocene Foss. 72, 41, 5.  
 T. *egena*, C. ib. 35, 19, 4.  
 T. *producta*, C. ib. 36, 19, 5.  
 T. *lenis*, C. Miocene Foss. 72, 41, 9.  
 T. *lusoria*? Say, Journ. A. N. S. v. 316. C. Miocene Foss. 35, 19, 3. Tuomey and Holmes, Plioc. Foss. S. C. 89, 22, 5. Emmons, Geol. N. C. 297, 225a.

## METIS, H. and A. Adams.

- M. (*Tellina*) *biplicata*, Miocene Shells, 36, 19, 4. Tuomey and Holmes, Plioc. Foss. S. C. 88, 22, 3. Emmons, Geol. N. C. 296, 225.

## STRIGILLA, Turton.

- S. *Carolinensis*, C.  
*Tellina fluxuosa*, Tuomey and Holmes, (not Say,) Plioc. Foss. S. C. 90, 22, 7.

## DONACINÆ.

## DONAX, Lin.

- D. *variabilis*? Tuomey and Holmes, Plioc. Foss. S. C. 95, 23, 6.  
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D? ———, Emmons, Geol. N. C. 298, 226.

### SCROBICULARIINÆ.

ABRA, Leach.

- A. (*Amphidesma*) *carinata*, C. Journ. A. N. S. vi. 229, 9, 23. Miocene Foss. 37, 19, 7. Tuomey and Holmes, Plioc. Foss. S. C. 93, 23, 2.  
 A. (*Amphidesma*) *equalis*, Say, Amer. Coach. pl. 28. C. Miocene Foss. 76, 43, 9. Tuomey and Holmes, Plioc. Foss. S. C. 93, 23, 3.  
 A. (*Amphidesma*) *æquata*, C. Miocene Foss. 65, 36, 5. Tuomey and Holmes, Plioc. Foss. S. C. 95, 23, 5.  
 A. (*Amphidesma*) *protecta*, C. Sillim. Journ. xli. 347. C. Miocene Foss. 73, 41, 7.  
 A. (*Amphidesma*) *subreflexa*, C. Journ. A. N. S. vii. 133. Miocene Foss. 37, 19, 6.  
 A. (*Amphidesma*) *subovata*, Say, Journ. A. N. S. iv. 152, 10, 6. C. Miocene Foss. 36.  
 A. (*Amphidesma*) *nuculoides*, C. Sill. xli. 347. Miocene Foss. 73, 41, 6.

### PAPHIINÆ.

MESODESMA, Desh.

- M. (*Mactra*) *confraga*, C. Sillim. Journ. xxiii. 340. Miocene Foss. 26, 14, 2.  
 M. (*Mactra*) *incrassata*, C. Miocene Foss. 24, 13, 2.

SEMELE, Schum. AMPHIDESMA, Lam.

- S. (*Amphidesma*) *orbiculata*? Say, Tuomey and Holmes, Plioc. Foss. S. C. 94, 23, 4.

FABELLA, Conrad.

- F. (*Amphidesma*) *constricta*, C. Sillim. Journ. xli. 347. C. Miocene Foss. 76, 43, 10. Proceed. A. N. S. 1862, 586.

CUMINGIA, Sowerby.

- C. (*Mactra*) *tellinoides*, C. Journ. A. N. S. vi. 258, 11, 2-3.  
*Anatina tellinoides*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 237, 34, 12.  
*Lavignon tellinoides*, Tuomey and Holmes, Plioc. Foss. S. C. 92, 23, 1.

### VENERIDÆ.

MERCENARIA, Schum.

- M. (*Venus*) *cancellata*, Gabb, Journ. A. N. S. iv. 376, 67, 25, (1860.)  
 M. (*Venus*) *capax*, C. Miocene Foss. 68, 39, 4.  
 M. *mercenaria*? Lin. C. Sillim. Journ. xli. 344. Tuomey and Holmes, Plioc. Foss. S. C. 81, 21, 6.  
 M. (*Venus*) *permagna*, C. Foss. of Tert. Form. 9. Proceed. A. N. S. i. 324. Tuomey and Holmes, Plioc. Foss. S. C. 86, 22, 2.  
 M. (*Venus*) *Rileyi*, C. Miocene Foss. 9, 6, 1. Tuomey and Holmes, Plioc. Foss. S. C. 78, 21, 8. Emmons, Geol. N. C. 292.  
 M. (*Venus*) *submortoni*, D'Orbigny, Prodrom. iii. 108.  
*M. (Venus) mortoni*, C. Journ. A. N. S. vii. 251. Miocene Foss. 8, 5, 1.  
 M. (*Venus*) *tetrica*, C. Miocene Foss. 7, 4, 1.  
 M. (*Cyprina*) *tridacnoides*, Lam. An. sans Vert. v. 565. C. Miocene Foss. 10, 7, 2. Tuomey and Holmes, Plioc. Foss. S. C. 85, 22, 1. Emmons, Geol. N. C. 292.  
*V. deformis*, Say, Journ. A. N. S. iv. 148, 12, 2.

VENUS, Lin.

- V? *ascia*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 242, 34, 23.  
 V. *Ducatellii*, C. Miocene Foss. 8, 4, 2.

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## CIRCUMPHALUS, Klein.

## Subgenus LIROPHORA, Conrad.

- C. (Venus) *athleta*, C. Proceed. 1862, 586.  
*V. paphia*, Lam. (not Lin.)  
*V. alveata*, Say, (not Conrad,) Amer. Conch. pl. 63.  
*V. latilirata*, Tuomey and Holmes, (not Conrad,) Plioc. Foss. S. C. 85, 21,  
 12. Emmons, Geol. N. C. 293, 219.  
 C. (Venus) *alveatus*, C. Miocene Foss. 9, 5, 2.  
 C. (Venus) *latiliratus*, ib. 68, 38, 3.

## DIONE, Gray.

- D. (Cytherea) *albaria*, Say, American Conch. pl. 59. Miocene Foss. 13, 8, 2.  
 D. *Marylandica*, C.  
 D. (Cytherea) *Carolinensis*, C. Sillim. Journ. xli. 343.  
 D. *densata*, Proceed. A. N. S. 1862, 586.  
 D. (Cytherea) *elevata*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 241, 34, 21.  
 D. *idonea*, C. *albaria*, C. (not Say,) Miocene Foss. pl. 8, f. 2.  
 D. (Cytherea) *Marylandica*, C. Sillim. Journ. xxiii. 343. Miocene Foss. 15, 9, 1.  
 D. (Cytherea) *obovata*, C. Journ. A. N. S. vi. 132. Miocene Foss. 14, 8, 4.  
 D. (Cytherea) *reposita*, C. Journ. A. N. S. vii. 132. Miocene Foss. 15, 9, 2.  
 Emmons, 5, 2.  
 D. (Cytherea) *Sayana*, C. Miocene Foss. 13, 7, 3. Tuomey and Holmes, Plioc.  
 Foss. S. C. 83, 21, 9. Emmons, Geol. N. C. 294, 1.  
*C. convexa*, C. (not Say,) Miocene Foss. 13, 7, 3.  
 D. (Cytherea) *spherica*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 241, 34, 22.  
 D. (Cytherea) *staminea*, C. Miocene Foss. pl. 21, f. 1.  
 D. (Cytherea) *subnasuta*, C. Miocene Foss. 72, 41, 3. Tuomey and Holmes,  
 Plioc. Foss. S. C. 80, 21, 3.  
 D. *Virginiana*, C. Proceed. A. N. S. 1862, 586.

## Subgenus CHAMELEA, Klein.

- C. (V.) *cancellata*? Lin. Tuomey and Holmes, Plioc. Foss. S. C. 84, 21, 11.  
 C. (Venus) *cribraria*, C. Proceed. A. N. S. i. 310. Miocene Foss. 67, 38, 2. Tuomey and Holmes, Plioc. Foss. S. C. 83, 21, 10.  
 C. (Venus) *cortinaria*, Rogers, Trans. Amer. Philos. Soc. 7. 333. C. Miocene Foss. 11, 8, 1.

## GEMMA.

- G. (Venus) *sphærica*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 241, 34, 22.

## CIRCE.

- C. (Cyth.) *metastriata*, C. Miocene Foss. 14, 8, 5. Tuomey and Holmes, Plioc.  
 Foss. S. C. 79, 21, 1-2. Emmons, 293, 220.

## DOSINIA, Scopoli.

- D. (Art.) *acetabulum*, C. Tert. Foss. 20, 61. Miocene Foss. 29, 16, 1.  
 D. (Art.) *elegans*, C. Proceed. A. N. S. i. 325. Miocene Foss. 67, 38, 1.  
*D. transversus*, Emmons, Geol. N. C. 293, 223-4.  
 D. *intermedia*, C.  
*Venus concentrica*, Tuomey and Holmes, (not Born,) Plioc. Foss. S. C. 82,  
 21, 7.

## CLEMENTIA, Gray.

- C. (Venus) *inoceriformis*, Wagner, viii. 1, 2, C. Miocene Foss. 70, 40, 1.  
*Clementia inoceriformis*, C. Index to Miocene Foss.

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## PETRICOLIDÆ.

## PETRICOLA, Lam.

*P. compressa*, H. C. Lea, Journ. Amer. Philos. Soc. ix. 239, 34, 15.

*P. Carolinensis*, C.

*P. pholadiformis*, Tuomey and Holmes (not Lam.), Plioc. Foss. S. C. 87, 21, 5,

## PLIORYTIS, Conrad.

*P. (Petricola) centenaria*, C. Sill. xxiii. 341. Mioc. 17, 10, 1.

*Psammocola regia*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 234, 34, 17.

*P. Pliocena*, Tuomey and Holmes, Pliocene Foss. S. C. 91, 22, 8.

*Capsa centenaria*, D'Orbig. Prodrom. iii. 103.

## CYRENIDÆ.

## CORBICULA, Megerle.

*C. (Cyrena) densata*, C. Mioc. Foss. 68, 39, 2. Tuomey and Holmes, Plioc. Foss. S. C. 77, 20, 14. Emmons, Geol. N. C. 290, 215a.

## CARDIIDÆ.

## CARDIUM, Lin.

## Subgenus CERASTODERMA, Poli.

*C. acutillaqueatum*, C. Miocene Foss. 34, 18, 2.

*C. Carolinensis*, C.

*C. magnum*, Tuomey and Holmes (not Born), Plioc. Foss. S. C. 63, 19, 1. Emmons, Geol. N. C. 301.

*C. craticuloides*, C. Miocene Foss. 66, 37, 3.

*C. laqueatum*, C. Miocene Foss. 31, 17, 1.

*C. leptopleura*, C. Miocene Foss. 66, 37, 5.

*C. Virginianum*, C. Miocene Foss. 33, 18, 1. April, 1839.

*C. quadrans*, Rogers, Trans. Amer. Philos. Soc. v. 375, 30, 1. Dec., 1839.

## Subgenus LÆVICARDIUM, Swains.

*C. sublineatum*, C. Sillim. Journ. xli. 347, 2, 13. Miocene Foss. 66, 37, 4.

## Subgenus TRACHYCARDIUM, Mörch.

*C. muricatum*? Lin., Tuomey and Holmes, Plioc. Foss. S. C. 64, 19, 2. Emmons, Geol. N. C. 301, 232-3.

## BUCARDIIDÆ.

## BUCARDIA, Lister.

*B. (Isocardia) fraterna*, Say, (*I. rustica*, Con.) Miocene Foss. 20, 11, 1.

*I. Conradi*, D'Orbig. Prodromus, iii. 121.

*B. (Isocardia) Markoei*, C. Bullet. Nat. Inst. 193, 2, 1.

## CHAMIDÆ.

## CHAMA, Lin.

*C. congregata*, C. Sillim. Journ. xxiii. 341. Miocene Foss. 32, 17, 2. Tuomey and Holmes, 23, 7, 7-10.

*C. corticosa*, C. ib. 17, 3. Tuomey and Holmes, Plioc. Foss. 22, 7, 1, 2, 3. Emmons, 286, 210.

*C. striata*, Emmons, Geol. N. C. 286.

## ARCINELLA, Schum.

*A. (Chama) arcinella*, Lin., Tuomey and Holmes, Plioc. Foss. S. C. 22, 7, 4-6. Emmons, Geol. N. C. 286, 210.

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## LUCINIDÆ.

## LUCINA, Brug.

- L. Americana*, De France, Dict. des Sciences Nat. Art. Lucina, 1823.  
*L. anodonta*, Say, Journ. A. N. S. iv. 146, 10, 9, 1834. C. Miocene Foss. 39, 20, 4. Tuomey and Holmes, Pliocene Foss. S. C. 55, 18, 2. Emmons, Geol. N. C. 291.  
*L. contracta*, Say, Journ. A. N. S. iv. 145, 10, 8. C. Miocene Foss. 39, 20, 5. Tuomey and Holmes, Plioc. Foss. S. C. 54, 18, 1.  
*L. crenulata*, C. Miocene Foss. 39, 20, 2.  
*L. Foremani*, C. Journ. A. N. S. viii. 184. Miocene Foss. 71, 40, 4. Emmons, Geol. N. C. 291, 217.  
*L. Leana*, D'Orbig. Prodrom. iii. 117.  
*Lucina lens*, H. C. Lea, Trans. A. P. S. ix. 240, 34, 19.  
*L. subobliqua*, Say, Journ. A. N. S. iv. 147.  
*L. subplanata*, C. Journ. A. N. S. viii. 184.  
*L. trisulcata*, C. Sillim. Journ. xli. 346. Miocene Foss. 74, 40, 5.  
*L. undula*, C. Miocene Foss. 71, 41, 1.

## Subgenus CODAKIA, Scopoli.

- C. (Lucina) cribraria*, Say, Journ. A. N. S. iv. 147, 13, 1. Emmons, Geol. N. C. 293, 218.  
*C. (Lucina) multistriata*, C. Miocene Foss. 71, 40, 6. Tuomey and Holmes, Plioc. Foss. S. C. 61, 18, 16, 17.  
*C. (Lucina) speciosa*, Rogers, Trans. A. P. S. n. s. v. 333, 26, 6.  
*L. squamosa*, Conrad, (not Lam.) Miocene Foss. 38, 20, 1.

## Subgenus CYCLAS, Klein.

- Lucina Conradii*, D'Orbig. Prodrom. iii. 117, 2194.  
*L. divaricata*, var., Say, Journ. A. N. S. iv. 148. C. Miocene Foss. 39, 20, 3. Tuomey and Holmes, Plioc. Foss. S. C. 59, 18, 10, 11.

## UNGULINIDÆ.

## MYSIA, Leach.

- M. acclinis*, C. Foss. Shells of Tert. Form. 21, 6, 2.  
*Mysia Americana*, C. Miocene Foss. 30, 16, 2.  
*Lucina Americana*, Conrad (not DeFrance), D'Orbig. Prodrom. iii. 117, 2191.  
*M. elevata*, C. Miocene Foss. 73, 41, 8.

## SPHÆRELLA, Conrad.

- S. subvexa*, C. Miocene Foss. 18, 10, 2.  
*Erycina subconvexa*, D'Orbig. Prodrom. iii. 115, 2152.

## KELLIA, Turton.

- K. (Aligena) lævis*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 238, 34, 13, 1.  
*Erycina sublævis*, D'Orbig. Prodrom. iii. 115, 2153.  
*K. striata*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 238, 34, 14.

## LEPTONIDÆ.

## LEPTON, Turton.

- L. mactroides*, C. Journ. A. N. S. vii. 151. Miocene Foss. 19, 10, 5.  
*Erycina mactroides*, D'Orbig. Prodrom. iii. 115, 2153.

## CRASSATELLIDÆ.

## ASTARTE, Sowerby.

- A. arata*, C. Miocene Foss. 42, 20, 8.  
*A. bella*, C. Proceed. A. N. S. 1862, 585.

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- A. concentrica*, Tuomey and Holmes (not Conrad), Plioc. Foss. S. C. 71, 20, 3. Emmons, Geol. N. C. 289, 212.  
*A. concentrica*, C. Journ. A. N. S. vii. 123. Miocene Foss. 44, 21, 6.  
*A. cuneiformis*, C. Miocene Foss. 42, 20, 9.  
*A. Coheni*, C. Miocene Foss. 43, 21, 5.  
*A. distans*, C. Proceed. A. N. S. June, 1862, 288.  
*A. exaltata*, C. Proceed. A. N. S. i. 29. Miocene Foss. 66, 37, 6.  
*A. lineolata*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 241, 34, 20.  
*A. obruta*, C. Journ. A. N. S. vii. 15. Miocene Foss. 43, 21, 2.  
*A. perplana*, C. Miocene Foss. 43, 21, 3.  
*A. planulata*, C. Bullet. Nat. Inst. 187.  
*A. symmetrica*, C. Miocene Foss. 44, 21, 7.  
*A. Thomasii*, C. Proceed. A. N. S. vii. 267.  
*A. undulata*, Say, Journ. A. N. S. iv. 150, 9, 5. C. Miocene Foss. 41, 20, 7 and 21, 4. Tuomey and Holmes, Plioc. Foss. S. C. 70, 20, 1, 2. Emmons, Geol. N. C. 289, 213.  
*A. vicina*, Say, Journ. A. N. S. iv. 151, 9, 6. C. Miocene Foss. 41.  
*A. varians*, C. Proceed. A. N. S. i. 29. Miocene Foss. 67, 37, 7.  
*A. Virginica*, Proceed. A. N. S. 1862, 585.

## EULOXIA, Conrad.

- E. (Venus) latisulcata*, C. Miocene Foss. 40, 20, 6.  
*Astarte latisulcata*, D'Orb. Prodrum. iii. 112, 2089.

## GOULDIA, C. B. Adams.

- G. (Astarte) lunulata*, C. Miocene Foss. 44, 21, 8.  
*A. lunulata*, Tuomey and Holmes, Plioc. Foss. S. C. 72, 20, 4.

## ERYCINELLA, Con.

- E. ovalis*, C. Miocene Foss. 74, 42, 5.  
*Erycina ovalis*, D'Orbig. Prodrum. iii. 115.

## CRASSATELLA, Lam.

- C. curta*, C. n. s.  
*C. Marylandica*, C. Miocene Foss. 21, 12, 1.  
*C. melina*, C. Miocene Foss. 22, 12, 2.  
*C. turgidula*, C. Miocene Foss. 69, 39, 7.  
*C. undulata*, Say, Journ. A. N. S. iv. 142, 11, 2. C. Miocene Foss. 21, 11, 2.

## CARDITIDÆ.

## ACTINOBOLUS, Klein.

- A. (Cardita) carinata*, Emmons, Geol. N. C. 302.  
*A. (Cardita) granulata*, Say, Journ. A. N. S. iv. 142, 11, 1. C. Sillim. Journ. xxviii. 110. Mioc. Foss. 12, 7, 1. Tuomey and Holmes, Plioc. Foss. S. C. 66, 19, 6, 7. Emmons, Geol. N. C. 302, 236a.  
*A. (Cardita) tridentata*, Say, Journ. A. N. S. v. 216. C. Miocene Foss. 76, 43, 11. Tuomey and Holmes, Plioc. Foss. S. C. 67, 19, 8, 9. Emmons, Geol. N. C. 302, 236a.

## Subgenus PTEROMERIS, Conrad.

- P. (Cardita) abbreviata*, Sillim. Journ. xli. 2, 17. Miocene Foss. 77, 43, 12. Tuomey and Holmes, Plioc. Foss. S. C. 69, 19, 12. Emmons, Geol. N. C. 302, 235.  
*P. radians*, C. Sillim. Journ. xli. 2, 16. Miocene Foss. 77, 43, 13.

## CARDITAMERA, Conrad. LAZARIA, Gray.

- C. aculeata*. Proceed. A. N. S. 1862, 585.

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*C. arata*, C. Miocene Foss. 11, 6, 2.

*Cardita arata*, Tuomey and Holmes, Plioc. Foss. S. C. 65, 19, 4, 5. Emmons, Geol. N. C. 302, 234.

*C. carinata*, C. Proceed. A. N. S. 1, 305. Miocene Foss. 65, 37, 1.

*Cardita pseudo-carinata*, D'Orbig. Prodrom. iii. 114, 2133.

*Cardita carinata*, Tuomey and Holmes, Plioc. Foss. S. C. 67, 19, 10.

*C. protracta*, C. Proceed. A. N. S. i. 37, 2. Miocene Foss. 65, 37, 2.

*Cardita protracta*, D'Orbig. Prodrom. iii. 114, 2134.

#### MYTILIDÆ.

PERNA, Adans. MODIOLA, Lam.

*P. (Modiola) spinigera*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 244, 35, 30.

*P. (Modiola) Ducatellii*, C. Miocene Foss. 53, 28, 2.

*P. (Mytilus) inflata*, Tuomey and Holmes, Plioc. Foss. S. C. 33, 14, 3.

#### MYTILICONCHA, Conrad.

*M. (Myoconcha) incurva*, C. Miocene Foss. 52, 28, 1.

*M. incrassatus*, C. Sillim. Journ. xli. 247. Tuomey and Holmes, Plioc. Foss.

S. C. 32, 14, 1, 2. Emmons, Geol. N. C. 283, 203A.

*Mytilus Conradinus*, D'Orbig. Prodrom. iii. 127.

#### CRENELLA, Brown.

*C. (Nucula) æquilatera*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 243, 34, 27.

#### STALAGMIUM, Conrad, 1833.

*S. —*. A minute species occurs at Yorktown (specimen lost).

#### AVICULA.

*A. multangula*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 245, 35, 31.

#### ISOGNOMEN, Klein. PERNA, Brug.

*I. (Perna) torta*, Say, Sillim. Journ. ii. 38.

*Perna maxillata*, C. (not Lam.) Miocene Foss. 51, 27.

*P. Conradii*, D'Orbig. Prodrom. iii. 127.

#### TRIGONIIDÆ.

#### VERTICORDIA, Wood.

*V. Emmonsii*, C. Emmons, Geol. N. C. 286, 206.

#### ARCIDÆ.

#### SCAPHARCA, Gray.

*S. (Arca) arata*, Say, Journ. A. N. S. iv. 10, 1. C. Miocene Foss. 58, 30, 6.

*S. (Arca) æquicostata*, C. Miocene Foss. 60, 31, 6. Tuomey and Holmes, Plioc. Foss. S. C. 44, 16, 3, 4.

*S. (Arca) callipleura*, C. Miocene Foss. 54, 29, 2.

*S. (Arca) idonea*, C. Foss. Shells of Tert. Form. 15, 1, 5. Miocene Foss. 55, 29, 3. Emmons, Geol. N. C. 285.

*S. (Arca) incongrua*? Say, Tuomey and Holmes, Plioc. Foss. 45, 16, 5, 6.

*S. (Arca) improcera*, C. Miocene Foss. 60, 31, 5. Tuomey and Holmes, Plioc. Foss. S. C. 41, 15, 4, 5.

*S. (Arca) lineolata*, C. Miocene Foss. 61, 32, 3.

*A. sublineolata*, D'Orbig. Prod. iii. 125.

*S. (Arca) lienosa*, Say, Amer. Conch. pl. 36. Tuomey and Holmes, Plioc. Foss. S. C. 40, 15, 2, 3. Emmons, Geol. N. C. 284, 204.

*S. (Arca) plicatura*, C. Miocene Foss. 61, 32, 4.

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- S. (Arca) rustica, Tuomey and Holmes, Plioc. Foss. S. C. 39, 15, 1.  
 S. (Arca) stillicidium, C. Foss. Shells of Tert. Form. 14, 1, 3.  
 S. (Arca) scalaris, C. Miocene Foss. 59, 31, 1. Proceed. A. N. S. i. 324. Tuomey and Holmes, Plioc. Foss. S. C. 43, 16, 1, 2. Emmons, Geol. N. C. 284.  
 S. (Arca) subsinuata, C. Miocene Foss. 62, 32, 6.  
 S. (Arca) subrostrata, C. Miocene Foss. 58, 30, 7.  
 S. (Arca) transversa? Say, C. Foss. Shells of Tert. Form. 14, 1, 2. Tuomey and Holmes, Plioc. Foss. 42, 15, 6, 7. Emmons, Geol. N. C. 285.  
 S. (Arca) triquetra, C. Miocene Foss. 59, 31, 2.

#### NETIA, Gray.

- N. (Arca) Carolinensis, C. Proceed. A. N. S. 1862, 290.  
 N. (Arca) limula, C. Foss. Shells of Tert. Form. 15, 1, 1. Miocene Foss. 60, 31, 3.

#### ARGINA, Gray.

- A. (Arca) pexata, Say, Journ. A. N. S. ii. 268. Tuomey and Holmes, Plioc. Foss. S. C. 46, 16, 7, 8.

#### ANOMOLOCARDIA, Klein.

- A. (Arca) incile, Say, Journ. A. N. S. iv. 139, 10, 8. C. Fossil Shells of Tert. Form. 16, 21. Miocene Foss. 56, 29, 5. Tuomey and Holmes, Plioc. Foss. S. C. 35, 14, 6, 7. Emmons, Geol. N. C. 284.  
 A. trigintinaria, C. Proceed. A. N. S. 1862, 289.  
 A. (Arca) protracta, Rogers, Trans. Amer. Philos. Soc. v. 332; and vi. 337, 26, 5. C. Miocene Foss. 58, 30, 5.

#### STRIARCA, Conrad. 1862.

- S. (Arca) centenaria, Say, Journ. A. N. S. iv. 138, 10, 2. C. Foss. Shells of Tert. Form. 16, 1, 4. Miocene Foss. 55, 29, 4. Tuomey and Holmes, Plioc. Foss. S. C. 37, 15, 11, 12. Emmons, Geol. N. C. 284, 205.

#### BARBATIA, Gray.

- B. (Arca) caelata, C. Miocene Foss. 61, 32, 2. Tuomey and Holmes, Plioc. Foss. S. C. 36, 14, 8.  
 B. (Arca) hians, Tuomey and Holmes, Plioc. Foss. S. C. 34, 14, 4, 5.  
 B. (Byssarca) Marylandica, C. Miocene Foss. 54, 29, 1.

#### Subgenus GRANOARCA, Conrad. 1862.

- B. (Arca) propatula, C. Miocene Foss. 61, 32, 1.

#### AXINÆINÆ.

#### AXINÆA, Poli.

- A. (Pectunculus) arata, C. Sillim. Journ. xli. 346. Miocene Foss. 62, 3, 2. Tuomey and Holmes, Plioc. Foss. S. C. 50, 17, 6. Emmons, Geol. N. C. 287, 208.  
 A. (Pect.) Carolinensis, C. Sillim. Journ. xli. 346. Miocene Foss. 63, 35, 2.  
 A. (Pect.) laevis, Tuomey and Holmes, Plioc. Foss. S. C. 50, 17, 5.  
 A. (Pect.) lentiformis, C. Miocene Foss. 64, 36, 2. Tuomey and Holmes, Plioc. Foss. S. C. 48, 17, 2. Emmons, Geol. N. C. 286.  
 A. (Pect.) passa, C. Miocene Foss. 64, 35, 3. Tuomey and Holmes, Plioc. Foss. S. C. 48, 17, 3.  
 A. (Pect.) parilis, C. Proceed. A. N. S. i. 306. Miocene Foss. 64, 36, 2.  
 A. (Pect.) quinqueregata, C. Sillim. Journ. xli. 346. Miocene Foss. 63, 34, 3. Tuomey and Holmes, Plioc. Foss. S. C. 49, 17, 4.  
 A. (Pect.) tricenaria, C. Miocene Foss. 63, 35, 1.  
 A. (Pect.) transversa, Tuomey and Holmes, Plioc. Foss. 51, 17, 6c.

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- A. (Pect.) subovata, Say, Journ. A. N. S. iv. 140. C. Foss. Shells of Tert. Form. 17, 2, 3. Miocene Foss. 62, 34, 1. Tuomey and Holmes, Plioc. Foss. S. C. 47, 17, 1. Emmons, Geol. N. C. 286, 207.
- A. (Pect.) tumulus, C. Miocene Foss. 72, 41, 4.

### NUCULIDÆ.

#### NUCULA, Lam.

- N. dolabella, H. C. Lea, Trans. Amer. Philos. Soc. ix. 242, 34, 25.
- N. diaphana, H. C. Lea, ib. 243, 34, 26.
- N. proxima? Say, Journ. A. N. S. ii. 270. Tuomey and Holmes, Plioc. Foss. S. C. 53, 17, 7-8. Emmons, Geol. N. C. 287, 208B.
- N. obliqua, Say, (not Lam.) Sillim. Journ. ii. 40, 1820.

#### NUCULANA, Link.

- N. (Nucula) acuta, C. Marine Conch. pl. 6, f. 3. Miocene Foss. 57, 30, 2. Tuomey and Holmes, Plioc. Foss. S. C. 53, 17, 10-12. Emmons, Geol. N. C. 287, 208A.
- N. (Nucula) acutidens, H. C. Lea, Trans. Amer. Philos. Soc. ix. 244, 34, 28.
- N. (Nucula) carinata, H. C. Lea, ib. 244, 34, 29.
- N. (Nucula) concentrica, Say, Journ. A. N. S. iv. pl. 10, f. 6. Amer. Conch. pl. 12. C. Miocene Foss. 57, 30, 3.
- N. (Nucula) liciata, C. Miocene Foss. 64, 36, 3.

#### YOLDIA.

- Y. eborea, C. n. s.
- Y. (N.) laevis, Say, Journ. A. N. S. iv. 141, 10, 5.
- N. limatula Tuomey and Holmes, (not Say,) Plioc. Foss. S. C. 52, 17, 3.

### PECTINIDÆ.

#### PECTEN, Lin.

- P. biformis, C. Miocene Foss. 73, 42, 1.
- P. Clintonius, Say, Journ. A. N. S. iv. 135, 9, 2. C. Miocene Foss. 47, 23, 1.
- P. principoides, Emmons, Geol. N. C. 280, 198.
- P. comparilis, Tuomey and Holmes, Plioc. Foss. S. C. 29, 11, 6-10. Emmons, Geol. N. C. 279.
- P. concentricus? Say, C.
- P. decemnarius, C. Journ. A. N. S. vii. 151. C. Miocene Foss. 49, 24, 2.
- P. Edgecomensis, C. Proceed. A. N. S. 1862, 291.
- P. dispalatus, Miocene Foss. 74, 42, 3.
- P. eboreus, C. Sillim. Journ. xxiii. 341. Miocene Foss. 48, 23, 2, and 24, 3.
- Tuomey and Holmes, Plioc. Foss. S. C. 28, 11, 1. Emmons, Geol. N. C. 279, 197.
- P. Holbrookii, Ravenel, Tuomey and Holmes, Plioc. Foss. S. C. 28.
- P. fraternus, Con. Proceed. A. N. S. 1862, 291.
- P. Jeffersonius, Say, Journ. A. N. S. iv. 133, 9, 1. C. Miocene Foss. 46, 22, 1.
- Emmons, Geol. N. C. 281, 199, and 282, 201.
- P. Marylandicus, Wagner, Journ. A. N. S. viii. 51, 1, 1.
- P. Madisonius, Say, Journ. A. N. S. iv. 134. C. Miocene Foss. 48, 24, 1. Emmons, Geol. N. C. 282, 200.
- P. micropleura, H. C. Lea, Trans. Amer. Philos. Soc. ix. 245, 35, 23.
- P. Pedecensis, Tuomey and Holmes, Plioc. Foss. S. C. 30, 12, 1. Emmons, Geol. N. C. 281.
- P. Rogersi, C. Miocene Foss. 45, 21, 9.
- P. septenarius, Say, Journ. A. N. S. iv. 136, 9, 3. Miocene Foss. 47, 22, 2.
- Tuomey and Holmes, Plioc. Foss. S. C. 31, 13, 1-4.
- P. tenuis, H. C. Lea, Trans. Amer. Philos. Soc. ix. 246, 35, 33.

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- P. tricenarius*, C. Miocene Foss. 74, 42, 2.  
*P. Virginianus*, C. Miocene Foss. 46, 21, 10.  
*P. vicenarius*, C. Proceed. A. N. S. i. 306.

## VOLA, Klein.

- V?* (*Janira*) *affinis*, Tuomey and Holmes, Plioc. Foss. S. C. 26, 8, 56.  
*V.* (*Janira*) *hemicycla*, Ravenel, Tuomey and Holmes, Plioc. Foss. S. C. 25, 8, 1-4.  
*V.* (*Pecten*) *Humphreysii*, C. Bullet. Nat. Inst. 194, 2, 2.

## AMUSIUM, Klein.

- A.* (*Pecten*) *Mortoni*, Ravenel. Tuomey and Holmes, Plioc. Foss. S. C. 27, 10, 1, 2. Emmons, 281.

## RADULIDÆ.

## RADULA, Klein.

- R.* (*Lima*) *papyria*, C. Miocene Foss. 76, 43, 7.

## SPONDILIDÆ.

## PLICATULA, Lam.

- P. densata*, C. Proceed. A. N. S. i. 311. Miocene Foss. 75, 43, 6.  
*P. marginata*, Say, Journ. A. N. S. iv. 9, 4. C. Miocene Foss. 75. Tuomey and Holmes, Plioc. Foss. S. C. 24, 7, 11.  
*P. rudis*, H. C. Lea, Trans. Amer. Philos. Soc. ix. 246, 35, 34.

## ANOMIIDÆ.

## ANOMIA, Lin.

- A. delumbis*, C. n. s.  
*A. Conradi*, D'Orbig.  
*A. ephippium?* var. C. Journ. A. N. S. vii. Miocene Foss. 75, 43, 4. Tuomey and Holmes, Plioc. Foss. S. C. 18, 5, 4. Emmons, Geol. N. C. 277.  
*A. Conradi*, D'Orbig., Prodrom. iii. 134, 25, 30.  
*A. Ruffini*, C. Proceed. A. N. S. i. 323. Miocene Foss. 74, 42, 6.

## PLACUNANOMIA, Brod.

- P. plicata*, Tuomey and Holmes, Plioc. Foss. S. C. 19, 6, 4.

## OSTREIDÆ.

## OSTREA, Linn.

- O. disparilis*, C. Miocene Foss. 51, 24.  
*O. Mauricensis*, Gabb, Journ. A. N. S. iv. 67, 26, (1860.)  
*O. percassa*, C. Miocene Foss. 50, 25, 1.  
*O. Ravenelliana*, Tuomey and Holmes, Plioc. Foss. S. C. 21, 6, 1.  
*O. sculpturata*, C. Miocene Foss. 50, 25, 3.  
*O. subfalcata*, C. Miocene Foss. 50, 25, 2.  
*O. Virginiana?* Gmel. Tuomey and Holmes, Plioc. Foss. S. C. 20, 5, 6-9.

## ORBICULIDÆ.

## ORBICULA, Sowerby.

- O. lugubris*, C. Miocene Foss. 75, 43, 2. Tuomey and Holmes, Plioc. Foss. S. C. 17, 5, 1. Emmons, Geol. N. C. 274, 187.  
*Capulus lugubris*, C. Journ. A. N. S. vii. 143.  
*O. multilineata*, C. Miocene Foss. 75, 43, 3. Tuomey and Holmes, Plioc. Foss. S. C. 18, 5, 2.

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## Descriptions of New, Recent and MIOCENE SHELLS.

BY T. A. CONRAD.

## FASCIOLARIIDÆ?

BUSYCON, Bolton.

*Recent Species.*

*B. plagosum*.—Dextral, pyriform, moderately thick; body whorl ventricose, but not profound; angle acute, slightly salient, subtuberculated; spire moderately prominent; whorls slightly concave above; angle below the middle; summits deeply channelled at the suture; revolving lines prominent and distinct, unequal, with closely-arranged intermediate microscopic lines; beak produced; columella fold wide and deeply impressed; labrum striated within; striae prominent, acute, about 31 in number; color whitish, with purplish-brown longitudinal bands, and yellowish-brown stains. Length  $4\frac{1}{2}$ , width  $2\frac{1}{2}$  inches.

*Locality*.—N. J.?

Allied to *B. pyrum*, (*Pyrrula spirata*, Lam.) but very distinct. The spire is more prominent and acutely carinated, and the labrum profoundly striated within, whilst in the *pyrum* it is entire.

*Pyrrula spirata*, var. Kiener. Lister, iii. f. 737.

*B. spinosum*.—Dextral, pyriform, volutions 7, angle spinous; spines numerous, prominent; revolving lines alternated in size; whorls slightly concave above, towards the apex more distinctly concave; spire rather short; angle near the base of the whorls; beak moderate in length; canal wide; color whitish, with longitudinal brown bands.

*Locality*.—Coasts of U. S.

This shell has long been confounded with *B. aruana*, L. (*B. carica*, Gmel.) but it is a thinner, less ventricose species, growing to a much larger size than the former, with more numerous, less elevated spines, which almost disappear in old shells.

*Busycon elegans*.—Pyriform; whorls 6, with prominent revolving lines, and minute closely-arranged wrinkles; angle of body whorl prominently carinated; spire short, sides straight, oblique, sutural channel profound; angle of the whorl margins the channel and is tuberculated; summit of labrum elevated slightly above the carina of body whorl; within ribbed; ribs about 35, acute; color whitish, with numerous irregular brown bands.

*Locality*.—?

The specimen in the Academy's cabinet, is rather less than *B. plagosum*, and differs in having a shorter spire, in being more ventricose, proportionally shorter, and having the summit of the labrum much more elevated, as well as the carina on the body whorls.

*Fossil Species.*

*B. Tritonis*.—Fusiform, moderately thick; body whorl profoundly ventricose; lines of growth remote, plicated, revolving lines fine, wrinkled, closely-arranged, with distant more prominent lines; angle spinous; spines distant, prominent, foliated; whorls 6, slightly concave above; spire somewhat scalariform; the spinous angle of the whorls situated considerably above the suture and rounded; summit of whorls obtusely subcarinated at the suture, which is deeply impressed; beak sinuous; columella projecting inwardly below the middle; fold obsolete. Length 7 inches, width  $4\frac{1}{2}$ .

*Locality*.—Yorktown, Va.

*B. alveatum*.—Fusiform; spire prominent, scalariform; angle of whorls 1862.]

situated much above the middle, not tuberculated; summits channelled and margined with a carina, which is most conspicuous on the body whorl, and beneath it is a flattened space. Length  $3\frac{1}{4}$  inches, width  $1\frac{1}{2}$ .

*Locality*.—St. Mary's River, Md.

A single specimen only was found, which appears to be a mature shell, and is most nearly allied to *B. canaliculatum*. The spire is more elevated than in that species, and differs also in being without tubercles.

*B. Carolinense*, C.

*B. canaliculatum*, Tuomey and Holmes (not Lam.), Pliocene Foss. S. C. 145, 29, 3.

*B. adversarium*, C.

*B. perversum*, Tuomey and Holmes (not Lam.), Pliocene Foss. S. C. 146, 29, 2.

*B. scalarispira*.—Subfusiform; spire moderate, turrited, sides above the angle oblique; angle subcarinated, with numerous approximate subcompressed tubercles; whorls striated transversely.

*Locality*.—Shiloh, Cumberland Co., N. J.

Allied to *B. rugosum*, but differs in wanting the channel round the base of the whorls.

*B. striatum*.—Subfusiform; spire moderate in elevation, sides of whorls oblique, the angles near the suture furnished with not very prominent obtuse tubercles; beak long and straight; whorls conspicuously striated.

*Locality*.—Like the preceding, this species is without a channel, and is small, probably a young shell.

TURRITELLA, Lam.

*T. æquistriata*.—Subulate, volutions 14, bicarinate, carinæ distant with a concave interval, the lower carina near the suture; surface covered with nearly equal fine closely-arranged striæ, with a minute intermediate line; aperture longer than wide.

*Locality*.—Shiloh, Cumberland Co., N. J.

*T. Cumberlandia*.—Elongated, tapering gradually; volutions 24, bicarinated, carinæ nearly equal, distant; revolving lines unequal, wrinkled; sides of whorls concave between the carinæ, somewhat channelled beneath the lower one, and rounded at base. Length  $2\frac{3}{8}$ .

*Locality*.—Shiloh, Cumberland Co., N. J.

AURICULIDÆ.

MELAMPUS, Mont.

Subgenus ENSIPHORUS, Conrad.

*M. longidens*.—Acutely oval; spire conical, mucronate at the top; whorls 7; suture profound; aperture very narrow; labrum dentato-striate within; base of columella with an elongated, slightly curved plate, directed obliquely upwards in the line of the aperture.

*Locality*.—Yorktown, Va.

The single elongated plate at base distinguishes this subgenus.

DACTYLUS, Klein.

*D. Carolinensis*.—Cylindrical; spire short, conical; whorls concave or angulated; columella strongly plaited throughout; substance of shell very thick at base.

*Locality*.—Dauphin Co., N. C. Prof. Mitchell.

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The strongly plated columella is the principal character which distinguishes this species from *Oliva litterata*, Lam.

## PERIPLOMA.

*P. alta*.—Suborbicular, subequilateral, anterior side subrostrated, end truncated, direct; basal margin profoundly rounded medially and posteriorly; anteriorly obliquely truncated or very slightly emarginate.

*Locality*.—Shiloh, Cumberland Co., N. J.

A much larger species than *P. (Anatina) papyracea*, Say, but closely allied.

## SILICUARIA, Schum.

*S. Carolinensis*.—Oblong, ventricose, inequilateral, disks slightly contracted; 2 cardinal teeth in the right valve, 3 in the opposite; sinus of pallial impression profound, extending beyond the line of the apex.

*Locality*.—Wilmington, N. C.

Closely related to *S. gibba*, but distinguished by the three cardinal teeth in the left valve, and the more profound pallial sinus. There is a tubercle on the anterior end of the nympha in each valve in the only specimen I have seen.

## SAXICAVA, Bellevue.

*S. myeformis*.—Ovate, thin and fragile, inequilateral; extremities rounded; surface marked with fine rugose concentric lines; cardinal teeth small, two in the right valve.

*Locality*.—Shiloh, Cumberland Co., N. J.

## MACTRA, Lin.

*M. medialis*.—Subtriangular, ventricose, elongated; beaks submedial, not oblique; posterior extremity truncated; posterior basal margin straight; lateral teeth striated.

## EULOXIA, Conrad.

Subtriangular, posteriorly sulcated; cardinal teeth three in the left valve, the two posterior teeth oblique; two teeth in the right valve, the posterior one oblique; sinus of pallial impression truncated or slightly emarginate posteriorly.

*E. (Venus) latisulcata*, C.

## CARDITAMERA, Conrad.

*C. aculeata*.—Trapezoidal; umbonal slope inflated; base emarginate; ribs on anterior side crenulated, on the anterior side subspinose.

*Locality*.—Shiloh, Cumberland Co., N. J.

## ASTARTIDÆ.

## ASTARTE, Sowerby.

*A. bella*.—Triangular, compressed; marked by very regular closely-arranged fine concentric lines.

*A. concentrica*, Tuomey and Holmes (not Conrad), *Plioc. Foss. S. C.* 71, 20,

3. Emmons, *Geol. N. C.* 289, 212.

*Locality*.—Virginia.

Differs from *concentrica* in being proportionally shorter, and in its much finer and more regular lines.

*A. Virginica*.—Suborbicular, inequilateral, convex; margins rounded; surface with concentric grooves above; lower half of the valves concentrically striated.

*Locality*.—Eastern Virginia.

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## VENERIDÆ.

## CIRCUMPHALUS, Klein.

## Subgenus LIROPHORA, Conrad.

*C. athleta*.—Triangular, thick in substance, with eight broad, prominent, recurved ribs, striated at the base; ribs without posterior laminae; lunule cordate.

*V. latilirata*, Tuomey and Holmes (not Conrad).

*Locality*.—Virginia.

Distinguished from *latilirata* by its more numerous and narrower ribs, and larger size. The marginal crenulations are much less distinct, and the umbo broader.

The subgenus is characterized by broad, thick, recurved ribs. The following recent species belong to it: *Venus tiara*, Dill.; *V. paphia*, L.; *V. Kellettii*, Hinds; *V. varicosa*, Sowerby; *V. fasciata*, Don.

## DIONE, Gray.

*D. densata*.—Ovato triangular, convex, inequilateral; umbo somewhat flattened, and the substance of shell thick in that part, and more so towards the muscular impressions; pallial sinus strongly defined and rounded; lunule lanceolate; anterior cardinal tooth rather thick; posterior extremity acutely rounded; surface polished, with strong lines of growth. Length  $2\frac{1}{2}$  inches, height 7-10.

*Locality*.—Petersburg, Va.

Thicker than *albaria*, Say, with a less concave lunule margin, and otherwise very distinct.

*D. Virginiana*.—Ovate, rather thin, slightly ventricose, inequilateral; lunule long, lanceolate, defined by a slight groove and carinated line; basal margin profoundly rounded medially; cardinal teeth prominent, compressed. Length 4 inch. 7-10, height 3 5-10.

*Locality*.—Petersburg, Va.

## SCROBICULINÆ.

## FABELLA, Conrad.

Suboval, inequilateral, posterior side shortest; cardinal teeth in right valve two, anterior one submarginal, straight, rudimentary; the other thick, recurved, with a pit behind it; teeth separated by a profound oblique cartilage pit; left valve with three teeth, the anterior one slightly curved, and a pit behind it, separated from the cartilage cavity by a slightly oblique tooth; posterior tooth rudimentary and parallel with the hinge margin; muscular impressions near the hinge.

F. (*Amphidesma*) *constricta*, C.

A small bivalve from the Virginia Miocene.

## Errata.

Page 561, erase *Busycon scalaris*.

563, for "MEGOPTYGMA" read MEGAPTYGMA.

564, for "cælata" read cælatus.

566, for "curtum" read curta.

566, for "(Odostomea)" read (Odostomia).

567, for "F. (Cancellaria) biplicifera" read *C. biplicifera*.

570, for "quadricostata" read quadricostatus.

570, for "duodecenaria" read duodecenarium.

571, for "(Hidella)" read (Hiatella).

573, for "PERONÆDERMA" read PERONÆODERMA.

573, for "fluxuosa" read flexuosa.

576, for "craticuloides" read craticuloide.

Remarks on some species of **PALUDINA**, **AMNICOLA**, **VALVATA**, and **MELANIA**.

BY JAMES LEWIS, M. D., MOHAWK, N. Y.

**AMNICOLA (PAL.) LIMOSA**, Say. Soft parts.

Foot seen below, truncate anteriorly, with acute angles laterally, the foot being constricted. Back of the constriction the foot dilates to nearly or quite the width of the anterior, the sides being parallel, thence posteriorly about  $1\frac{1}{2}$  diameters of the foot; posterior termination an abruptly-shortened wedge. Colors variable. In some specimens there are longitudinal strips of flesh color on the inferior surface of the foot, widest behind the constriction, and growing narrower posteriorly. Between these strips is a wider area of slate color, with a few faint granulations. In other specimens the foot is bordered with white on each side, the flesh color of the preceding variety being replaced with what appears to be a band of compact granulations, which become less numerous posteriorly; a few are seen in the central portions of the foot, where they appear to be embraced in the parenchyma of the foot. Other specimens are observed in which the visible soft parts are of a very uniform salmon color without any observable markings on the surface. In these the bands which appear on the mantle of other specimens, visible through the shell, are absent.

No obvious markings have been detected on the superior surfaces of the foot in any instances. A few specimens, however, in favorable light, present slight markings on the superior lateral portions of the foot, too indistinct to have a name.

The rostrum seen below has a strongly-impressed central line, which extends over its anterior extremity. In most instances the superior surface of the rostrum has a dark longitudinal strip extending from the head forward, growing indistinct and becoming lost before the extremity is reached. Each side of this dark strip is an interrupted and not very well defined line of light colored or yellowish granulations. The lateral portions of the rostrum are marked by a dark strip that becomes more dense and broader as it recedes along the sides of the head beneath the tentacles. These strips are more variable than the central strip.

The tentacles are directed obliquely forward and are nearly parallel. They are not always equally developed, being sometimes malformed; the malformations usually manifested are slight deviations from a right line, with contractions in length. Either tentacle may be seen to be affected in this way, and sometimes both. In a considerable number of specimens, the inferior surface of the tentacle presents a well-defined black line extending from the base to near the tip. This line is not always present in both tentacles, and seems to be more frequently wanting in the right. It is sometimes irregularly interrupted, and may be so in one or both tentacles. When interrupted, the tentacle may also be seen to present other irregularities. The eye is obviously inserted in the dilated base of the tentacle, and less obviously in the head at the base of the tentacle.

Neck of the animal large and robust; superior lateral portions of the foot and neck without fold or sinus.

In younger specimens the general appearances are the same, except that the foot presents rounded lateral and posterior outlines, and the foot is usually a little smaller in proportion to the size of the shell. The movements of the animal are quite brisk, and free from hesitation, and have the graceful, gliding motion peculiar to the genus.

**AMNICOLA (PAL.) GRANA**, Say.*Paludina lustrica*, Ad. (Thompson's Vermont.)

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Shell thin and translucent, form paraboloid, the apical whorls having a greater angle than those forming the body of the shell.

Dimensions variable. In the Mohawk River, adults are often 3-16th inch in length. In other localities it is usual to find them much less.

Soft parts seen through the shell orange or white, with one or more irregular bands like the preceding species.

*External soft parts—Inferior surface.*—Foot as long or a little longer than the shell, anterior truncated and rounded. The anterior lateral angles formed by the constriction of the lateral portions of the foot as in other species. The middle of the lateral portions of the foot expanded, growing narrower posteriorly and terminating in a rounded extremity. Anterior portion white, with a translucent border; posteriorly granulated with numerous, crowded, minute white points. Tentacles diverging in front of the anterior margin of the foot. Rostrum extending about half as far as the tentacles beyond the foot. Superior surface. External soft parts nearly all white and translucent: eyes black and set close to the base of the tentacles; between the tentacles is a longitudinal strip of dark brown, which fades to orange on the base of the rostrum. Scarcely any granulations, or other markings appear on any of the superior surfaces.

MELANIA SUBULARIS, Lea. Soft parts.

Inferior surface of foot salmon colored, with a narrow, well-defined border of lighter tint around the semicircular anterior margin, within which is a wider band of a deep flesh color.

The superior surface of the foot orange-colored; the anterior portion presenting a deeper tinge, with numerous well-defined black lines parallel with the anterior margin, but separated therefrom by a zone of the same tint, as the narrow margin of the inferior surface.

The superior lateral portions of the foot are marked with irregular anastomosing black lines, which preserve a general parallelism with the margins of the foot, but frequently terminating downwards in the lateral margins of the foot; toward the neck the anastomosing lines embrace numerous areas of granular surface, in which the granulations are not strongly marked. The rostrum inclines to a yellowish tinge, and is marked by numerous fine black transverse lines, which are least developed on the superior lateral portion of the rostrum near the middle of its length.

The anterior and a narrow lateral portion have a lighter appearance. The tentacles present a faint greenish tint, and are marked near their tips with dark bands, presenting a jointed appearance. The tentacles are small and somewhat elongated. The eye appears as a small but well-defined black spot at the apex of a rounded but not very elevated tubercle, growing out of the head and posterior of the base of the tentacle, a little above a line connecting the axes of the tentacles at their insertion.

The lateral portion of the foot presents a vertical sinus or fold extending up along the neck from the constricted portion of the foot behind the angular termination of the rounded anterior. The existence of this sinus permits the foot to be largely extended. The color of the external soft parts is not uniform in a series of specimens, though the form and the black lines are constant. In some specimens there are scarcely any traces of orange or flesh tints. In these the soft parts are more translucent, and the inferior portion of the foot is white, with a blue tint, resulting from translucency. The parts within the shell are sometimes yellow or orange, and those of the apical whorls sometimes green. The motions of the animal in progressing are irregular.

The foot is elongated, the shell remaining stationary; the posterior portion of the foot is then contracted, and the shell pulled forward. At this point the foot presents an outline.

These movements are sometimes changed, and the animal advances by an

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apparent gliding motion of the whole foot; more usually the progressive movements are an alternate expansion and contraction of the foot.

This *Melania* abounds in the Mohawk River, preferring sloping, muddy banks in eddies, where there is little current.

*MELANIA EXILIS*, Haldeman.

The shells of this species are quite variable in form and color, so much so as to have drawn from a distinguished zoologist the inquiry if they might not be more than one species.

Some are elongated and slender, with scarcely any angularity on the larger whorls below the carinated apical whorls; others are more robust, with a wider apical angle, with a tendency to form gibbous enlargements of the last whorl. In these there is an obsolete angle between the base of the shell and the surface of the spire. The soft parts present some diversity of color, as is the case with all the univalves of this class observed in the Mohawk River, (except *Valvata tricarinata*, which is pretty uniformly white.) There are, however, constant features which seem to characterize the species.

Specimens in which the prevailing tints of the soft parts are salmon or orange, have the anterior margin of the inferior surface of the foot marked with a not very well-defined border of orange, which is darkest where lightest in the preceding species; back of this, and covering nearly the whole bottom of the foot, is an area of purplish slate color, surrounded entirely by a narrow orange or salmon margin, which is not well-defined, except as limited by the margin of the foot.

In other specimens of lighter color, no obvious zones appear, the anterior being pale, nearly white, and the translucency of the posterior parts permitting a faint reflection of the operculum and shell to be seen through them, presents a darker appearance. In some instances the variety of color is diversified, and presents a faint purplish slate-colored area of horse-shoe shape within a border of lighter color forming the posterior margin of the foot.

The superior surface of the foot near the anterior margin is marked with a few black lines, parallel with the margin. Back of the angle of the foot these lines are limited to a narrow zone along the lateral margin of the foot, where they are irregular and inosculate with each other, and frequently terminate downward in the margin of the foot. Approaching the neck, after leaving the lineated margin of the foot, the surface presents a beautiful granulated appearance, from the effect of numerous, minute, brilliant yellowish or orange spots (of a faint greenish tinge), irregularly yet densely distributed over a surface of greenish black. There is no appearance of *sinus* or *fold* in the margin of the foot and side of the neck.

The rostrum is wider and shorter than in the preceding species, and presents a very robust appearance when the two species are compared. The upper surface is marked with numerous well-defined transverse black lines; between these the prevailing color of the surface is salmon or orange, with a dirty greenish tinge. Usually the end of the rostrum is of a green tint, like that produced by certain salts of copper when combined with organic matter. This color is seen whether the parts are inspected from above, below, or in front. One specimen in which this feature was absent presented all the other prominent characters of the species.

The tentacles are large at their base, less elongated and not so slender as in the preceding species. At their base they are surrounded by a dense band of brownish black, well-defined towards the head, but fading away indistinctly on the side towards the end of the tentacle. This band is constant, and seems to be characteristic. The tentacles are usually of a beautiful ruddy salmon color, lighter near the tips, where the surface is quite regularly marked with black bands, imparting a jointed appearance to these organs. These bands,

when closely inspected with a powerful lens, give the tips of the tentacles a ciliated appearance, resulting from the manner in which the bands are arranged. The bands are well-defined on the side toward the base of the tentacle, but fading away into linear patches towards the tip.

In half-grown specimens the tentacles are more slender and elongated, with more numerous bands extending often beyond the middle towards the head. Occasionally a specimen may be seen in which the tentacle terminates in a not very well-defined bulb, approaching in appearance the eye-bearing tentacles of *Helices*.

The eye is situated on the apex of the tubercle placed against the posterior of the base of the tentacle, and appears larger than in the preceding species, at the same time giving a massive feature to the head. The pupil of the eye is a well-defined black spot, surrounded by a bright yellowish surface, which is again surrounded by a darker area extending down the sides of the tubercle. The motions of the adult are slow, and seem to be regular and continuous: younger specimens move more rapidly, and are observed more frequently to drag the shell by an interrupted motion than the adult; but no elongation and contraction of the foot has been noticed in either young or adult, as in the preceding species.

This species is found abundantly in the Mohawk River, in places where there is considerable current, adhering to hard, dry banks, stones, sticks and aquatic plants. It is seldom found associated with the preceding species—their habits being quite unlike.

The following features of the two species above considered may suffice for placing them apart in subgenera:

1. The presence of a sinus or fold in the sides of the foot and neck of *M. subularis* and its absence in *M. exilis*.
2. The extension of the anastomosing black lines from the margin of the lateral portions of the foot upwards along the side of the neck in *M. subularis*, and the restriction of these lines to a narrow zone along the lateral portions of the foot of *M. exilis*.
3. A well-defined dark band around the base of the tentacle in *M. exilis*; not observable, or at most only faintly indicated, in *M. subularis*.

#### CYCLOSTOMA LAPIDARIA, Say.

The soft parts of this animal have been observed, and notes in relation thereto have appeared in the Proceedings of the Boston Soc. Nat. Hist. It may be well to apply here a few inadvertent omissions.

The rostrum is proportionally larger than in *Amnicola* and has the appearance of *Melania*, being marked with well-defined transverse black lines. The tentacles are proportionately large, and, instead of being directed obliquely forward, droop and form an angle near their middle. The eye, instead of being placed in a tubercle at the base of the tentacle, is placed in a tubercle, surrounded by a well-defined and elevated process, presenting the appearance of a cup or ring around the eye tubercle, which ring at its anterior side unites with the base of the tentacle. The motions of the animal are entirely unlike *Amnicola* (in which genus this mollusc has been included by late writers who have examined the shell only,) and are very much like the movements of *Melania subularis*, only that it exhibits more uniformly the expansions and contractions of the foot in progressing, and also exhibits a very positive halt at each movement. Its progress in moving is slow and irregular. The shell is not carried obliquely erect as in *Amnicola* and *Paludina*, but drags behind the foot as in *Melania subularis*, and is hitched along in the same manner. A figure of the soft parts of *Truncatella* in the Supplement to Terr. Moll. by W. G. Binney is a better illustration of this mollusc than any figure of *Amnicola* yet published.

This resemblance, together with an agreement in habit with *Truncatella*,

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suggest that the mollusc now under consideration may properly be set apart under a separate generic designation between *Truncatella* and *Melania* if it be not retained in *Melania*.

It certainly cannot be retained in *Ammicola*, as its external anatomy is too unlike that of *Ammicola* in any respect to sanction such treatment.

Inhabiting the waters in various parts of the United States is a small mollusc first noticed by Mr. Say under the name "*Melania isagona*." Since then it has been assigned by different writers to *Anculosa*, *Paludina* and *Ammicola*. To Mr. Lea is assigned the credit of first surmising the generic place of this mollusc, and an examination of the soft parts of this mollusc in connection with other species of *Ammicola* confirms the correctness of Mr. Lea's decision in placing this mollusc with *Ammicola*. The most marked feature observed in the soft parts of this species when compared with other species of *Ammicola*, is the shortness and width of the foot. In this respect the foot corresponds with the shell. It may be well to remark here, that the length and breadth of the foot in all species of *Ammicola* observed by the writer, correspond to the length and breadth of the shell.

The following notes on *Paludina* have, in part, been some time prepared. Their publication at this time may serve a useful purpose.

*PALUDINA INTEGR*a, Say, (De Kay.) Soft parts.

The coloring of the external soft parts presents some variety, but less than has been observed in other univalves found in the Mohawk River and Erie Canal. A characteristic specimen exhibits the following features:

Upper surface of foot mottled with numerous coalescing orange spots, more or less brilliant, the interstices being slate color with a faint purple tinge, in a strong light almost black, by contrast with the orange spots. The longer diameters of these spots are directed toward the anterior central part of the foot, causing them to appear somewhat as if radiating from that point. Beneath the shell (on the neck) and anterior to the opercle the surface is nearly destitute of spots, and of a light slate color. On the inferior surface of the foot, the spots are less numerous, smaller and diminishing toward the central line, on each side of which is an undefined space nearly free from spots.

Removed from the shell, the mantle is observed to be densely covered with *pigmentum nigrum*, from the margin bordering the aperture of the shell to very near the last apical whorl. The parts of the mantle which line the outer portions of the shell are more densely covered with pigment than the part embracing the columella.

Embryonic specimens when ready for exclusion are nearly 3-16th inch long, the shell translucent, pale olivaceous and permitting two or three faint black linear bands on the mantle to be seen through it. These black lines subsequently extend, and form the coating of pigment observed on the mantle of the adult. This species, as well as other species of *Paludina* of this country, (and perhaps this may be observable in all viviparous univalve molluscs, as it certainly is to a greater extent in a genus of air-breathing molluscs of the Sandwich Islands,) affords about two per cent. of reversed specimens among its young. A considerable number of specimens of this species having this character have been found full grown, bearing young. The young in such instances show only a slightly increased percentage of reversed specimens.

It is not unusual to find among the embryonic young of this species, specimens in which the whorls are made to embrace each other, as in *Planorbis*.

Specimens have also been observed in which the whorls were lax and separated from each other. But no living specimens separated from the parent have ever been detected with these features.

Other specimens have been observed in which the whorls are drawn nearer the axis of the shell, making the shell elongated. In these specimens the parts which have been drawn away from the preceding whorls are eroded and  
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the adult presents a curious scalariform appearance under these circumstances.

This species feeds on animal and vegetable food; over one hundred were taken from a decomposing salt cod-fish that had been thrown into the Erie Canal. They have also been found feeding on *Uniones* recently dead. They are most abundant in locations where refuse food from boats or other sources accumulate in the Canal.

The ovaries are usually free from young only a few weeks in early summer. The number produced by an adult seldom exceeds thirty, and is often less. Specimens have been found 1 9-10th inches long. The usual dimensions of the adult seldom exceed 1 6-10th inches. The proportions of the sexes are somewhat different in this species from those of *decisa* and *rufa*, there being a somewhat greater percentage of males for this species. The females are about eight times more numerous than the males.

*Paludina decisa?* Say.

*Paludina decisa*, De Kay.

This seems to be somewhat a stumbling block to naturalists in this country, and writers who have endeavored to elucidate Mr. Say's writings on this species, evidently imitate him in confounding two distinct species. Mr. Say's figure of *decisa* in his American Conchology belongs to a group which embraces *P. ponderosa*, Say, as its type, which species any one acquainted with the soft parts would say is more nearly related to *integra* than to that species which, by common consent among naturalists in the eastern portion of the United States, (and evidently following Mr. Say's earliest types,) is called *decisa*.

The writer of this paper at one time confounded *integra* and *decisa*, and continued in that error until obvious and constant differences from the embryonic young to the adult, forced the conclusion that they were distinct species.

*P. DECISA.* *Soft parts.*

Spots less numerous than in *integra*, larger, brighter, circular, well-defined, and separate, and not arranged radially as in *integra*.

Mantle white, with scarcely any *pigmentum nigrum*. Embryonic young more numerous than in *integra*; no linear bands of pigment on the mantle. Length  $\frac{1}{8}$  inch. Reversed specimens about two per cent. as in *integra*. No distorted embryonic young yet observed. The reversed young seldom attain half the size of the adult, and specimens have not yet been found with young.

No evidence has been presented that this species partakes of animal food.

Adults of this species sometimes attain a length of  $1\frac{1}{2}$  inches—usually less.

*PALUDINA RUFa*, Haldeman. *Soft parts.*

Upper surface of foot of a dark slate color, almost purple when seen in a favorable light, marked with numerous small disconnected greyish orange spots occupying less of the surface than in *decisa*. Tentacles dark, with a pale margin. Mantle covered with *pigmentum nigrum*.

Embryonic young nearly as large as those of *decisa*, the shell of a decided pink tinge, translucent and with a polished epidermis. This last feature characterizes the shell at all stages of development. Faint markings appear on the mantle through the shell.

The largest adults observed were nearly  $1\frac{1}{2}$  inches long. In these the last whorl presents a flattened surface parallel with the surface of the preceding whorls, with a somewhat well characterized angle between that surface and the base of the shell. The angularity observable below the suture of *integra* is never seen in this species, and the angularity on the middle of the whorl in this species, is not seen in *integra*; *decisa* has no angularities.

Specimens of this species with well-marked bands have been observed. Similar features have also been observed in *integra* and *decisa*, but in these

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they can be traced to injuries inflicted on the margin of the mantle at an earlier stage of existence, while *rufa* presents these characters as the indications of a variety.

Reversed specimens among the embryonic young do not seem to be as numerous as in *decisa* or *integra*, though they are not rare. They seldom survive separation from the parent. Of many hundreds of specimens taken of all ages, only a single reversed specimen  $\frac{1}{4}$  inch in diameter attests their existence after exclusion. No distorted specimens, either young or adult, have yet been detected.

This species has within a few years been introduced at the points where observed. It prefers to associate with *integra* rather than with *decisa*, and this leads to the supposition that it is carnivorous, though no evidence has been found which is demonstrative of that fact.

The writer has been favored with proof sheets of a Descriptive Catalogue of the species of *Amnicola*, *Vivipara*, &c., of North America, by W. G. Binney. As I do not hope to alter Mr. Binney's views by any suggestions made to him, the following are offered for the consideration of those who might otherwise accord too much to Mr. Binney's somewhat sweeping generalizations.

It is quite probable that many small molluscs, which are at present placed in genera to which they seem most nearly allied by the forms of their shells, will hereafter be separated when their soft parts have been studied. Two instances appear in the preceding papers—" *Amnicola isogona*, Lea," and " ——— (*Cyclost.*) *lapidaria*, Say." Perhaps a third (*Amnicola attenuata*, Hald., 3d page Des. Cat.) deserves consideration, under a future review of *Amnicola*. There are good reasons for believing that the forms of the shells of the various species of *Amnicola* are embraced within limits typified by *A. tenuipes*, Hald., and *A. isogona*, Lea. A species more slender than *A. tenuipes* should certainly have the evidence of the soft parts to confirm its position, and it is unfortunately the case that these are too often passed over hurriedly or entirely neglected.

It is quite probable that "*Amnicola protea*, Gould," will be found not to be an *Amnicola*.

*Amnicola* (Pal.) *lustrica*, Say, if Mr. Say's remarks on that species are entitled to any consideration, probably covers some such a shell as *Valvata pupoidea*, Gould.

*Amnicola granum*, Say. This species may perhaps be the same as *Amnicola obtusa*, Lea.

Specimens of this species (*granum*) found in near, but dissimilar, locations, present great variations in magnitude and color.

Mr. Binney's treatment of the several species of *Paludina* (*Vivipara*), the apical whorls of which are carinate, should be modified to conform to the rules he applies to *decisa* and its analogous forms, or he should abandon the position he has assumed with regard to *decisa*. It is quite as plain that *Pal. subcarinata*, Say, should be made to embrace as varieties all the species with carinate apical whorls as that *decisa* should embrace so many species as Mr. B. has assigned to it.

On page 22 of Mr. Binney's paper is a figure of *decisa*, which may be regarded as presenting a tolerable outline of the typical form of that species, as first understood by Mr. Say. On page 23 is a figure of a deformed *Pal. integra*, the malformation resulting from an injury imparted to the margin of the mantle of the animal in an earlier stage of growth. The original specimen from which the figure was made is in the possession of the writer.

Page 24, fig. 37, is a specimen of *P. integra*, in which the whorls are drawn to the axis. The parts which should be applied to the preceding whorls are somewhat drawn away at the suture, and are eroded.

Page 26, fig. 38, is correctly named *Pal. (Vivi.) integra*.

Page 32, fig. 38, a reversed shell. All our olivaceous species produce this form, and it cannot be regarded as a normal species.

Fig. 40, does not give a recognizable outline of typical *Pal. rufa*, of the size of the figure.

Fig. 43, page 27, refers to a species of shell found in the Ohio Canal at Columbus, Ohio. Other shells of a similar form at maturity, from other localities have been confounded with this as *Pal. obesa*; but later investigations referring to the embryonic young and other specimens of various sizes would warrant the conclusion that they were distinct. This shell stands related on one hand to *integra* and *ponderosa*, and on the other to *Pal. regularis*, Lea. The young shells nearly but not quite resemble Mr. Lea's types of *regularis*.

Fig. 44. *Pal. genicula*, is more nearly allied to *integra* than to any other known form.

Mr. Binney has given a figure of the lingual dentition of specimens of *Pal. integra* on page 29. It is to be regretted that minute comparisons were not made between those of *integra* with the teeth of *rufa* from the specimens of the two species which were furnished him by the writer for that purpose.

Mr. Binney is also unfortunate in his treatment of *Pal. coarctata*, Lea. It certainly cannot short of doing violence to the subject be made to embrace *Pal. exilis*, Anth., to which *P. compressa* is here submitted as a synonym.

#### ERRATA AND ADDENDA.

Page 71, line 9 from bottom, for "chryostictus" read chrysostictus.

73, line 34, for Ialtris read Jaltris.

75, line 7 from bottom, for Ophiomorphus read Opheomorphus.

76, note 3d, for 210 read 180.

77, line 12, add loreal oblong.

77, line 28, for "Haliophis" read Alsophis.

78, line 13, for "epinephalus" read epinephelus.

154, line 11, add after *Halophila*, Gird., (?=*Platymantis*, Gthr.)

154, line 12, add plicifera.

184, line 5 from bottom, add Tympanic orifice distinct.

189, line 34, for 1 in. 9 l. read 2 in. 9 l.

240, line 6, for *Carphoptis Harpesti* read *Carphophis harperti*.

337, line 3 from bottom, for *Homoroselaps* read *Homoroselaps*.

337, note, for Falvin read Salvin.

340, line 5, add, although the same parts may usually very early attain completion, thus becoming of great systematic value.

340, line 4 from bottom, add, from Ooroomiah.

340, line 3 from bottom, add Umvoti Zulu Country.

341, line 30, add, from Umvoti Zulu Country.

344, line 8, add, from Ooroomiah.

346, before TESTUDINATA insert CROCODYLIA. *Jacare latirostris*, Gray.  
Dum. Bibr. iii. p. 86, Buenos Ayres.

350, line 14, add Perhaps the curiyú of Azara, i. 226.

350, line 26, add as shown by Dr. J. E. Gray.

353, line 5, for podicipinus read podicipitinus.

353, line 29, for variabilis read intermedius.

356, line 6 from bottom, and

357, line 21, for Von Martins read Von Martens.

358, between lines 40 and 41, add stermodignatus ex Gthr.

358, line 46, after *Phryne* add Fitz.

359, note, line 9, add perhaps not different from *H. baudinii*.

The Reports of the Recording Secretary and Curators were read as follows :

[Dec.

## REPORT OF THE RECORDING SECRETARY.

For 1862.

During the year ending 30th November, 1862, there have been elected eleven members and thirteen correspondents. Five members have resigned.

The following members have died: Mr. George W. Peterson, Mr. Charles Henry Fisher, Mr. Henry J. Boller, Dr. Henry E. Drayton, Mr. Hugh Cooper Hanson, Mr. Richard Wistar, Major Henry J. Biddle, General Francis E. Patterson.

The deaths of the following Correspondents have been announced: Mr. Grateloup, of Bordeaux; Professor Ormsby M. Mitchel, of Cincinnati, O.

The number of papers presented for publication during the past year has been ninety-five, as follows:

By Theodore Gill, twenty-nine; Isaac Lea, LL. D., nine; E. D. Cope, eight; George W. Tryon, six; S. B. Buckley and John L. Le Conte, M. D., each five; Temple Prime and Elliott Coues, each three; Wm. M. Gabb, F. B. Meek and F. V. Hayden, M. D., J. H. Slack, M. D., Wm. H. Edwards, Wm. Stimpson, Augustus R. Grote, Prof. Asa Gray, each two; Charles C. Abbott, Sidney S. Lyon, Thomas Meehan, George H. Horn, Harrison Allen, M. D., W. G. Binney and George W. Tryon, Benjamin D. Walsh, M. A., John Cassin, T. A. Conrad, John Warner, Alexander Winchell, D. G. Elliott, F. G. S., Horatio C. Wood, Jr., each one.

All of which is respectfully submitted.

B. HOWARD RAND, M. D.,

*Recording Secretary.*

## REPORT OF THE CURATORS.

For 1862.

The collections of the Museum of the Academy continue in their usual good state of preservation. During the year the most important additions have been as follows:

1. A valuable collection in Natural History, presented by Dr. I. I. Hayes, and made by him during his late Arctic Expedition, consisting of skins and skeletons of mammals, skins of birds, marine dredgings, plants, minerals, fossils and Esquimaux skulls.

2. A collection of about six hundred species of West Indian marine shells, presented by Dr. A. Heermann.

Besides the foregoing, the following have been received in the various departments of Natural History:

*Mammals.*—Eleven specimens of ten species were presented by Rev. Alden Grout, and M. J. McKen, Dr. J. H. Slack, Van Amburgh & Co., F. Rhineland, Dr. J. Evans, Mr. Howard and Dr. Parker.

*Birds.*—Ten specimens were presented by Dr. Wilson, Dr. J. Evans, Dr. J. H. Slack, W. H. Yeaton, J. Buzby and Mrs. Farren.

*Reptiles.*—The Smithsonian Institution presented 55 specimens of 42 species, besides 30 others in the name of the U. S. Government. Dr. Le Conte presented 60 specimens of 23 species; Mr. E. D. Cope 44 specimens of 39 species; Rev. Alden Grout and M. J. McKen 15 specimens of 13 species; John Xantus 13 specimens of 9 species; and several others were received from Dr. T. B. Wilson, Dr. J. H. Slack and Dr. J. Evans. Eighty-six specimens of 29 species were also obtained in exchange.

*Fishes.*—Small collections containing numerous specimens of about 40 species were presented by Rev. A. Grout and M. J. McKen, Capt. T. Y. Field, E. D. Cope, C. F. Bernhardt, J. Roosevelt and S. Powell.

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*Mollusks*.—A collection of shells from Port Natal was presented by Rev. Alden Grout, and M. J. McKen, and a collection of 63 species was presented by J. H. Sternberg, through Captain Field. Other specimens were presented by Captain T. Y. Field, U. S. N., Dr. C. J. Cleborne, Dr. A. L. Heerman, Dr. J. H. Slack, I. Lea, S. Smith and J. F. Whiteaves.

*Articulates*.—The Smithsonian Institution presented 54 specimens of 37 species of myriapoda, and a number of insects, crustacea, and spiders were received from Rev. A. Grout and M. J. McKen, Dr. J. Wilson, Captain T. Y. Field, James Roosevelt and Dr. Stewardson.

*Radiates*.—A collection of thirty-five echinoderms, from the coast of Maine, was presented by Dr. J. H. Slack.

*Anatomy*.—Skulls of animals and other anatomical specimens were presented by W. S. Vaux, W. S. Wood, Professor Frazer and Lieutenant De Haven.

*Fossils*.—A fine collection of fossils of the Swiss Jura was presented by Joseph Lesley, Jr. Several collections were also received in exchange, and a number of specimens were presented by E. D. Cope, Dr. J. M. Corse, Rev. A. Grout, J. McKen, Dr. J. Evans, Dr. Le Conte, A. H. Smith, Captain Field and Rev. H. Riley.

*Minerals*.—Specimens were presented by W. S. Vaux, W. Struthers, Dr. Rand, E. Kretzmar, Captain Field, G. D. Coleman and J. H. Thompson.

*Botany*.—A collection of plants was presented by T. J. Hale, and other specimens were received from Dr. Bertolet, R. Bingham and E. Durand.

Submitted by

JOSEPH LEIDY,

Chairman of the Curators.

The election of officers for the ensuing year was held, in accordance with the By-Laws, with the following result :

<i>President</i> .....	ISAAC LEA, LL. D.
<i>Vice-Presidents</i> .....	Robert Bridges, M. D., Wm. S. Vaux.
<i>Corresponding Secretary</i> .....	Thomas Stewardson, M. D.
<i>Recording Secretary</i> .....	B. Howard Rand, M. D.
<i>Librarian</i> .....	J. D. Sergeant.
<i>Treasurer</i> .....	Wm. C. Henszey.
<i>Curators</i> .....	Joseph Leidy, M. D., Wm. S. Vaux, John Cassin, J. D. Sergeant.
<i>Auditors</i> .....	Wm. S. Vaux, Joseph Jeanes, Aubrey H. Smith.
<i>Publication Committee</i> .....	Wm. S. Vaux, Isaac Lea, Robert Bridges, Joseph Leidy, Thomas Stewardson.

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ELECTIONS IN 1862.

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The following persons were elected Members:

*January 28.*—George K. Wood, of New York.

*March 25.*—John P. Crozier, F. Leyboldt, Henry Morris.

*May 27.*—Robert Hare Powel, E. Spencer Miller.

*July 29.*—Harrison Allen, M. D.

*October 28.*—Capt. Wm. F. Reynolds, U. S. Top. Engineers.

*November 26.*—Thomas Scattergood, Jr., A. K. Smith, M. D., John S. Billings, M. D.

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The following were elected Correspondents :

*January 28.*—Lovell Reeve, of London; G. B. Sowerby, of London; Temple Prime, of New York; Ph. P. Carpenter, of Warrington, England.

*February 25.*—Francis Boot, M. D., of London.

*April 29.*—Prof. Jos. Decaisne, Jacques Gay, Edouard Spach, all of Paris.

*June 24.*—Dr. F. Stein, of Prag; J. Lachmann, of Geneva; Dr. John Dean, of Boston.

*July 29.*—J. H. Thompson, of New Bedford, Mass.; Prof. D. S. Sheldon, of Davenport, Iowa.

## CORRESPONDENCE OF THE ACADEMY.

For 1862.

Letters were received and read as follows :

*Jan. 14th.* Natural History, Society of Augsburg, August 3d, 1861 ;  
 Society of Naturalists in Halle, August 8th, 1861 ;  
 Society of Natural Science, Wurtemberg, July 1st, 1861 ;  
 Royal Society of Sciences, Liege, July 27th, 1861 ;  
 Royal Saxon Society of Sciences, Leipzig, July 30th, 1861 ;  
 Senkenburg Natural History Society, Frankfurt-am-Main, August 22d, 1861 ;  
 Imperial Society of Naturalists, Moscow, June 13th, 1861 ;  
 Dr. Rutz of Paris, September 9th, 1861 ; severally accompanying donations.  
 The Royal Society of Sciences of Liege, July 27th, 1861 ;  
 Royal Saxon Society of Sciences, Leipzig, Aug. 1st., 1861 ; severally acknowledging the receipt of the publications of the Academy ;  
 The Society of Naturalists, Freiburg, July 10th, 1861 ; transmitting donations, and acknowledging the receipt of those of the Academy ;

The Society of Natural Sciences, Hamburg, Nov. 27th, April 6th, 1861 ; acknowledging the receipt of the publications of the Academy. From the same, Oct. 2d, 1861.

Royal Academy of Sciences of Madrid, Jan. 1, 1862 ; acknowledging the receipt of the publications of the Academy.

Royal Academy of Sciences of Vienna, Jan. 25th, 1861 ; transmitting their publication.

*Feb. 11th.* Prof. Henry, Secretary of Smithsonian Institution ; accompanying a donation.

*Feb. 18th.* Mr. E. D. Jackson, New York, Jan. 29th, 1862 ; transmitting a donation.

*March 18th.* Royal Imperial Geological Society of Vienna, Sept. 15th, 1861 ;  
 Lyceum of Natural History, New York, Feb. 24th, 1862 ; Editors Entomological Monthly Journal, Vienna, Oct. 21st, 1861.

Society of Natural Science, Altenburg, Sept. 24th, 1861 ;  
 German Geological Society, Berlin, Oct. 7th, 1861 ;  
 Royal University of Norway, Christiana, Oct. 26th, 1861 ;  
 Royal Academy of Sciences, Munich, Dec. 2d, 1861 ; severally acknowledging the receipt of the publications of the Academy.

Prussian Academy of Sciences, Aug. 31st, 1861 ;  
 Society of Natural Sciences of Nassau, Wiesbaden, Oct. 1st, 1861 ;  
 Royal University of Norway, Christiana, Oct. 26th, 1861 ;  
 Adolph Weiss, Vienna, Sept. 1st, 1861 ;  
 Society of Sciences of Finland, Helsingfors, Oct. 18th, 1861 ;  
 Royal Society of Sciences, Upsala ;  
 Society of Natural Sciences of Offenbach-am-Main ; severally accompanying their publications.

Society of Natural Sciences, Lunenburg, Nov. 17th, 1861 ;  
 Royal Academy of Sciences of Vienna, Oct. 28th, 1861 ;  
 Royal Danish Society of Science, Copenhagen, July 1st, 1861 ;  
 Society of Natural Sciences of Saxony, Halle, Nov. 1st, 1861 ;  
 Natural History Society in Nuremberg, Dec. 4th, 1861 ; transmitting their publications and acknowledging the receipt of those of the Academy.

Geo. V. Frauenfeld, Vienna, Oct. 3d, 1861 ; acknowledging his election as correspondent.

*April 15th.* C. Des Murs, Bordeaux, Feb. 28th, 1862 ; acknowledging his election as correspondent, and in behalf of the Linnean Society of Bordeaux, acknowledging the receipt of the Proceedings of the Academy.

London Athenæum, March 25th, 1862;  
American Geographical and Statistical Society, New York, April 21, 1862;  
severally acknowledging the receipt of the publications of the Academy.

*April 22d.* New York State Library, Albany, April 19th, 1862;  
Lyceum of Natural History, New York, April 14th, 1862; severally acknowledging the receipt of the publications of the Academy.

Mr. John P. Crozier, Upland, April, 1862; acknowledging his election to membership and transmitting a donation.

*May 13th.* The Imperial Academy of Sciences, Vienna, Dec. 28th, 1861;  
American Geographical and Statistical Society, May 1st, 1862;  
Royal Society of Edinburgh, Dec. 31st, 1861;  
Leeds Philosophical and Literary Society, Oct. 24th, 1861;  
Geological Survey of India, Sept. 14th, 1861; severally acknowledging the receipt of the publications of the Academy.

Catholic University of Louvain, Sept. 16th, 1861;  
Royal Academy of Sciences of Amsterdam, Oct. 26th and 29th, 1861;  
Royal Society of Zoology of Amsterdam, Feb. and April, 1862; severally transmitting their publications and acknowledging the receipt of those of the Academy.

Lovell Reeve, London, April 14th, 1862;

F. Boot, London, April 7th, 1862; severally acknowledging their election as correspondents.

A letter dated Harlæm, Jan. 15th, 1861; transmitting in behalf of the Minister of the Interior a donation to the library of the American Philosophical Society, which donation had been inadvertently presented to the Academy at its last meeting, was transferred to the American Philosophical Society.

*June 3d.* British Museum, June 21st, 1861;  
Royal Society of Edinburgh, Dec. 31st, 1861;  
Batavian Society of Sciences, Rotterdam, Sept. 30th, 1861;  
Society of Natural Sciences, Basel, Switzerland, Nov. 8th, 1861;  
Natural History Society, Augsburg, Nov. 20th, 1861;  
Royal Institution, London, Oct. 10th, 1861;  
Society of Natural Sciences, Berne;  
Leeds Philosophical and Literary Society, Oct. 24th, 1861;  
Geological Survey of India, Calcutta, Sept. 14th, 1861; severally acknowledging the receipt of the publications of the Academy.

Royal Institute, Picadilly, Nov. 14th, 1861; transmitting its publications and acknowledging the receipt of those of the Academy.

*July 1st.* Natural History Society of Prussian Rhineland and Westphalia, Bonn, Jan. 22d, 1862;

Smithsonian Institution, Nov. 26th and Dec. 28th, 1861;  
Royal Prussian Academy of Sciences, Berlin, Feb., 1862;  
Lyceum of Natural History, New York, Jan. 13th, 1862; severally acknowledging the receipt of the publications of the Academy.

Senkenburg Natural History Society, Frankfurt-am-Main, March 1st, 1862;  
Royal Academy of Sciences, Lisbon, March 22d, 1862; severally transmitting their publications.

Catholic University, Louvain, Nov. 26th, 1860; transmitting its publications and acknowledging the receipt of those of the Academy.

*July 8th.* Mr. Cheney, Cattaraugus, N. Y., July 3d, 1862;  
A. Grant, Mioli Mission Station, March 30th, 1862; accompanying a donation.

*July 15th.* Smithsonian Institution, July 14th, 1862; accompanying a donation.

*Aug. 5th.* Jacques Gay, Paris; acknowledging his election as correspondent.

*Sept. 16th.* Royal Society, London, Jan. 10th, 1862;  
Smithsonian Institution, Washington, Jan. 14th, 1862;

Royal Asiatic Society, London, Jan. 1st, 1862; severally acknowledging the receipt of the publications of the Academy.

Physical and Medical Society, Wurtzburg, April 8th, 1862.

Imperial Academy of Sciences, Vienna, April 12th, 1862; severally accompanying donations.

Academy of Sciences, Madrid, Dec. 31st, 1861;

Natural History Society, Freiburg, March 5th, 1862;

Imperial Leopold-Carolus Academy, Jan. 19th, April and Sept., 1861; severally transmitting donations and acknowledging the receipt of those of the Academy.

J. H. Thompson, New Bedford, Mass., Aug. 16th, 1862;

John Dean, Boston, Aug. 16th, 1862; severally acknowledging their election as correspondents.

*Oct. 7th.* Royal Geographical Society of London, March 22d, July 1st, Dec. 4th, 1861, June 3d, 1862; severally acknowledging the receipt of the Proceedings of the Academy.

Prof. D. S. Sheldon, Sept. 18th, 1862; acknowledging his election as correspondent.

*Dec. 2d.* J. C. Cornay, Paris, Oct. 1st, 1862;

Frederich Stein, Prague, Oct. 2d, 1862; severally acknowledging their election as correspondents.

British Museum, May 29th, 1862;

Academy of Sciences of St. Louis, Nov. 8th, 1862;

New York State Library, Albany, Nov. 10th, 1862;

American Geographical and Statistical Society, New York, Oct. 1st, 1862;

Royal Academy of Sciences of Belgium, Sept. 6th and 7th, 1860, Sept. 1861;

Linnæan Society, London, Aug. 1st, 1862; severally acknowledging the receipt of the publications of the Academy.

Bohemian Society of Sciences, Prag, March 21st, 1862;

Natural History Society of Riga, April 22d, 1862;

Imperial Royal Academy of Sciences of Padua, Feb. 15th, 1862;

Royal Imperial Zoologico-Botanical Society, Vienna, March 20th, 1862;

Natural History Society of Danzig, May 29th, 1862;

Imperial Academy of Sciences, Vienna, Aug. 1st, 1862;

Geological Survey of India, Calcutta, Dec. 20th, 1862;

Delaware County Institute of Sciences, Nov. 25th, 1862; severally transmitting their publications.

Upper Hessian Society of Physical and Medical Sciences, Giessen, June 1st, 1862; transmitting their publications and acknowledging the receipt of those of the Academy.

*Dec. 9th.* Mr. Thos. Scattergood, Philadelphia, Dec. 8th, 1862, acknowledging his election to membership.

*Dec. 16th.* John S. Billings, M. D., U. S. A., Philadelphia, Dec. 16th, 1862, acknowledging his election to membership.

## DONATIONS TO MUSEUM.

1862.

Bernhardt, C. F. *July 1st.* *Tetraodon levigatus.*

Bertolet, Dr. *July 1st.* A collection of Sections of Woods.

Bingham, R. *Jan. 7th.* Fossil Wood, from near Alexandria, Va., and 8 specimens of Native Woods.

Busby, J. *Dec. 9th.* Young of the Eiderduck. Barnegat.

Cleborne, C. J., M. D. *Sept. 2d.* A collection of Marine Shells from the coast of S. Carolina.

Coleman, G. D. *April 1st.* Numerous specimens of Native Copper, Lebanon Co., Penna.

- Cope, E. D. *June 17th.* A collection of Cretaceous and Eocene Fossils, from Monmouth Co., N. J. *July 1st.* Thirty-three specimens, 28 species, Reptiles, from various parts of the world. Numerous specimens, two species of Fishes. *Sept. 2d.* Eleven specimens of Reptiles.
- Corse, Dr. J. M. *Nov. 18th.* Two fine specimens of Fossil Fishes of Monte Bolca.
- De Haven, Lieut. *Jan. 7th.* Tusk of Narwhal.
- Durand, E. *April 1st.* Specimens of the Club and Egg Gourd.
- Evans, Dr. J. *April 1st.* A collection of Tertiary Fossils, and Coal, 3 Reptiles, several Bats, 3 Bird Skins, &c., from Chiriqui. Presented by the widow of the late Dr. John Evans.
- Exchange, received in *Jan. 7th.* Brucite. Lancaster Co., Penna. *May 6th.* A collection of Coal Fossils from New Brunswick, B. P. *Oct. 7th.* Forty specimens Oolitic Fossils from England.
- Farren, Mrs. *May 6th.* *Colymbus torquatus.*
- Field, Capt. *July 22d.* A collection of Shells. *Aug. 5th.* A collection of Fishes of the genera *Serranus*, *Hemiramphus*, *Vomer*, *Batrachus*, *Julis*, *Diodon* and *Ophidium*. A collection of Crustacea of the genera *Mithrax*, *Eriphia*, *Xantho*, *Panopeus*, *Ozius*, *Lupa*, *Gecarcinus*, *Ocypode*, *Gelastimus*, *Grapsus*, *Planes*, *Pagurus*, *Porcellana*, *Scylla*, *Calappa* and *Lithodes*, from the Isthmus of Panama and other places. Fragments of Fossil Wood and Bone, and several Minerals, from California. *Sept. 2d.* Six species land and fresh water Shells, from Panama.
- Frazer, Prof. *July 1st.* Mummied Ibis.
- Grout, Rev. Alden and M. J. McKen. *July 8th.* Skins of *Eleotragus reduncus*, *Pteropus*? *Crysochloris*? and a collection of Reptilia and Fishes, from West Africa. *Sept. 2d.* Fifteen specimens, 13 species Reptiles, from Port Natal, Africa. A collection of Terrestrial, Fluvial and Marine Shells. A small collection of Insects, and two specimens of Fossil Wood, from Port Natal.
- Hall, T. J. *Feb. 18th.* Collection of Plants, from Wisconsin.
- Hayes, Dr. I. I. *Jan. 14th.* A portion of his collection from the Arctic Regions, viz.: Twenty-three species of Marine Shells, from the vicinity of Port Foulke. Two *Phoca barbata*, 2 *Vulpes lagopus*, 2 *Vulpes fuliginosus*, 1 *Lepus glacialis*; several fetuses of *Phoca barbata* and *Lepus glacialis*, skeleton of *Vulpes lagopus*, a large skull of the Walrus, skull of a young Walrus, and fragment of a second penal bone of the Walrus, skull of the Polar Bear, fragment of 3 skulls of the Musk Ox, from Port Foulke, and fifty bottles of dredgings from the vicinity of the latter place. A small collection of Carboniferous Limestone Fossils, from Cape Leidy. *Nov. 2d.* The remainder of his collection, viz.: 1 skeleton of Walrus, from Port Foulke, 1 skin of Walrus, do.; 1 heart of Walrus, from Whale Sound; 1 jaw of Walrus, from Cape Isabella; 1 Seal skin, from Port Foulke; 1 Seal skin, from Godhavn; 1 skin of Esquimaux Dog, from Port Foulke; 1 Fox skin, from Godhavn; 1 Fox skin (blue), from Port Foulke; 1 Fox skin (white), do.; 1 skeleton of Blue Fox, do.; 1 skin of Arctic Hare, do.; 1 skeleton of Reindeer, do.; 2 pairs of Reindeer Antlers, do. A small Botanical collection, from Port Foulke and other localities. The choice of specimens from a large collection of Esquimaux skulls, from Port Foulke, Godhavn, and other localities, list of specimens selected to be furnished by Dr. J. A. Meigs. The choice of specimens from an Ornithological collection, from various localities, list of specimens selected to be furnished by Mr. John Cassin. Geological specimens from various localities, including some Silurian Fossils, from Grinnell Land, located 81° North. Some small specimens of Meteoric Iron, from *Sa-vi-sa-vik*, near Cape York, North Greenland. Also the privilege of selection from the collection of the expedition, now in the store-rooms of the Academy, as the Academy may desire.

- Heermann, A. L. *Jan. 7th.* Seven *Unio laticostatus*, *U. aureus* and *U. Forshyei*, Texas. *Jan. 14th.* A collection comprising about 600 species of W. India Marine Shells.
- Howard, Mr. *April 1st.* Two skins of *Sciurus Aberti*.
- Kretzmar, E. *April 8th.* Two specimens of Gold Ore, from Nova Scotia.
- Le Conte, Dr. J. *Aug. 5th.* Collection of Fossils, from an Artesian well, 500 feet deep, at Fortress Monroe. *Sept. 2d.* Sixty specimens, 23 species of Reptiles, from the collection of the late Major Le Conte.
- Lea, I. *Jan. 7th.* *Lithasia florentina* and *L. semigranulata*, Alabama.
- Lesley, Jas., Jr. *Aug. 12th.* A collection of Fossils of the Swiss Jura.
- Poey, Prof. *Sept. 2d.* Eighty-six specimens, 29 species of Reptiles, from Cuba and Mexico, in exchange.
- Parker, Dr. *May 6th.* An Albino Rat.
- Powel, S. *May 2d.* Several Fishes, from Newport.
- Rand, Dr. B. H. *Sept. 2d.* Large specimen of Arborescent hæmatite, from Pike's Peak.
- Rhineland, F. *May 2d.* A foetal Porpoise. Newport, R. I.
- Riley, Rev. Henry. *Nov. 3d.* Two casts of Fossils, from the old red sandstone of Montrose, Pa.
- Roosevelt, J. A. *May 20th.* Numerous specimens of Fishes, Crustacea, Scorpions, Marine Annelides, &c., from Tortugas.
- Slack, J. H. *Feb. 4th.* Mounted specimen of *Hylobates leuciscus*, from India. Huffnagle Collection. Two skulls of *Sus Indicus*. India, deposited. *March 4th.* *Amblystoma tigrina*, from Oakwood, N. J. *Pecten magellanicus*, from Grand Manan. *July 8th.* Thirty-five specimens *Echinodermata*, from Eastport, Maine. *July 9th.* Young mounted specimen of *Scops asio*, from Crosswicks, N. J. *Dec. 9th.* Cast of skull of *Gorilla castaneiceps*, deposited.
- Schmidt, H. D. *Feb. 11th.* Large Grasshopper, from Brazil.
- Smith, A. H. *April 8th.* Four species of Fossil Shells, from the boring of an Artesian well at Fortress Monroe.
- Smith, S. *Sept. 23d.* *Diplothyra Smithii*. Tryon, Coast of N. Y.
- Smith, T. G. *May 20th.* Fossil Plant, from Schuylkill Co., Pa.
- Smithsonian Institution. *Feb. 11th.* Thirty-one specimens, 20 species, of Chilopoda. *April 1st.* Twenty-three specimens, 17 species, of Myriapoda. *Sept. 2d.* Fifty-five specimens, 42 species, Reptiles.
- Sternberg, J. H. *July 1st.* A fine collection comprising numerous specimens of 63 species of Shells, from Panama. Through Capt. T. Y. Field.
- Stewardson, Dr. T. *Nov. 3d.* Six specimens of the *Attacus Cynthia*.
- Struthers, Wm. *May 20th.* Fossil Coal Plant, from New Brunswick, B. P. Two specimens of Marbles, from Cumberland Co., Pa.
- Thompson, J. H. *April 1st.* Sand, from Davis' Strait. *Nov. 11th.* Two species of Sponges, and six specimens of Crystalline slags.
- United States Government. *May 6th.* Thirty species of Reptiles.
- Van Amburg's Menagerie Co. *April 1st.* Skin of a Bengal Tiger.
- Vaux, W. S. *Feb. 4th.* Skull of *Crocodilus palustris*. India, Huffnagle Collection. *Dec. 9th.* Tetrahedral Grey Copper, coated with copper pyrites, from Cornwall, England.
- Whiteaves, J. F. *Sept. 23d.* *Modiola barbata*. England.
- Wilson, Dr. T. B. *May 20th.* *Mycteria Senegalensis*, River Camma, W. A. *Ardea goliath*. R. Ogobai, W. A., from DuChailu's Coll. *Feb. 4th.* Two specimens of *Hyliæ* in Alcohol, from Newark, Del. Bottle of Reptiles, from Charleston, S. C.
- Wilson, Dr. J. *Jan. 7th.* Large Spider, from Vera Cruz.
- Wood, Dr. Wm. S. *Feb. 18th.* Skull of an Esquimaux.
- Xantus, John. *April 1st.* Thirteen specimens, 9 species *Caudisona*, *Trimorphodon*, *Hypsigena*, *Pityophis*, *Tropidonotus*, *Chilomeniscus* and *Lichanura*, from Cape St. Lucas, Cal.
- Yeaston, W. H. *March 11th.* Two Brant Geese, from Tuckertown, N. J.

## DONATIONS TO THE LIBRARY.

1862.

## JOURNALS AND PERIODICALS.

## SWEDEN.

- Upsala. Arsskrift ut gifven af Kongl. Vetenskaps-Societeten, 1. Upsala, 1861. From the Society.  
 Nova Acta Regiæ Societatis Scientiarum. Upsaliensis. Seriei Tertie, vol. 3, 1861. From the Society.

## DENMARK.

- Kobenhavn (Copenhagen). Oversight over det Kongeligedanske Videnskabs-bernes. Selskabs, 1860. From the Society.  
 Skifter af Naturhistorie-Selskabet, 6 vols. From the Library Fund.

## NORWAY.

- Christiania. Det Kongelige Norske Fredericks Universitets stiftelse fremstillet, 1861. From the Society.

## RUSSIA.

- Helsingfors. Bidrag till Finlands Naturkännedom, utgifna af Finska Vetenskaps-Societeten, 1860. From the Society.  
 Bidrag till Kännedom af Finlands Naturoch Folk, utgifna af Finska Vetenskaps Societeten, 1858—61. From the same.  
 Acta Societatis Scientiarum Fennicæ, Tomus 6, 1861. From the same.  
 Moscow. Bulletin de la Société Impériale des Naturalistes de Moscou. Année, 1861, No. 1. From the Society.  
 Mémoires of the same, Tome 3, Nos. 2—9. From the same.  
 Nouveaux Mémoires of the same, Tome 13, Liv. 2.  
 Riga. Correspondenz-blatt des Naturforschenden Vereins zu Riga, 1862. From the Editors.  
 St. Petersburg. Mémoires de l'Académie Impériale des Sciences de St. Petersburg, 1e Serie, Tome 3, Nos. 10 and 11. From the Society.  
 Bulletin of the same, Tome 3. Feuilles 23 to 36, Tome 4 to 10. From the Society.

## HOLLAND.

- Amsterdam. Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen. Elfde und Twaalfde Deel, 1861. From the Society.  
 Jahrbuch of the same, 1860. From the Society.  
 Verhandelingen der Koninklijke Akademie van Wetenschappen. Negende Deel, 1861. From the Society.  
 Bijdragen tot di Dierkunde. Achste Aflevering, 1859. From the Society.

## GERMANY.

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