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JOURNAL

OF THE

Academy of Natural Sciences
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OF

PHILADELPHIA.

—
VOL. II. PART I.

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PHILADELPHIA:

PRINTED FOR THE SOCIETY,

BY J. HARDING.

1821.

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JOURNAL
OF THE
ACADEMY OF NATURAL SCIENCES
OF
PHILADELPHIA.

JANUARY, 1821.

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Description of a new Genus, and of several new species of fresh water fish, indigenous to the United States. By C. A. LE SUEUR.—Read, December 19th, 1820.

Messrs. Maclure, Ord, and Say, from their voyage to Florida, and Mr. Nuttall, in his last journey up the river Arkansa, brought back with them several species of fish, which it is my desire to communicate to this society. Several of them are undescribed, and one of them appears to constitute a new genus, allied to *Cyprinodon*; if we may admit for distinctive character the form of the body, that of the fins, their position, and particularly that of the anal one placed exactly between the ventral fins; the last of which characters appears to me of peculiar importance; it has likewise four or five branchial rays, and the remarkable teeth of *Cyprinodon*, whether or not they exist in the pharynx, as in that genus, I have not been able to ascertain.

The other species of fish which form the subject of this memoir appertain to the genus *Pœcilia*, of Schneider, and *Lebia* of Cuvier.

I would here observe generally, that all these species possess a form of body sufficiently similiar among themselves; that they are all of small magnitude, with the body and neck compressed and elevated anteriorly; the tail compressed, and wide in proportion, but narrower than the anterior part of the body taken between the back and the ventral fin; the head is flattened and terminated by a cuneate snout, cleft crossways by the mouth, of which the jaws are protractile.

GENUS.—*MOLLINESIA.†

Essential Character.

Head flat; operculum large; branchial rays, or gills, four or five. Jaws flattened; mouth horizontal, very small, furnished with small and slender teeth, anteriorly hooked, and with minute posterior ones resembling velvet. Body short, thick, and compressed. Anal between the ventral fins.

Fish of small size indigenous to North America and inhabiting fresh water.

M. *LATIPINNA. Pl. 3, fig. 1.

DESCRIPTION.—Dorsal fin very large, longer than broad, prolonged behind, caudal fin rounded; blackish spots upon the scales; anal fin situated exactly between the ventral, and originating immediately under the dorsal.

Body compressed, short, thick, and most elevated anteriorly. Head flat, horizontal; snout short, cuneiform, opening of the mouth transverse; jaws protractile, furnished with small teeth, anteriorly hooked, posterior ones minute and resembling velvet. Four or five branchial rays. Scales upon the operculum; the head, and the upper part of the body, large. Eyes situated near the summit of the head, distant, the color of a terra sienna yellow, with golden reflections.

† In honor of Monsieur Mollien, French Minister of Finance, a man of science, and one of the patrons of the celebrated Peron.

Scales posteriorly spotted with black, forming interrupted lines. Dorsal fin ornamented with black spots between the divisions of the rays, and with several longitudinal bands towards their base.

The individual being in spirit of wine, I have not been able to judge of the natural color, but Mr. Nuttall, who saw and collected it living, says, that it exhibits a brilliant reddish golden tint.

B. 4 or 5.—P. 16.—D. 14.—V. 16.—A. 6.

Entire length two inches and half. Height taken from the base of the dorsal fin eight lines. Height of the tail five lines. HAB. In the fresh-water ponds in the vicinity of New-Orleans. Very common.

GENUS.—PÆCILIA. *Schneider.*

Jaws flattened horizontally, slightly cleft, furnished with a range of small and very slender teeth. The upper part of the head flat: operculum large, rays 3. The body somewhat elongated. Ventral fins a little distant, the dorsal under the anal.

Small fish inhabiting the fresh waters of America.

P. *MULTILINEATA. Pl. 1. fig. 1.

Dorsal fin small, longer than high, under the anal; lines and black spots forming as many small bands and passing through the limits of each row of scales; caudal fin straight.

DESCRIPTION.—Total length about four times that of the head; the depth about one head. Body compressed, wider towards the operculum, and much

compressed towards the tail, which is high, with a short and truncated fin. Dorsal fin about twice its height in length. Pectoral middle sized, placed about mid-way between the eye and the abdomen. Eyes large, placed near the summit of the head, and approaching the point of the snout, which is cuneiform seen in profile, flat, and wide seen from above. Operculum large, and open in all its length as far as immediately under the eye. The opening of the mouth very small. The teeth of the jaws small, curved, and closed, moveable, and forming a single range in each jaw; the upper jaw as in the *Lebias*, appearing to be formed by the intermaxillary bone. Inferior maxillary bones projecting forward, and disposed in an horizontal line. Head flat, and as well as the gill-covers, the snout, and the sides of the body, covered with large scales. The scales themselves are middle sized, rounded, and concentrically lined.

Color a deep brown-red.

B. 4 to 5.—A. 16.—D. 14.—V. 6.—A. 9.—C. 26.

This small species, of which the individual above described, measured one and a half inches, was brought in the collections of Messrs. Maclure, Ord, and Say, from East Florida, and is indigenous to the rivers of that country.

GENUS.—*LEBIA*. *Cuvier*.

Character similar to *Pœcilia*, with the exception of branchia of 5 rays, and denticulated teeth.

L. *ELLIPSOIDEA. Pl. 2, fig. 1—3.

Body compressed and deep ; dorsal fin higher than long, rounded above the ventral ; a large scapular scale.

Total length of the body three and a half times that of the head, by one and a half in depth. Snout short, jaws very protractile and narrow, armed with compressed and curved teeth, each terminated by three or four points. Head flattened above, between the eyes ; the greatest thickness of the body is between the opercula, very compressed towards the tail. The opercula are large and strong, and without denticulation. Eyes large, approaching the end of the snout, and placed at the summit of the head. Anterior lamina of the operculum, scaly, posterior lamina even, perhaps deciduous. The scales which cover the body are large, and more truncated than rounded, marked with concentric lines. A large scale upon the head between the eyes, surrounded with lesser ones near to the point of the snout. Dorsal fin high, rounded, placed above the ventral, abdominal fins very small, their extremity touching the anal ; the anal fin small and round ; pectoral middle-sized, the extremity prolonged to half the length of the ventral ; caudal mostly unequal, enlarged and elongated posteriorly, and obliquely truncated.

Color a very deep brown.

OBSERVATIONS — There is a membrane attached to the base of the scapular scale, and to the opercu-

lum, closing the opening of the branchia to prevent their too widely separating.

This small species appertains to the genus *Lebia* of Cuvier by its denticulated teeth, and by its possessing four or five branchial rays. It was collected in East Florida, and brought by the party of Messrs. Maclure, Ord and Say. The figure represents the natural size.

B. 4 to 5.—P.—D. 11.—V. 6.—A. 10.—C. 20.

The small fish to which I now call your attention, apparently occupies a place between the Genus *Saurus* and *Scopeles* of Cuvier. The individual here described, is from thirteen to fourteen lines in length, with the body compressed as in the herrings, and having in common with them, the argentine color of the abdomen, with the back of a deep blue. The snout, or terminating portion of the head, is very short, and truncated; the opening of the mouth oblique, the cleft not passing beyond the parallel of the eye; the maxillary bones long, and narrow, the inter-maxillary very small, set with minute teeth, the former, and the wings of the palate are equally furnished with them; as well as the rays which form the opening of the gorge; these rays are prolonged before, in such a manner, that the lower ones appear to form the termination of the tongue; the opening of the gills are large, and continued almost to the insertion of the lower maxillary bones.

According to the above character, this small fish ought apparently to be placed between the two genera

already mentioned. By the vomer furnished with small teeth it cannot appertain to *Saurus* nor to *Scopeles*, in which the palate and tongue are smooth. The scales are large, particularly on the sides, and to the lateral line they are higher. Pectoral fin rather large, continued parallel to the half of the dorsal; ventral small, situated between the abdominal and the pectoral; the dorsal fin placed between the pectoral and the anal; the anal between the two dorsal, of which the second is very small and adipose. The tail long and slender, terminated by a slightly forked fin. Eyes rather large, silvery and gilded, situated contiguous to the maxillary bones and the snout.

B. 4.—P. 15.—V. 6.—First D. 10.—Second D. adipose.—A. 20.—C. 20.

OBSERVATIONS.—I have thought proper to offer some observations upon this small fish, as presenting traits of difference from the genus *Saurus* and *Scopeles*; but I am inclined to think, that it may occur of a greater magnitude. The specimen was communicated to me by Mr. T. Nuttall, the botanist, who obtained it in the river Arkansa.

Description of two new species of Exocetus. By C. A.

LE SUEUR.—*Read, December 19th, 1820.*

EXO CETUS. *Lin. Cuvier.*

The Flying-fish are distinguished among the abdominals by the uncommon magnitude of their pec-

toral fins, sufficient when extended to support the body for some seconds in the air. For the rest, the head and body is scaly, they have likewise a carinated longitudinal range of scales as in the *Belonæ* and *Hemiramphi*, &c. The head is flattened above and at the sides; the eyes are large, the maxillaries without pedicles and forming alone the border of the upper jaw; both jaws are furnished with small pointed teeth, and the os pharynx with teeth in pairs. They have ten rays in the gills; the natatory bladder is very large, and the intestines straight and without cœcum; the upper lobe of the caudal fin is the shortest. Their flight is never very long, and they elevate themselves in order to escape the pursuit of voracious fish; they immediately fall, because their wings merely serve the purpose of parachutes; the birds also pursue them in the air, as the fish do in the water. They are found in all the temperate seas.

*EXOCETUS *fasciatus.*

Abdominal fins long and broad, somewhat truncated, scarcely attaining to the caudal; anal and dorsal, straight, low, and almost equal; pectoral fins not touching the anal; brown bands on the pectoral and ventral fins; the two first rays of the pectoral fins shorter; head destitute of beard.

DESCRIPTION.—The total length of this small species was three inches. The body is elongated and en-

larged towards the head. The back a little flattened. Scales rather large, covering the whole body. The lateral line passes along the sides of the abdomen and touches the abdominal fins. Head flattened above, and slightly carinated to the throat. Eyes distant, at the summit of the head, large and silvery, placed obliquely. Anterior rays of the pectoral fins unequal, the three first simple, and shorter than the fourth and fifth, which are divided like the following. Abdominal fins large, placed nearer to the tail than the head, their extremities rounded, with the first rays simple, and the others divided. The snout a little extended; the opening of the mouth much inclined.

The two individuals which I have seen, the one dried, and the other in alcohol, had lost their color, which was then brownish. It is probable that they are of the same color as the *Exocetus volitans*, and the individuals which I have met with in the Gulf Stream, and in our traverse from the isle of St. Croix to the United States. I saw several of the length of three or four inches, leaping before our vessel, the color of the body of which was a deep blue, with blackish spots on the fins, which appeared very transparent; but I was not sufficiently fortunate to procure any of them.

P. 18.—V. 16.—D. 12.—A. 10.—C. 20 rays.

EXOCETUS **Nuttalli*.

Two large, thick, fleshy, and trilobated appen-

dages pendant from the extremity of the lower jaw ; pectoral fins broad and long, exceeding a little the base of the dorsal ; ventral fins very long, originating near the middle of the body ; dorsal and anal fins large and truncated ; the pectoral and ventral marked with brown bands.

OBSERVATIONS.—This species, as well as *E. fasciatus*, presents brown bands upon the pectoral and ventral fins ; the head is also equally flattened above, and carinated under the gorge. The under side of the body is, however, shorter, less elongated, with the third ray of the ventral fin longer ; the anal fin smaller than the dorsal. The caudal fin lunulated, with the lower lobe longer. Scales over all the body, along the lateral line, and on each side of the abdomen. Eyes large, situated at the summit of the head, and near the extremity of the mouth. Mouth transverse, and rather large.

Color, blue upon the back, argentine and blueish along the sides.

HAB. In the Gulf of Mexico. Communicated to me by Mr. Nuttall.

P.—V. 10.—D. 15. simple.—A. 8.—C. 17.



Descriptions of the Thysanouræ of the United States.

By THOMAS SAY.—Read Nov. 21st, 1820.

Genus MACHILIS, Latr.

Eyes compound, occupying almost all the head ;

abdomen beneath with an appendage for leaping; tail with three styles of which one is above the others.

SPECIES.—*M. *variabilis*. Superior caudal process more than double the length of the others; false feet bisetous at tip; colour cinereous or iridescent varied with black.

Inhabits North America.

Cabinet of the Academy.

Body above cinereous, somewhat iridescent, varied with black; gibbous portion of the body not differently coloured; a more or less regular whitish vitta; *false feet* white, hirsute, setaceous at tip; superior caudal process more than double the length of the inferior ones.

Var. a. Body above unicolor, destitute of the white dorsal vitta.

Var. b. Body ferruginous, with dusky lateral spots.

Var. c. Body with several snowy spots each side.

A common insect in many humid places, probably in almost every temperate part of North America. We observed it as far south as East Florida. It is subject to a great many variations.

Genus—PODURA.

Antennæ four jointed, filiform, terminal joint entire; body cylindrical; trunk distinct.

SPECIES.—1. *P. *fasciata*. *Body* yellowish-white with four distant black bands; *tail* black; bands

paler beneath; *spring* white; *antennæ* blackish; *eyes* black.

Length one-twentieth of an inch.

Cabinet of the Academy.

In considerable numbers under the bark of decaying Live Oak, &c. in Georgia and East Florida.

2. P. **bicolor*. *Body* plumbeous; *feet* with a few hairs, rather paler at base; *nails* small, acute; *spring* large, white; *eyes* deep black.

Length from one-tenth to three-twentieths of an inch.

Cabinet of the Academy.

Our most common species, under stones, &c.

3. P. **iricolor*. *Body* blackish, iridescent; *thorax* with long hairs before; *abdomen* hairy at tip; *feet* hairy, whitish; *head* beneath and *antennæ* hairy.

Length nearly one-fifth of an inch.

Cabinet of the Academy.

Inhabits Pennsylvania, common.

Genus—SMYNTHURUS. Latr.

Antennæ attenuated towards the tip, four jointed, ultimate joint composed of many smaller ones; trunk and abdomen united into a rounded mass.

SPECIES.—S. **guttatus*. *Body* yellowish-white, with numerous reddish-brown, irregular spots, disposed in bands; numerous, sparse, white hairs, and two tubercles each side of the middle, which are truncated at tip; beneath white; *antennæ* reddish-brown, hairy; *face* maculated, a line of irregular

spots behind the eyes; *eyes* black; *spring* flesh-coloured.

Length rather more than one-twentieth of an inch.

Cabinet of the Academy.

Found under the bark of the long leaved Pine, (*P. palustris*) in Georgia.



Observations on the Geological Structure of the Valley of the Mississippi. By THOMAS NUTTALL.
Read, December 1820.

§ I. THE PROBABLE LIMITS AND CHARACTER OF THE
SECONDARY FORMATION.

The near approach which the calcareous and other strata west of the Alleghany mountains make to the horizontal line, considering their inherent character, has been a matter of surprise to those who are any way familiar with the geology of Europe. A number of hand specimens, which some years ago I compared with what is called the compact mountain limestone of Derbyshire, in England, presented not a single dissimilar feature, either in regard to composition or organic reliquiæ; and I am fully satisfied, that almost every fossil and shell figured and described in the “*Petrificata Derbiensia*” of Martyn are to be met with throughout the great calcareous platform of the Mississippi valley. We everywhere, perceive the same host of *Terebratulites*, *Alcyonites*, and *Encrinal vertebræ*; the same zoophi-

tic casts, and vegetable impressions, likewise attend the coal formations, and it is only the difference of their elevation above the horizon which in any manner distinguishes the same strata in one country from those of the other. Here, however, the difference is sufficiently obvious. In Derbyshire, and in every other part of England of which I possess any knowledge, the beds of coal are never come at by any thing like an horizontal drift; indeed, the dip of such strata is often but little inferior to that of the primitive rocks, and expensive machinery is always necessary, both to raise the coal and drain the mine. In the western states of America, on the contrary, the coal is obtained by an almost horizontal drift, and draining becomes unnecessary. If we are then to search for any transatlantic region similar in its materials and in their horizontal stratification with the extensive plains of Ohio, of Michigan, Indiana, Illinois, Kentucky, West Tennessee, and a part of the territory of Missouri, it is to be found in those extensive plains or steppes of the Tartarian desert traversed by the Kuban, which have been described by Professor Pallas and Daniel Clarke. Here, I think, we find strata of the same materials, at least, as it regards calcareous rock, abounding with fossil reliquiæ, and also as nearly approaching the horizontal level. As we pursue, however, our enquiry concerning the western and northern limits of this great calcareous platform, through Canada, and the territories of Missouri and

Arkansa, we shall perceive that the same materials are also elevated into ranges of hills, dipping from the horizontal level, though still at a far inferior angle to that which prevails in those transatlantic countries above noticed.

In the summer of 1809, my attachment to the study of Botany, induced me to make a pedestrian tour round the greatest part of the southern shore of Lake Erie, to Detroit, from whence I proceeded in a canoe along the same coast of the Huron lake to the island of Michilimakinak, situated near its commencement. I then took a southwest direction along the coast of Michigan, to Green Bay; thence to the banks of the Mississippi, by ascending Fox River, near to its source, and embarking on the Ouisconsin, which disembogues itself two miles below the village called Prairie du Chien. I then descended to the town of St. Louis. This route, and the subsequent voyages which I made up the Missouri and Arkansa, afforded me an ample opportunity of instruction, as to the extent and character of this vast platform of secondary formation.

The coast of Lake Superior I was then prevented from examining, by the sinister regulations of the company of the north-western fur-traders. Some remarkable facts, however, concerning this lake, and the minerals of its southern coast, are detailed by the adventurous Captain Carver, and afterwards corroborated by the relation of M^rKenzie. Such are the accounts of the masses of native copper scattered along the shores of the bay, called Fond du Lac.

The existence of this fact did not fail to excite the avidity of adventurers, who were, however, disappointed in the pretended quantity and locality of this native metal. But although there is every reason to consider the masses of this metal, as well as others which were shown to me during this route by a chief of the Mononomies, collected near the outlet of the river St. Croix of the Mississippi, as entirely adventitious in their relation to the surrounding strata, still even these insulated facts justify us in supposing them as strongly indicative of the approaching termination of the secondary formation in this direction. We cannot yet indulge our inquiries to any advantage any further to the northward, as none of the other travellers in this quarter have favoured us with the smallest ray of geological information. Still we are led to suppose that the Falls of St. Anthony,* no less than the numerous portages and rapids of the Utowa river are occasioned by some considerable deviation in the strata from that almost horizontal position which they otherwise present. This opinion, however, as it regards the Mississippi, amounts to nothing more than conjecture, for, as in the beds of many other rivers, there is no possibility of deriving any information regarding the nature of its sources from the debris or gravel deposited along its banks, knowing, as we do, the wide extent of

* According to the observations communicated to me by Major Long, testaceous lime-stone exists both above and below these falls.

adventitious granitic gravel and bolders throughout the western states and territories. It is true, that around the Prairie du Chien, and many other places along the banks of the Mississippi, as well as those of the Missouri, and even to the borders of the Arkansa and Red Rivers, rounded debris occasionally appear, sufficiently distinct from any thing which we have met with either in the beds of the St. Lawrence and its lakes, or along the Ohio and its tributary streams ; such are the different varieties of fine chalcedony, far more resembling those of India than of Europe, and which we term carnelian, sard, &c. as they vary in color and texture, being either red, hyaline and white, or different shades of yellow ; all these varieties, and possessing every requisite beauty for the lapidary, are to be met with in considerable abundance along the Missouri, less plentifully on the gravel bars of the Mississippi, while little more than their existence is ascertainable, along the banks of Red River and the Arkansa. To what class of rocks or strata these were to be attributed, as they appear on the Mississippi and the Missouri, I never was able to ascertain ; nor am I still much better informed on the subject, although I have had an opportunity of observing a singular granulated rock, in which they are occasionally imbedded, bassetting out from under the more recent testaceous lime-stone of Red river, about one thousand miles above its entrance into the Mississippi. My uncertainty as to the true locality of these rounded chalcedonic debris, arises from

the ambiguity inherent in all conglomerates, which merely mark the transition of one formation into that of another, and are thus almost intermediate betwixt every species of transition whether general or partial. There is, I think, reason to believe, that most of the finer chalcedonic geodes, which appear in the form of pebbles of various sizes, originate almost uniformly in those transition rocks which we term amigdaloids and conglomerates, and though porphyries, as approaching more nearly to the class of rocks called primitive, are artificially distinguished from them, there exists, in fact, no such natural precision of limit.* At all events, the presence of these chalcedonic debris, if not more remotely adventitious, would appear to point out in this quarter, the termination of the calcareous platform, somewhere below the sources of the Mississippi as well as those of the Missouri.

Descending the St. Lawrence, or rather its chain of lakes, we perceive even along the southern coast of the Huron, very intelligible indications of the approaching termination of this secondary formation, in the vast beds, as I may call them, of adventitious granitic rocks, which for more than one hundred miles in succession, continue to line its shores. Many of these blocks, which are in places collected and extended into the lake for ten or twelve miles together, are of a magnitude so enormous, as to have

* One or two specimens of hyaline calcedony, I once found on the gravel bars of the Missouri, imbedded in a white Jasper

long acquired the veneration of the Indians, and are justly considered as their perpetual land-marks. We cannot reasonably suppose that this enormous collection of adventitious rocks can have been very far conveyed from their original situation ; still from the existence of facts, it does not appear that the Huron lake constitutes a boundary betwixt these formations. If I mistake not, both Kalm and Carver inform us of the existence of fibrous gypsum or alabaster on the banks of the Utawas ; a river, which by the aid of inconsiderable portages, affords a navigable communication from Montreal to French river of lake Huron. In connection with this formation is found the softish brown-red argillaceous stone, so much esteemed and employed by the Indians in the manufacture of their pipes. By Carver, and others, it is improperly termed a serpentine, but appears to be merely a clay-stone, of which I then obtained a specimen from the river in question. There is also equal reason to credit the existence of fibrous gypsum in that country, of which I received specimens during my stay at the island of Michilimakinak. Hence it would appear, that we are to search for the termination of the stratum we are tracing beyond the northern shores of the Huron, and that it in all probability ceases where the fibrous gypsum and red clay-stone commence.

This calcareous platform is not even disturbed by a single elevated hill along the whole southern border of lake Erie. The ridge, however, traversed by the cataract of Niagara, and the falls of Genessee,

generally marks the termination of this stratum throughout its course, which terminates westwardly near to the proper commencement of lake Ontario. In several parts of this ridge and its vicinity gypsum has been found, as at the falls of the Genessee, at the outlet of Owasco lake, and also contiguous to the falls of Niagara. The Table-Rock, from whence visitors commonly view the stupendous cataract, is in great part a mass of gypsum ; which, continually moistened by the falling spray and the neighbouring springs, carries down a portion of the dissolved mass, which is afterwards deposited in rounded nodules in the cavities below. In these rocks we also discover small nodules of galena and the blende ore of zinc, which is more or less prevalent throughout this ridge as far as Grand River in Upper Canada. In the dark grey gypsum of Genessee, employed in agriculture, there exists a considerable admixture of carbonate of lime. About fifteen or twenty miles west from Queenstown this ridge presents considerable beds of calcareous breccia, or dislocated angular fragments, again collected and cemented in a base of the same material. Mr. Maclure traced this calcareous stratum, with its concomitant accompaniment of shells and hornstone nodules, as far as the borders of Lake Champlain, where it terminates in the immediate vicinity of the primitive on the west, and an elongated point of the transition on the east.

The very imperfect knowledge which we yet possess of the western regions of the Mississippi, pre-

vent us in a great measure from arriving at any very satisfactory results, while pursuing our enquiries in this direction. Before entering upon this part of the subject, it is necessary to make some remarks upon the anomalies which present themselves towards the western and north-western confines of the calcareous platform. Thus, on arriving at the banks of the Ousiconsin, instead of an almost imperceptible current, as that of Fox river and its lakes, we are carried along at the rate of three or four miles per hour, and have almost uninterrupted hills on either bank of the river; still there is no very considerable dip, but sufficient to bring into view a considerably lower portion of the stratum, in which veins of galena or lead-ore begins to make their appearance. Captain Carver, and afterwards Mr. Dickson, received from the Indians a grant of these lead-mines, which Mr. Dickson informed me, promised to be no less productive than those they gave to Monsieur Dubuque, situated on the western side of the Mississippi, and about 40 miles below the entrance of the Ousiconsin. The same calcareous lead-hills are met with dividing the branches of the Meremek, about thirty miles below St. Louis, and continue in a south-west direction to the sources of the river St. Francis. They are again met with on the banks of White River, and galena has also been found near the banks of Grand river of the Arkansa. The first occurrence of secondary calcareous rock on the banks of the Arkansa, is towards the base of the arenelitic

hills of Lee's-creek (called Papillon, in Pike's map) and about eight miles below the garrison of the Pottoe. Lime-stone is found along the banks of the Salais-eau, a few miles above the former, but we nowhere meet with any considerable quantity of calcareous rock, in that part of the Arkansa territory which came under my notice, excepting on the banks of Grand river, whence the garrison was supplied with lime for building. As indications of coal, however, appear in this quarter, on both sides of the river, and even near the garrison, along the banks of the Pottoe, accompanied by the usual fossil reliquiæ, we are not to suppose that the secondary calcareous stratum is so limited in its existence in this direction, but merely covered by the sand-stone with which the occurrence of coal is concomitant. This circumstance, again, almost independent of any collateral observation, points out the extraordinary approach of these strata towards the horizontal level; for, from Lee's creek to the northern branches of the Canadian, and from thence to the great Saline river of the Paunees, a distance, over land, of near 300 miles, on the southern side of the Arkansa, we were never able to discover a solitary specimen of calcareous rock, being every where covered by the sand-stone, and in no place presenting a derangement or dip sufficient to be exposed from beneath. It is almost unnecessary to add, that a country like this, presents little else than one uniform plain, in general destitute of arborescent vegetation, and that it is also very defi-

cient in springs of water. While on the contrary, the calcareous country of the Salaiseau, of Grand-river, of the Illinois, of Arkansa, and also the undulated arenelitic lands towards the borders of the great Saline river, abound in springs, that continue to flow throughout the hottest months of the summer, and produce around them morasses, which from their deceiving depth, are dangerous to the approach of the larger quadrupeds.

While ascending the Missouri in the summer of 1810, I could not ascertain the existence of the compact calcareous rock, containing organic reliquiæ, beyond the confluence of the river Platte; yet the sand-stone hills, and woodless plains, in the rear of the Maha village, were precisely such as we met with along the northern borders of the Arkansa, within the limits of Pottôe, and the Saline rivers. In the territory of Arkansa we could no where distinctly ascertain the existence of those more ancient and deep beds of uniform argillaceous matter which so often along the banks of the Missouri, bury out of sight the inferior rocky stratum, in such a manner, as at length entirely to conceal its character. This clay formation, entirely unconnected with that of the Mississippi, and the lower part of the Arkansa, is of a blueish-grey, abounding in pyrites and xylanthrax, and is the active seat of those pseudo-volcanoes and their remains existing in the upper part of the Missouri territory. Excepting wood, even whole trunks of trees, in every state of siliceous penetration and petrification, a fossil *Ostrea* or *mya*, and what my friend Mr.

Thomas Say considered as an unknown species of baculite,* no other organic remains were noticed by us in this vast deposition of argillaceous matter, which often appeared near the bank of the river in blackened sterile hills and cliffs of from two to three hundred feet elevation. It is highly probable that the fossil crocodile skeleton, or *proteasaurus*, mentioned by Lewis and Clarke, was deposited in this argillaceous bed, although I once found, on the loftiest summits of the gravel hills of White River of the Missouri, several fragments of large fossil bones, apparently vertebræ, accompanied by some eburneous process partly transformed into silex.

The calcareous cliffs which border the Missouri, not far from the creek of the Maha village, more closely resembled chalk than any thing of the kind which I have heretofore seen or heard of in North America, but cannot by any means be identified with the same formation in the south of England and in France. We could not discover in it any organic reliquiæ, nor any vestiges of flint. It is, nevertheless, sufficiently white, meagre, and absorbent, when moistened, and marks with facility. Connected apparently with this anomalous formation of chalk, we observed considerable beds of what appeared to be stalactital gypsum, but whether a more general de-

* Published in Silliman's Journal. vol. II. p. 41, under the name of *baculites compressa*.

position, or a mere adventitious production formed by the partial agency of the decomposed pyrites so prevalent in the argillaceous bed above noticed, I am not prepared to ascertain. It occurred in seams, though divided into small and rounded masses, perfectly white, but so devoid of the fibrous structure as to be readily confounded with the chalk. The similarity of this secondary calcareous formation on its opposite confines in East Tennessee, as it appears immediately after crossing the Cumberland gap is deserving of attention; here again the calcareous rock puts on the appearance of chalk, and even contains nodules of flint, but bordering too much on chalcidony to afford the character requisite for economical purposes.

Before taking leave of this part of our subject, and indeed not unconnected with it, is the anomalous deposition of salt, and the production of nitre. We all know that the impure nitre of the western states, of which the greatest abundance has been found in the neighbourhood of the Cumberland ridge of mountains on the confines of East Tennessee, is always connected with the caverns of calcareous and arenilitic rock; and that it is not an accidental production, arising from the decomposition of animal and vegetable matter, is indeed proved by its gradual renewal in those caverns which have been exhausted. As I have been informed, it exists in the calcareous and sandstone rocks which are consequently attacked by the humidity of the air, and so falls into earthy fragments, which are

collected for lixiviation, and that the solid stone itself is also occasionally broken and submitted to the same process. I am not acquainted with the existence of many localities of nitre on the west side of the Mississippi, though it has been obtained in considerable quantity along the banks of the Meremek, and some of the streams emptying into the lower part of the Missouri. The Hirundel rocks on the banks of the Arkansa possess the only appearance of affording nitre which I have seen in that territory.

I have termed the production of salt in this formation as anomalous, regarding any connection which it bears with the ordinary gypseous or red-clay formation of the European geologists. No doubt numerous remarks have been made upon this subject, which I now merely examine as a matter of fact. Every one knows the abundance of salt springs which exist in the valley of the Ohio and its tributary branches. The most productive among them are the springs of the Kenhaway and the Big Bone Lick. Those of Onondago Lake, in the western part of the state of New-York, are no less important. In my enquiries and personal examinations, I must confess myself to be generally at a loss to ascertain the proper origin of these springs. In no instance is this salt met with in a solid form, nor in distinct connection with gypsum, or with *red* coloured clays. The argillaceous soils, indeed, which do occur, are dark gray or grayish blue. At the Big Bone or Mammoth Lick on the Ohio, and in many other places, where

fossil bones have been found in their immediate neighbourhood, we should have been led to suppose these springs to be in connection with ancient alluvial deposits; while on the other hand, where the boring and obtaining of salt water has been continued through beds of coal and of limestone for some hundreds of feet, every idea of alluvial origin must vanish, and we are led to consider the existence of these saline springs as coeval with the strata in which they originate, in common with the nitre, the petroleum, and the coal. The occurrence of those remains of extinct quadrupeds which are found in their vicinity, may be considered as accidental, or merely connected with their relish for salt.*

The extent of these salt springs is nearly as wide as that of the secondary rocks which they accompany: thus they are found in several places along the banks of the Mississippi, from the Prairie du Chien to the confluence of the Ohio, wherever the intersection of streams have afforded them an outlet. They occur along the banks of the Meremek near to St. Louis, and along the Missouri to the Osage river; they are met with on the banks of this river almost to its sources; they reappear along the borders of

* These relics are the bones of the common mammoth or mastodon of the Ohio, the Siberian elephant, or true mammoth, teeth of the rhinoceros, and in the caves have been found the bones of the megatherium, a very fine collection of which were in the cabinet of the late Mr. Clifford of Lexington.

Grand River of the Arkansa, fifty miles up which river, one of the principal springs is now worked. This place I have carefully examined. Here the springs, which are uncommonly clear, strong, and copious, distinctly and immediately issue through a bed of calcareous rock, and are accompanied by a stream of sulphuretted hydrogen gas, but occasioning only a minute deposition of sulphur. Other springs, equally productive, likewise occur in the distance of twenty-five miles further up this stream. The Cherokees have discovered springs of salt water on the banks of the Illinois of Arkansa, but in this quarter as well as on the banks of Grand River, they do not happen to be accompanied by any remains of quadrupeds.

Unconnected with this soil and strata, though scarcely with our subject, is the gypseous Red Clay formation, and the salt which it affords. Of the existence of this salt formation towards the sources of Red River, there is the most unequivocal evidence; it is the abundance of this mineral, independent of that of the calcareous stratum, which so frequently communicates, particularly in the inundation of the Red water, a sensible brackishness to the whole stream of the Arkansa, and occasions its water to be preferred by all the wild and domestic animals. Indeed, in dry seasons, like that of the last autumn, (1819) a saline efflorescence was sufficiently visible over all its argillaceous deposits. The locality of this red clay soil is sufficiently attested by a slight

attention to the color of the streams which empty into the Arkansa; thus, all the rivers which enter from the north or north-west, bring down either water which is clear, or rendered turbid with grey colored earths and clays, while on the opposite side come in a number of streams which are charged with turbid water, always of a reddish brown color. Such are the Canadian, and the three Saline rivers, whose waters, except that of the former, are at all times impotably saline. Still further tracing the locality of this production, we find that the red water of the Canadian is the produce of its main southern branches, which all the hunters and traders assert to derive their sources with the head waters of Red river, and the Spaniards inform us, as a well known matter of fact, that Red river originates in the mountains of Santa Fe, of Rio del Norte. The northern branch of the Canadian is said to proceed almost parallel with the Arkansa, and possesses clear water in common with its tributary the lesser North river, which sources in the immediate vicinity of the Arkansa, and makes a very near approach to the great Saline river of the Paunees, already mentioned. It is in the immediate neighbourhood of the second river of Saline water, that Dr. Sibley was conducted by the Osages to what are commonly called the salt plains, where this mineral appears in place, and lies scattered over the surface of the ground. These beds of salt and clay very improperly and vaguely laid down in the maps as so many lakes of salt water, are nothing

more than the neighbouring beds of red clay, which occasionally inundated, and washed by the winter rains, afterwards deposit a copious efflorescence of the dissolved mineral.

From three experienced hunters who had spent a great part of their lives in this country, and penetrated to the western mountains, I received accounts of the prevalence of a mineral towards the sources of Red river, which, on producing specimens, turned out to be fibrous gypsum, similar to that of the Utawah river, in Upper Canada; it was said to be very abundant and continuous in its appearance. My guide, Mr. Lee, first observed it on the banks of what the French call the False Washita, one of the principal northern branches of Red river. A river of saline water too brackish to drink, as I was informed, enters the river Platte from the south, about thirty miles above its confluence with the Missouri. The Sioux river entering the Missouri from the north, according to the report of the interpreter (Dorion) who accompanied us in our voyage up the Missouri, in 1810, informed us, that this river sources with the St. Peters, and after remaining navigable for upwards of two hundred miles, is then obstructed by a cataract, and that below the falls a creek enters from the eastward, after passing the cliffs of the red clay-stone employed by the Indians in the fabrication of their pipes.

From what we can glean concerning this principal formation of salt and gypsum, it would appear to be situated in the vicinity of the primitive mountains,

and at all events marks the termination of the secondary soil.

The fluata of lime, so abundant and beautiful in the secondary calcareous rock of Derbyshire, in England, is not altogether wanting in the valley of the Mississippi. In 1810, Mr. J. Bradbury favoured me with very fine specimens of white, blue, and amber colored fluor, from a lead mine, at the Rock and Cave, in the vicinity of the Ohio. Another locality of this mineral was pointed out to me, also in 1818, as existing near Centreville, in the county of Logan, in Kentucky. In the same locality with that described by Mr. Bradbury, Mr. Jessup found it in abundance on the surface for a space of thirty miles, accompanied by a vein of galena. In its vicinity, Mr. J. also met with nodules of argillaceous iron ore, containing blende. But fluor has never yet been found on the banks of Missouri, as asserted by Mr. Claiborne.

The floetz trap formation, or that variety of it, termed in Derbyshire, *toad stone*, and which there so signally deranges the strata and metalliferous deposits, in no form makes its appearance throughout this secondary platform, the only anomalous bed in any manner analogous to this, is the greenish, and apparently ferruginous arenilitic rock, with a sparry calcareous cement, and bordering on graawacke, which appears beneath the newer floetz lime-stone of Red River.

Having thus taken a cursory, but imperfect view of the great tabular formation of secondary calcareous rock, which gives place to the immense plains and lakes of the western states and territories, we shall next proceed to offer a few remarks upon the ancient maritime alluvium, and a flœtz formation apparently connected with it, which continues from Rhode Island to the coast of the Gulf of Mexico, principally with a view to ascertain its south-western limits, and to observe the influence which it has had in producing the present character of that part of the Mississippi valley. The accurate and comprehensive view of this formation, as well as of all the others composing the North American continent, by our absent president,* the result of observations continued for many years in succession, leaves us little more to do than corroborate his assertions by additional details, and an extension of its limits into the remoter territories of the Union.

§ II. LIMITS AND CHARACTER OF THE ANCIENT MARITIME ALLUVIUM.

The extent of the primeval ocean, and the vast agency which it has exercised over our globe, to render it habitable, and thus to complete the plan of creation, is evinced by a vast proportion of its surface wherever our observations are directed. That

* William Maclure, Esq.

immense portion of the valley of the Mississippi, over which we have in the preceding section rapidly glanced, without entering into details, exhibits throughout all its extent unequivocal marks of a pelagian origin, its rocks are filled with marine productions, with bivalve shells, with Alcyonites, Encrinites, Madreporas, Millepores, Tubiporites, Flustras, Trilobites, some species of Ammonites, Zoophytes, &c. &c. of which by far the greater part are now extinct, having disappeared with the ocean that gave them birth; indeed, several of their genera no longer possess any existing type. The antiquity of this order of things, apparently anterior to the creation of any other organized beings, is beyond our comprehension; what occasioned the reflux and subsidence of these mighty waters, and the consequent elevation of the land, is a subject equally involved in mystery. It is sufficient for us to mark the different epochs of this reflux, so as to connect our remarks, and render them intelligible to those who wish to follow us in the course of observation.

The pelagian calcareous rock which occupied our attention in the preceding section, and which may correctly be termed a compact limestone, presents to our view scarcely any of those shells and marine productions still existing in the present ocean. They are almost without exception bivalves, among which the terebratulites continually predominate. Coal, petroleum, fluor spar, blende galena, argilla-

ceous iron ore, salt springs, and nitre, with several other materials of minor importance are almost concomitant with this formation, and tend to characterize and distinguish it when it assumes an almost horizontal stratification. It is greatly to the advantage of the miner and the mineralogist, as well as to several branches of public economy, that such geological distinctions could be drawn betwixt the different strata and formations of minerals, as might always prevent the waste of money and labour. Yet, after all, it is to be regretted, that the ambiguity of certain strata is sometimes so great, as to admit of considerable argument in ascertaining their difference; such, in a great measure, is the character of the second calcareous formation which now claims our attention.

In its geographical limits, it occupies a position universally to the east of the primitive and transition formations. Its existence, as far as I know, has not been ascertained to the north of the bay of Chesapeake; it here makes its appearance in the vicinity of Annapolis, and presents several features common to the transmontane stratum. It appears, however, to be destitute of the concomitant minerals, excepting, indeed, it were possible to conceive it in connexion with the coal basins of Richmond, which I have found on examination to be actually underlaid with a calcareous rock of a peculiar appearance. Mr. Heath's coal-mines, and, in fact, nearly all of them, except those which were in a state of combus-

tion, are overlaid by a massive micaceous conglomerate, or grit rock, containing *crystals* of felspar like porphyry, in which, besides gigantic *culmarii*,* occur veins of the argentine calcareous spar of Kirwan, similar to that of Cornwall, resembling silvery talc or steatite, in which are occasionally imbedded minute crystals of blue and white fluor like those, equally rare, in the gneiss of the Schuylkill, together with common calcareous spar and crystals of sulphate of lime. In the bituminous slate clay, which, as usual, accompanies this coal, besides impressions of ferns, and the supposed *Equiseta*, there are vestiges of some enormous flaccid leaved gramineous plant, leaves of one of the *Scitamineæ* similar to those of ginger, and fine casts of a palm, resembling the pennate fronds of some species of *Zamia*, or *Cycas*. The apparent remains of fish, which also occur together in such uncommon abundance, are extremely ambiguous, inasmuch as the supposed fins alone, are found. The coal in this formation, instead of that even continuity so obvious in that of the western states, presents very limited beds, which, as they recede or occupy the centre of the basin, vary from 6 or 8, to that of 40 feet in thickness! The coal itself, highly bituminous and brittle, contains abundance of pyrites. What relation the breccias and

* An assumed generic name for an assemblage of extinct Zoophytes? (one species of which, is the *Phytolithus striaticulmis*, of Martyn's *Petrificata Derbiensia*.)

conglomerates of this vicinity have with the testaceous lime-stone, I cannot pretend to say; they do not indeed contain impressions of shells, though fragments of lignite, and silicised wood have been found imbedded in the siliceous conglomerate. On the high road to Richmond, in the exposed declivity of the barren pine-hills, a few miles from the coal-mines, I found fragments of transformed wood, penetrated with *quartz* of an opaque white color, destitute of the resinous fracture, and easily crumbling into an almost impalpable sand. These fragments, however, occurring in beds of disintegrated, and amorphous chrySTALLINE quartz, in which also appears the oldest conglomerate* of cloudy and pale blue quartz, are more probably referable to the ancient beds of the transition. Of the small importance, however, which ought to be attached to the relative antiquity of transition rocks, and particularly to those which are so evidently mechanical in their structure as the conglomerates and sand-stones, we have an almost unexpected example, in the recent discovery of bones imbedded in the *old red* sand-stone of New-Haven, 35 feet below the surface; a circumstance, in itself, sufficiently curious, without introducing the improbable conjecture of the remains being *human*.

* As it regards the strata of the United States, and always occurring from the state of New York to Georgia, imbedded in the mica-slate.

Although, there can remain but little doubt of the continuity of the floetz lime-stone we are endeavouring to trace towards the south, still, in consequence of the more recent alluvial deposits, it is not again discernable until we arrive in North Carolina. Here, Mr. Maclure remarks, that it runs "parallel to, and within the distance of from 20 to 30 miles of the edge of the primitive, through South Carolina, Georgia, and part of the Mississippi territory." That it continues also eastwardly to the borders of the ocean, I have reason to believe, from discovering it in the immediate vicinity of Wilmington, North Carolina, where it appears from beneath the alluvial sand-hills of the town. There, though less compact than the older secondary formation, it alike contains terebratulites, flustras, millepores, caryophylites, gorgonias, as well as more recent shells, such as cardiums, pectinites and ostreas, not very dissimilar to the existing species of the coast. In 1816, while proceeding through North and South Carolina, to the city of Charleston, I remarked the first appearance of this floetz lime-stone in the immediate neighbourhood of Statesburgh, in South Carolina, near the commencement of the hills of Santee. Here we observe a fine-grained slaty and ferruginous sand-stone, containing scales of mica, and rounded nodules of argillaceous iron-ore, bassetting out from beneath a conglomerate made up of *sea-shells* and quartzose pebbles, cemented together with calcareous as well as siliceous matter, the latter of which often appearing in the form

of botryoidal agate. These marigenous beds are nearly horizontal, though here elevated into hills, and appear, as far as I could previously observe from analogy, to be underlaid by a formation of trap and argillite. From hence, to the little town of Manchester, there intervenes a succession of coarse-grained and ferruginous sand-stone hills, washed into deep gullies, presenting a prevalence of red and very sandy clay, indicative of the decomposed trap. Eighty miles from Charleston, along what is called the river-road, on the high and sandy banks of the stream produced by the Drowning Spring, I noticed scattered masses of a stone, consisting in great part of flinty confluent silex, bordering on chalcedony, including seams of broken shells, as well as others which were imbedded and retained their calcareous substance. Some of them were *spiral univalves*, others *cardiums*, and pectinites resembling those of the present sea-coast. In some places this stone appears to pass into a granulated quartz, resembling sand-stone, but of a very fine and drusy grain. This bed appeared to be about twelve inches in thickness, and sensibly compressed; beneath, it passes into a sand-stone, which is again underlaid by a thick bed of light grey schistose and indurated marlite, containing also rounded nodules of the same substance. The Utaw spring is one of those large bodies of clear water which issue at once in considerable streams from the bosom of this stratum. This formation is considerably allied to the siliceous

lime-stone of the environs of Paris, and mill-stones have been made of it, but are found to be softer than those of France. In its seams have also been discovered depositions of hyalite, or the concretionary hyaline quartz of Haüy.

At Nelson's Ferry, on the south side of the Santee, I again observed an horizontal ledge of the floetz lime-stone, of a whitish color, and fragile consistence, containing amidst innumerable masses of small shells, those of some *Ostrea*, not very dissimilar to existing species, but of a remarkable thickness, and occasionally impressed with the forms of other shells. The copious and clear springs of this formation continue to within ten miles of the city of Charleston, where, with its overlay of ferruginous sand-stone, it forms the foundation of all the other alluvial deposits. Amorphous carbonaceous remains, connected probably with lignite, sparingly appear in this soft sand-stone a few miles from Charleston. In a former route, from Savannah and Augusta, in Georgia, I repeatedly met with this calcareous bed, in which even occurs the *trilobites paradoxus*, and the ovate encrinal fossil, figured by Parkinson and described by Mr. Say in Silliman's Journal, under the name of *Pentremite*, hitherto found only in North America, and in connection probably with this formation.* In some parts of South Carolina, this calcareous rock appears of a friable texture, and

* This curious fossil occurs also, abundantly in the limestone of Huntsville, in the Mississippi territory.

passing into marl, or containing so much argillaceous earth as to burn into a very indifferent lime. Its existence has been traced into part of the Mississippi territory,* and again found along the coast of Cape Florida, and the gulf of Mexico, by Mr. Maclure. Along the banks of the Mississippi, and towards the base of the hills of Fort Adams, it again presents its usual characteristics, being of a whitish color, of a soft and friable consistence, like calcareous tufa, and also in connection with an undurated marl. Ascending this river, without discovering its existence decisively in the alluvial hills of Natchez, we, however, perceive its arenilitic overlay in the basis of the cliffs known by the name of the Grand and Petit Gulf, where the obstruction of this stratum suddenly checks the meanders of the river, and produces two very powerful and dangerous eddies. The last appearance of this stratum on the banks of the Mississippi, as indicated by sand-stone, is in the bases of what are called the Walnut-hills, but its concomitant marigenous alluvium can be distinctly traced to the ferruginous cliffs, called the Paint-hills, or Mine au Fer, about 15 miles below the confluence of the Ohio; indeed Henderson, or the Red Banks, and the town

* Marine shells, as *Ostreas*, &c. have been found at the "Chickasaw Old Town," 300 miles north-east of Natchez, as well as at the United States agency amongst the Choctaws, 120 miles north north-east of the same place, according to Mr. E. Cornelius, in Silliman's Journal.

of Owensville, commonly called the Yellow banks, the latter about 120 miles below Louisville on the Ohio, still present traces of this extensive deposition, though unaccompanied by the sand-stone and calcareous rock. On the west side of the Mississippi we also discover the same marine alluvial formation in the elevated banks of the Arkansa, on which the town of Arkansas is situated, and which terminates the great prairie, dividing the waters of this and the White rivers. Still more lofty, and better characterized, are also the friable cliffs, called the Pine-bluffs, commencing about 120 miles higher up this river. Proceeding from hence in a southern direction, we again meet with this alluvium on the banks of the Washita, which gives rise to the Bovey-coal or lignite mentioned in the voyage of Dr. Hunter and Mr. Dunbar. In the calcareous platform of Red River, which we found to constitute the basis of its plains, both above and below the confluence of the Kiamesha, we discover a great extention of this formation to the west, and in some degree parallel with the indention of the Mexican Gulf. This limestone presents all the usual characters of friability, whiteness, argillaceous admixture, and more recent shells such as cardiums, pectinites and ostreas, as well as gryphites, terebratulites, and alcyonites. In a few places along the immediate banks of Red River, it is partially overlaid by hillocks of a conglomerate abounding in horn-stone and other siliceous pebbles, cemented principally by ferruginous matter. A more

remarkable aggregation, appears, by a dip, to basset out from beneath this calcareous platform, on the northern banks of the river, near the entrance of the Kiamesha. From its massive appearance, and obscure greenish-grey color, it strongly resembled a trap, or grauwacke; it proved, however to be a calcareous sand-stone, with a crystalline cement, and like the grauwacke, as well as sand, occasionally includes adventitious pebbles, and angular debris, among which we observed the existence of chalcedony.

How far this calcareous formation extends into the neighbouring province of Texas, and under what circumstances, I have not been able to ascertain; but I may further add, concerning its north-western limits, that it appears to be essentially separated from the older secondary calcareous formation, by the interposition of a transition range of mountains, stretching towards the south-west, which separate the tributary streams of the Arkansa from those which flow into Red River; and that from hence to the gulf of Mexico in a south-east direction, traversing the plains of Opelousas and Attakapa and the maritime part of the province of Texas, no other chain of mountains are known to exist. It is not necessary for us to trace the maritime alluvium of the Atlantic states so well defined in the essay of Mr. Maclure, and we shall now merely add some remarks on its character as it appears in the valley of the Mississippi. Along the immediate banks of this river, it is no where intersected on its western border; all the cliffs of reenter-

ing high-land are confined to its eastern bank. The first of these, below the mouth of the Ohio, is the Mine au Fer or Iron-banks; and after a descent of several hundred miles, we again perceive an occurrence of the same bank of friable materials in the four successive bluffs or cliffs of the Chicasaws. As this alluvium is here best developed, we shall attempt to describe its appearance. These cliffs are elevated about 250 or 300 feet above the lower level of the river, and are a portion of the continuous high-lands which constitute the principal part of the territory. They are connected with the uplands of the Walnut-hills, of Natchez, Fort Adams, Grand and Petit Gulf, Ellis's and Thomson's cliffs, and finally terminate a few miles below Baton-rouge. The surface often presents a ferruginous clay or gravel; and from the deep and friable nature of the materials, it is subject in the vicinity of streams to be washed into deep and wide ravines. The soil is but moderately fertile, and requires the aid of manures. The Chicasaw Bluffs, which from top to bottom, as well as at Natchez, present nothing but friable beds immediately below the surface, consist of sandy and ferruginous clays, lower down often purer and whiter; then succeeds, with an almost unexpected uniformity, a band of bright pink-colored clay, which we also recognize at the Mine au Fer, as well as in the Pine-bluffs, about 180 miles up the Arkansa. This clay is succeeded by another bed nearly similar to the first; a carbonaceous appearance then succeeds, and com-

monly a thin bed of lignite ; dark, greyish clays still follow, containing pyrites, and argillaceous iron ore, often lying at the base of the cliffs in corroded, flattened, and rounded masses ; and at the very lowest level of the river, in low water, a second and much thicker bed of lignite succeeds, exhibiting every gradation from the state of wood, and also containing, amidst more friable materials, indurated sand-stone nodules, resembling those of argillaceous iron-ore, containing impressions of the leaves of existing oaks* as well as those of plants resembling species of *Equisetum*.

We have to ascend the Arkansa 60 miles from its outlet, through the recent alluvium, before we arrive at the commencement of the *primitive* soil. All the inferior space intervening betwixt the Mississippi, and White River, is so subject to inundation as to be rendered totally uninhabitable. How far the supposed ancient marine deposit extends into the Great Prairie, which is about 90 miles in length, I have not been able satisfactorily to ascertain, though from the extent of adventitious gravel over the neighbouring uplands, and the reappearance of its bed in the Pine-bluffs, 120 miles above Arkansas, we have no reason to suppose its termination short of the whole extent of the prairie. Amongst the least equivocal marks of marine origin visible in this deposition, is the discovery

* Such as those of *Quercus phellos* the Willow Oak and *Q. rubra* or *Q. coccinea* the Red Oak.

of shells, which accidentally came to my notice a few miles below the Pine-bluffs, picked up by the children of some of the French hunters resident in this country, and consisting of a species of ostrea, like that of the Santee, penetrated by seams of calcareous crystals, exhibiting marks of a former attachment to a softish ferruginous sand-stone, and containing fragments of lignite. On the same sand-bar was also found a small conch-shell,* which did not appear to have been imbedded.

This massive deposit, in all probability, makes an appearance at Alexandria on Red River, to which place the recent alluvium also extends; and the ferruginous conglomerate resembling that of New Jersey we have found to continue more than 1000 miles up this river. From a consideration of these circumstances, and the direction of the transition chain of mountains, which traverse this territory nearly from north-east to south-west, we are led to suppose the existence of the more recent calcareous platform nearly to the sources of Red River, where it is probably succeeded by the gypseous red clay and salt formation.

The extraordinary breadth of that part of the alluvial valley of the Mississippi, subject to inundation, from the mouth of the Ohio to the ocean, said to be of the extent of from 30 to 40 miles, is easily accounted for, in the friable nature, and the magnitude of the marigenous deposit through which it flows. Its bed

* *Strombus pugilis*.

appears continually to have encroached towards the east; and indeed all the larger rivers, except the Ohio, come in from the west, and possess currents considerably more rapid than that of the Ohio.*

From a point, a few miles below Baton-rouge, where the primitive soil terminates, we are to trace the commencement of the proper delta, or modern alluvial formation of the Mississippi. From hence the river presents no more sinuous meanders; but, without any additional breadth, proceeds towards the ocean in flexuous lines or stretches, disembogues much of its waters by receding channels or bayous, and presents along its banks, which are of an uniform and depressed elevation, a conformity of surface incompatible with the caprice of any formation of independent origin. For several hundreds of miles in succession, to the city of New Orleans, no settlements are practicable beyond the border of the river; the agricultural plots, all defended in front from inundation, by a levee or continued line of embankment, are constantly averaged at a depth of 15 arpens or acres, beyond which universally commences an undrainable swamp. The fertility of these lands is no where exceeded, and without any kind of tillage, promise a perpetual harvest, and never-failing source of wealth to the planter.

* According to the observations of Major Long, the descent of the Ohio is 8 inches per mile, that of the Mississippi 12, that of the Missouri and Arkansas 16, and of the river Platte 18 inches.

We shall now conclude this essay by a few remarks on the transition chain of mountains which traverse the Arkansa territory.

§ III. OBSERVATIONS ON THE TRANSITION MOUNTAINS OF ARKANSA.

The first appearance of this formation, as well as the first rock which attracts our attention in ascending the Arkansa, commences about 200 miles above the village or post of Arkansas. From the unusual appearance, and inconsiderable comparative elevation which the hills here present, the place has received the name of the Little Rock. The strata which are schistose and destitute of organic reliquiæ, dip at an angle of more than 45° to the north-east, and consist of dark-grey, or greenish-grey, argillaceous sand-stone, of a fine grain, and intermingled with mica; it appears to be a grauwacke slate, bordering on argillite, and is traversed by massive veins of quartz containing crystals. It is here alternated with a soft and pale coloured slate clay, which decomposes into something resembling pipe-clay, and which the inhabitants have employed for white-washing the interior of their cabins. As we proceeded westward, those hills at length assumed the elevation of mountains, being schistose towards the base, and arenitic at the summit. The sand-stone of a coarse grain, lightish grey color, and lesser dip, is likewise destitute of organic remains. At Piatt's settlement, we came in full view of a conic topped mountain, rising not less than one thousand feet above the neighbouring

plain. At first view it appeared to be insulated, but was actually connected with an adjoining ridge of inferior elevation. This mountain, resembling a pyramid, is known to the French and American residents and hunters, by the name of the *Mammelle*. It was distinctly visible from the hills of the Dardenai, a distance of more than 60 miles over land. From the same point of view, we could enumerate three principal ranges of mountains tending towards the south-west.*

In several places the schistose strata are almost vertically elevated, so as to present along the margin of the river, a smooth and even wall, occasionally penetrated with zig-zag seams of quartz. At the Cadron, three hundred miles from Arkansas, the slate exposes to view impressions of something related to the ramified Alcyonites, but *flexuous* and spirally grooved, also concave articulations of a species of Or-

* The mountain, apparently laid down in Pike's map as visible at the distance of three days journey, is situated about ten miles south of the Illinois bayou, and is a long ridged eminence, known to the French by the name of the Magazin mountain, connected with a chain which proceeds to the sources of the Pottoe, the Petit John, Le Fevre's fork, and the Kiamesha of Red river; from hence, without ever touching Red river, the mountains proceed towards the sources of L'eau Bleu, and the Faux Washita, continuing in a direction towards the head springs of Red river, where they probably coalesce with the primitive range.

thoceratite;* the same schist, at the Galley rocks (the commencement of the Cherokee settlement,) also discloses organic reliquæ of the same class,† but no bivalve shells. A beautiful hone-slate appears to alternate with the other schistose formations, in the vicinity of the hot springs of the Washita, and is noticed in the journal of Hunter and Dunbar. Its pure whiteness, when recent, is a character quite peculiar; still, by its slaty texture, and inferior hardness, besides the absence of organic reliquæ, it can by no means be confounded with hornstone, which, in many respects, it resembles.‡ From the neigh-

* This shell appears to belong to the genus *RAPHANISTER* of Montfort's *Conchyliologie Systematique*, vol. I see p. 338, but very distinct from the species there figured.

† One of them with a moniliform flexuous appearance and of the length of six or eight inches, bears some resemblance to the *Ichthyosarcolite* of Desmarest, figured in the *Journal de Physique* for July, 1817, in plate II. figure 9 and 10.

‡ To avoid ambiguity and confusion, it seems to me necessary to designate the "hone-stone" of the Washita by a particular name, as nothing similar to it appears hitherto described. I shall therefore, in reference to its prevailing color, give it the trivial name of *GALACTITE*.

This siliceous mineral, which in many respects resembles Hornstone or Chert, is distinguished by its remarkably even; slaty cleavage both in the large masses and minute fragments; its cross fracture is largely conchoidal, and destitute of lustre; fragments, about a line in thickness, are strongly translucent. Its hardness is such, when pure, as readily to give fire with

bouring mountains of the hot springs, which originate in this formation, I have seen specimens of magnetic iron-ore, like that of the Hudson and New Jersey. On the road to the springs, also, I have obtained specimens of a dark grey amphibolic rock, strongly magnetic when heated, of a very close grain,

steel. Its color, very similar to that of Cacholong or porcelain, is milk-white, acquiring a faint ferruginous tinge by exposure to the weather, it then more readily cleaves, and becomes somewhat absorbent. Its specific gravity is 2,60. Before the blow-pipe it is perfectly infusible, and unlike chalcedony and flint still retains its translucence. With potash it dissolves into a white enamel, but does not form glass. Analyzed in the manner described by Klaproth, which it is not here necessary to repeat, it afforded in the hundred parts, silice 86, alumine 1,50, lime 2, oxid of iron 5, and volatile matter with a trace of carbonic acid 4.

Geological situation and locality.] It is found in the transition mountains of the Washita, a few miles from the hot-springs, and in the Mazern mountains, at the sources of the Kiamesha of Red river, forming schistose beds, which alternate with slate-clay and grauwacke-slate. Passing apparently into a translucent hornstone, still retaining the slaty cleavage, and often breaking into rhombic fragments, similar to felspar. This mineral is the "hone-stone," spoken of by Hunter and Dunbar, but sufficiently distinct from Novaculite, although when weathered or deteriorated by foreign admixture, it becomes in some degree, suitable for that purpose. Its cleavage appears to be produced by the iron, which it essentially contains, and its milky color is probably derived from the carbonate of lime.

and containing imbedded prismatic crystals of brown mica. Slate of various kinds, occasionally alternating with a peculiar novaculite bordering on hornstone, and dipping at an angle of not less than 45° constitutes the principal part of this formation, and is overtopped as in the Alleghanys, by elevated ridges of sand-stone.*

* In this chain of mountains, which continues north-eastward towards the sources of the St. Francis, two miles north of the village of St. Michael, at the lead-mine of La Motte, Mr. Schoolcraft observed, what he calls a *vein* of granitic rock, of a red color, and containing very little mica, he asserts it to be four or five miles wide, and traced its continuance for twenty or thirty miles; as he adds, at the same time, that it is used for mill-stones, I can scarcely doubt for a moment, its identity with the transition conglomerate which Mr. Bradbury and myself examined, in 1810, employed for the same purpose, a few miles from St. Louis. What the green-stone porphyry may really be, I cannot pretend to say, though it may very possibly exist in that quarter. Mr. Bradbury visited the spot and obtained specimens of the micaceous iron-ore, which is said to form a mountain mass near to Bellevue (Washington county.) These united facts, tend to prove the continuation of the transition chain of mountains beyond the valley of the Mississippi, but they ought not to be confounded with the crystalline granitic formation of the sea-coast and the northern Andes.

*A Notice concerning the Spider, whose webb is used
in medicine. By N. M. HENTZ.*

It has been found lately, that the webb of a species of spider, common in the cellars of this country, possesses very narcotic powers, and it has been administered apparently with success in some cases of fevers.

Having for some time past, studied with care, the genus *Aranea* of Linneus, I have been induced to write a description of this species; I therefore made a drawing taken from a large female, which accompanies the present notice.

The genus *Aranea* of the first writers on Entomology being composed of a very great number of species, it has been found necessary to divide it into smaller sections, or families. Gmelins' edition of Linneus contains ninety-eight species; Walckenaer enumerates nearly three hundred, and the number may be carried to a thousand. If the colour of the abdomen were the only character to find the species among several hundreds, it would be a very difficult task to assign with certainty a name to each separately, without any other description. Messrs. Latreille and Walckenaer have rendered the history of this genus quite easy to study: they have left little undone in regard to the species known to them. It is to be regretted that Mr. Walckenaer's *Tableau des Araneides* is not a more common work.

I shall therefore give the generic characters of

this spider, as if the work was unknown to the naturalists in this country.

It belongs to the genus *Tegeneria* of Walckenaer, and to that of spiders, properly so called, of Latreille. Its characters are : eight eyes, forming two parallel lines, the upper being curved and longer. Lip wider in the middle, cut straight at its extremity. Maxillæ inserted upright, not bent on the lip. Corselet nearly as large as the abdomen. The first pair of legs the longest, the fourth next, then the second, and the third the shortest. MANNERS, spiders forming an horizontal web, with a cylindrical tube, in the form of a funnel.

This is sufficient to characterise the genus, containing the different species of spiders, which inhabit cellars and dark places. The species that makes its web in the fields, on bushes, does not belong to the same genus; it has been properly separated from it by Walckenaer. The last pair of legs is the longest in this, and the eyes differ essentially in their situation. There is another species, very common in Carolina, which, however, I have not yet observed here, making a web nearly similar to this, but very different in all its generic characters; it ought not to be taken for the other: I intend publishing a description of the genus *Aranea*, in which this will form a separate section. But the characters which I have given are sufficient to ascertain whether a spider belongs to the genus *Tegeneria*, so that with some attention, no mistake will occur.

The species which I am treating of, is of a black colour, inclining to blue; the abdomen is marked with about ten livid pale spots, and a line towards its anterior extremity: I have seen specimens where the legs were marked with black spots. I think it necessary to remark here, that spiders of the same species living in dark places, vary greatly in their colours, according to the manner in which the light strikes upon them. The great point in this case I think, is to ascertain the genus, for it appears that the web of all species belonging to it, has the same virtues, and this is distinct from the *Aranea Domestica*, whose web has been used in Europe: we see an illustration of this in the genus *meloe*, where every species possess more or less the blistering power.

The present American spider, I think, has not been as yet described: for the present I shall call it *Tegeneria Medicinalis*.—Pl. V. fig. 1.

a—organs of manducation.

b—position of the eyes.

Description of some new crystalline forms of the minerals of the United States. By Dr. G. TROOST. —Read March 6, 1821.

As yet but little attention has been paid to the crystalline forms of the minerals of this country, many of which have no analogies with those described by European crystallographers. Among this number may be mentioned a variety of phosphate of lime, with the description of which, I have now the honor to present the Academy; and hope to continue the

research by the examination of some others in my possession.

1. PHOSPHATE OF LIME (*unitaire.*) Plate V. Fig. 3.

The representative signs of these crystals with the indications of the principle angles, are,

$$\overset{1}{M} B P$$

$$M x P$$

Inclination of M upon P 90°

M upon M 126°

x upon P $140^\circ 47'$

x upon M $129^\circ 13'$

The faces x being formed by the decrement of a single range of molecules, I have termed it Phosphate of lime (*unitaire*) according to the nomenclature of Mr. Haüy.

2. PHOSPHATE OF LIME (*unitaire compressed.*)

The crystals are sometimes so much flattened or compressed, as to put on the appearance of an eight sided table with bevelled edges. In this case the two opposite faces of the prism M offer square surfaces at the same time that the faces $P P$, and four of the faces of the hexaedral prism are linear.

Besides these two varieties there occurs in the same matrix, crystals of the primitive form, varying from one tenth of an inch to an inch; as well as in rounded pieces. Indeed nearly all the crystals present some of their edges rounded, and particularly the margins of the summits, so that they often have the appearance of hexaedral prisms terminated by rounded summits.

The phosphate of lime is slowly soluble in nitric acid; and occasions no phosphorescence when its powder is thrown on burning coals.

It is found at St. Anthony's nose, near New York, in magnetic pyrites of a grey, sometimes bronze yellow color. This ore is partly in a state of decomposition, having then the appearance of the brown oxide of iron, the crystals which occur in this part of the gangue have their edges generally blunted, which is not the case with those found in the unaltered pyrites; this would induce the belief that these crystals have been partly dissolved by the sulphuric acid formed by the decomposition of the pyrites. The crystals found in that part have always a ferruginous color, while those in the undecomposed part of the ore, are of a blackish green color. This mineral, besides phosphate of lime, contains lamellar hornblende of a dark green, when in the undecomposed ore, and of a ferruginous color in the decomposed parts.

ZIRCON.

Some well determined crystals of zircon occur on the York road, near Philadelphia, exhibiting modifications of the present known forms, which I shall endeavour to describe.

ZIRCON, (*primitive form.*) Plate V. fig. 4.

$\overset{1}{D} \overset{1}{E}_1 \overset{2}{E}_2 P$
Zircon pyramidal
 $\overset{1}{l} \ s \ x \ P$ fig. 5.
D

The inclination of the different faces are

$$\begin{array}{ll} l \text{ upon } s & 135^\circ \\ x & e \ 142^\circ \ 55' \\ x & P \ 150^\circ \ 5' \end{array}$$

This variety which is one-fourth of an inch in length, is in the possession of Mr. John P. Wetherill, who found it in the place above-mentioned. The prism is composed of eight hexagonal faces terminated by pyramids of eight faces, the summits being replaced by four rhomboidal ones corresponding with the faces of the primitive octahedron.

$$\begin{array}{l} \text{Zircon (bisunitaire)} \\ \begin{array}{ll} \overset{1}{D} \ \overset{2}{D}_1 \ E^1 \ \overset{2}{E}_2 \ P \\ \overset{1}{l} \ u \ s \ x \ P \end{array} \end{array} \quad \text{pl. V. fig 6.}$$

The inclination of these faces are

$$\begin{array}{ll} l \text{ upon } u & 159^\circ \ 17' \\ u & P \ 152^\circ \ 8' \\ x & l \ 142^\circ \ 55' \\ x & P \ 150^\circ \ 5' \\ l & s \ 135^\circ \end{array}$$

This variety was found by Mr. Benjamin Say. The faces *u* are sometimes so much extended as to make the faces of the pyramid almost entirely disappear.

The gangue, in which these crystals are found, is a granite composed of partly decomposed feldspar, sometimes of a greenish color, and quartz, containing besides the zircon particles of magnetic iron ore.

An account of the ARACHNIDES of the United States.

By THOMAS SAY.

The following descriptions of the *Arachnides* of this country, which respire by means of trachea in the manner of insects, may be regarded as the continuation of a series of essays, of which the "account of the Crustacea," &c. is the first, on the vast orders of *articulated animals with articulated feet*, (*Annulosa* of Cuvier) natives of this country. As the nature of the journal precludes the introduction of old matter or known facts, I shall confine myself in its pages, to the description of such of these animals only, as appear to be unknown to naturalists, or to the elucidation of such, as from their obscurity, are not understood.

SUBCLASS I. CEPHALOSTOMATA.

ORDER 1st, PODO SOMATA.

GENUS *ANAPHILA.†

Pl. 5. fig. 7.—*a* Trophi.

Artificial Character.—Mandibles longer than the rostrum, first joint longer than the second; palpi none; nails single.

Natural Character.—*Body* very slender, composed of four segments bearing feet, and a small sub-oval caudal process; *head* prominent, not perceptibly contracted behind, and consisting of a prolongation of the anterior segment of the body; *eyes* four,

† From α , without, and $\epsilon\phi\iota$, *tactus* the touch.

inserted on a common tubercle, upon the top of the head: *mandibles* robust, didactyle, inserted at the extremity of the head, pored, parallel, two-jointed, longer than the rostrum, first joint elongated attaining the tip of the rostrum; *hand* abruptly inflected upon the tip of the rostrum; *rostrum* pored, cylindrical, truncated at tip, shorter than the body, and inserted beneath the first segment; *palpi* none; *feet* eight, filiform elongated, slender; *coxæ* three-jointed, the middle one longest; *thighs* one-jointed; *tibiæ* two-jointed; *tarsi* two-jointed, the first very short; *nails* single, arcuated, capable of being inflected.

SPECIES.—A. **pallida*. *Body* whitish; *ocular tubercle* acute at tip; *eyes* sanguineous; *hands* suboval, slightly hairy, not dilated, inflected vertically, and with the fingers, hardly more than two-thirds the length of the preceding joint; *fingers* arcuated, crossing each other near the tip; a small, rather acute tubercle at the base of the anterior feet (probably the rudiment of the egg-bearing organ;) *coxæ* second joint clavate; *tibiæ* first joint rather shorter than the second.

Length of the body 1-4 of an inch.

Span of the feet 1 1-2 inch.

Inhabits the coast of South Carolina.

Cabinet of the Academy.

Of this new genus I found two specimens in the bay of Charleston, S. C. upon the branches of the *Gorgonia virgulata*, and as they have not the egg-bearing organs, I suppose them to be males. This

animal resembles *Phoxichilus* in being destitute of palpi, but differs from it in having didactyle mandibles and simple nails. In the form of the mandibles it resembles *Nymphon* and *Ammothœa* but the want of palpi distinguishes it from those genera, its proper situation is probably next to the genus *Phoxichilus*. It, unquestionably, is generically the same with *Phalangium aculeatum* of Montague, (Trans. Lin. Soc. vol. 9, tab. 5,) which Dr. Leach, in the article *Crustaceology* of Brewster's *Encyclopædia*, refers to the genus *Nymphon*, but which, as far as I can discover, he has omitted in his subsequent works. It will of course be a second species of this new genus.

ORDER II. POLYMEROSOMATA.

FAMILY 2. SCORPIONIDEÆ.

Genus BUTHUS. Leach. *Scorpio*, Latr.

Palpi brachiform, didactyle; eyes eight; abdomen terminated by a caudal process of six articulations, of which the terminal one is armed with a venomous aculeus.

SPECIES.—*B. *vittatus*. Fuscous, with three fulvous vitta; sides black.

Inhabits Georgia and Florida.

Cabinet of the Academy.

Body above granulated, granules irregular, distant, three fulvous equal vitta, and an elevated, interrupted vertebral line; *sides* black, rugose, *beneath* white; *thorax* reddish brown, more scabrous before and be-

hind, hardly marked by the vitta, subemarginate before, and divided by a longitudinal impressed line, region of the dorsal eyes blackish; *palpi* longer than the body, with granulated lines, carpus with three or four of the granules more conspicuous; *hand* subovate, greatest diameter about equal to that of the preceding joint; *fingers* filiform, incurved, longer than the hand, reddish-brown, furnished with numerous minute teeth; *feet* paler than the palpi, minutely granulated above and beneath; *caudal process* colour of the palpi, longer than the body, with granulated costa, those of the penultimate segment not more conspicuous; *terminal segment* subovate, slightly mucronate beneath the aculeus, the costal granulae minute.

Length from tip of the palpi to tip of the caudal process, 1 inch and 7-10ths.

I found numerous specimens of this species on the sea islands of Georgia and in East Florida, hibernating beneath the bark of trees.

The wound inflicted by the puncture of their aculeus, causes much pain and intumescence, but is readily cured by the topical application of the volatile alkali.

The species to which *vittatus* is allied, are the *punctatus* of Degeer and *Americanus* of Linné, but according to Latrielle (v. Sonnini's Buffon) these are both spotted with brown, the caudal process of *punctatus* being of the length of the body and that of *Americanus* three times the length of the body.

It is, however, very possible that our species may be a variety of *punctatus*.

Genus CHELIFER. Geoff, Leach.

Palpi brachiform, didactyle; thorax with the first segment divided by a transverse indented line; eyes two; mandibles short.

SPECIES.—1. C. **muricatus*. Third joint of the palpi nearly three times as long as the second, linear, gradually a little attenuated to the base; thorax muricated.

Inhabits North America.

Cabinet of the Academy.

Body ovate, narrowed before, rounded behind; *thorax* black-brown opaque, gradually narrowed from the base to the tip of the mandibles, armed with numerous short, robust spines; *feet* rufo-testaceous; *palpi* rufous, basal joints subglobular, gibbous behind, third joint cylindrical, nearly three times longer than the second, armed with short rigid hairs, and gradually attenuated to the base, fourth joint shorter but somewhat larger than the preceding one, and gradually much attenuated to its base; *hand* black-brown, above oblong-subovate, laterally linear, *fingers* as long as the hand, paler, incurved and furnished with a few elongated, flexible hairs; *abdomen* above black-brown, and with the feet furnished with minute, spinelike hairs, segments margined with obsolete pale testaceous.

Length rather more than 1-10th of an inch.

Common in decaying wood, under bark, in houses, under stones, &c. I found a variety on the river St. John, in East Florida, of which the anterior portion of the abdomen and posterior part of the thorax is rufous. This species considerably resembles *C. Hermannii* of Leach, (Zool. Misc. vol. 3, p. 49.)

2. *C. *oblongus*. Second joint of the anterior feet hardly twice as long as the first, rather larger towards the base; thorax polished.

Inhabits North America.

Cabinet of the Academy.

Body oblong, sublinear; *thorax* reddish-brown, polished, testaceous at base, rather abruptly attenuated from the middle to the tip, and with abbreviated flexible hairs, instead of spinules; *feet* pale, testaceous; *palpi* reddish-brown, with dilated, short joints, and furnished with numerous flexible hairs, second and third joints subequal, the latter rather shorter and dilated in the middle; *hands* ovate, almost truncated at base; *fingers* shorter than the hand, and with a few longer hairs; *abdomen* above brownish, slightly hairy, polished, margins of the incisures testaceous. Smaller than the last.

Occupies the same situations as the preceding. It bears considerable resemblance, in the form of the palpi, to the *C. Geoffroyi* of Leach, (Zool. Misc. p. 50.) This species, as well as the preceding, are readily distinguishable from the *Phalangium acaroides* of Linne, by the mutic antepenultimate segment of the palpi.

ORDER 3. DUOMEROSOMATA.

FAMILY 2. PHALANGIDEÆ.

GENUS PHALANGIUM.

Body rounded; feet elongated; tarsi with numerous joints; mandibles salient much shorter than the body; eyes two, supported on a common tubercle.

SPECIES. 1 P. **vittatum*. Whitish, with a dorsal fuscous vitta; terminal joint of the palpi not pectinated with spines.

Inhabits the Southern States.

Cabinet of the Academy.

Body whitish, truncated and fuscous behind, a dorsal fuscous vitta from the clypeus to the cloaca and lateral fuscous line, above with dense, obtuse granules, beneath with distant ones; three profoundly impressed lines before the middle, of which the anterior one is semicircular including the ocular tubercle, the intermediate one transverse, and the posterior one recurved; *ocular tubercle* prominent, slightly contracted at base, crowned with from four to six more conspicuous, acute spines; *clypeus* not elevated, concave beneath the obtuse tip; *feet*, second pair about fifteen times as long as the body; *tarsi* capillary, articulations not contracted.

Length, female nearly one-fifth of an inch. Male much smaller.

The armature of the ocular tubercle is obsolete in the male, and in this sex there are generally two

whitish lines, drawn from the base of the ocular tubercle to the tip of the clypeus, which are also sometimes visible in the female.

I have not found these in coitu, but have considered them of the same species, from their being associated and somewhat similar in form and markings.

2. *P. *dorsatum*. Whitish, with a dorsal fuscous vitta, joints of the palpi armed with a series of spines.

Inhabits the United States.

Cabinet of the Academy.

Body rounded behind, whitish, a dorsal fuscous vitta continued from the clypeus to the cloaca, and obsolete punctured with whitish, a few submarginal, obsolete, irregular lines or spots; granules dense, obtuse, not prominent; *ocular peduncle* prominent, contracted at base, slightly muricated before, obsolete granulated; *clypeus* not elevated; *palpi* rather long, robust; second, third, and fourth joints pectinated on the exterior edge with acute, distant spines; fifth joint more densely pectinated on the inner edge; *feet* armed with minute distant spines; *coxae* blackish; *pectus* with distant very distinct, obtuse granules; radical supports of the feet with a moniliform line each side in the incisures; *venter* nearly glabrous, granules indistinct; *tergum* not deflected.

Length of the female one-fifth of an inch.

Very similar in colour to the preceding, but sufficiently distinct by the spinulose palpi, &c.

3. *P. *nigrum*. Body ovate, blackish; clypeus

prominent; radical joint of the three anterior pairs of feet armed with a spine; pectus and base of the feet white.

Inhabits the Southern States.

Cabinet of the Academy.

Body ovate, a little dilated each side behind the posterior feet, blackish, with a few obsolete paler spots, above and beneath, above granulated, granules spherical, irregularly placed in somewhat reticulated lines; *ocular tubercle* destitute of spines, with obtuse granules; *clypeus* prominent, somewhat elevated; *feet* short, fuscous, whitish at base; second pair hardly four times as long as the body, and, with the first pair, armed with a prominent, cylindric, obtuse spine behind the basal joint; third pair with a similar spine before; *pectus* whitish; *venter* blackish.

Length, female nearly one-fifth of an inch.

A very distinct species, and not uncommon in the Carolina's and Georgia.

4. P. **grandis*. *Body* oval, covered with short spines; *ocular tubercle* spinous; *feet* rather short.

Inhabits the Southern States.

Cabinet of the Academy.

Body oblong-oval, scabrous, with approximated, robust, short, acute, spinules; rufo-ferugineous, two impressed transverse lines before the middle; *ocular tubercle* prominent, slightly contracted at base, crowned with numerous, robust, acute spinules; *clypeus* hardly elevated; *feet* rather short; *pectus* with numerous, minute, acute granules; *venter* with but few.

Length, female nearly seven-twentieths of an inch.
 Much the largest species I have seen.

GENUS *GONYLEPTES*. Kirby.

Feet moderate; tarsi from six to ten jointed; mandibles chelate; maxillæ none; palpi unguiculated.

SPECIES. *G. *ornatum*. Ocular tubercle hardly elevated, unarmed; hind feet remote; two erect spines behind.

Inhabits Georgia and Florida.

Cabinet of the Academy.

Body ovate reddish-ferruginous, destitute of granules, edge slightly contracted over the insertion of the fourth and fifth pairs of feet, two small acute tubercles on the middle of the disk, and two large, prominent, erect, acute spines on the hind margin, no impressed line before the middle, an anterior arcuated yellow transverse line connected to a posterior undulated one by a yellow line which is crossed near the middle by two obsolete yellow bands; *ocular tubercle* slightly raised, unarmed; distance between the eyes much greater than their diameters, orbits black; *clypeus* abruptly somewhat acute in the middle of the tip; *mandibles* rather small, the fingers subequal, and crossing each other at tip; *palpi* robust, and when at rest concealing the mandibles; penultimate articulation dilated on the exterior side and elongated and depressed; terminal joint half as long as the preceding, cylindrical; terminal nail elongated, moveable, capable of being inflected;

feet short, not three times as long as the body, three anterior pairs before the middle, posterior ones behind the middle and remote from the others; fourth and fifth pairs with double nails; *abdomen*, segments with a series of equidistant, minute tubercles.

Length, one-fifth of an inch.

This remarkably distinct species, we first discovered on Cumberland Island, Georgia, and subsequently many specimens occurred in East Florida, where it appears to be common. It is not an inhabitant of the Northern States.

FAMILY 3. ARANEIDÆ.

Although I have a considerable number of descriptions of Araneides, which I think are new, yet, as I am not sufficiently well acquainted with the species of this family, in their different ages, prudential motives induce me to refrain from publishing them until further investigation shall qualify me for the task.

ORDER 4. MONOMEROSOMATA.

GENUS TROMBIDIUM.

Body consisting of a thorax and head united and distinct from the abdomen; two anterior pairs of feet distant from the others; eyes pedunculated, lateral; palpi with a moveable appendice beneath their tips.

SPECIES. 1. *T. *scabrum*. *Body* ovate, broadest and very obtusely rounded before, pale reddish, minutely scabrous, surface unequal, with numerous in-

dentations, and with hardly perceptible hairs; *thorax* obtriangular, short; *eyes* white; *feet* whitish.

Cabinet of the Academy.

In forests, on trees, &c. not uncommon.

2. T. **sericeum*. *Body* oblong-subovate, broadest before, narrowing behind, densely covered with short, silken hair; *thorax* elongated, sublinear, slightly contracted before the middle, and with a darker, central line above; *eyes* white, placed in a transverse line; *feet* paler, whitish.

Cabinet of the Academy.

Inhabits trees, in forests, under stones, &c. and is more common than the preceding.

GENUS ERYTHRÆUS. Latr.

Body without division, the two anterior pairs of feet not distant from the others; *eyes* two, sessile; *palpi* conic, chelate.

SPECIES. E. **mamillatus*. *Body* ovate, granulated, reddish-yellow, with a marginal impressed line, edge thickened, a robust, obtusely conic, granulated spine on the anterior lateral edge, before the middle of the disk two indented punctures, a few distant hairs; *eyes* approximated, whitish; *mandibles* granulated, a rounded tubercle on each of the middle above; *feet* paler than the body, yellowish, with scattered hairs.

Less than one-twentieth of an inch.

Under bark of trees, &c. Georgia and East Florida.

GENUS **GAMASUS.** *Latr.*

Mouth with mandibles ; palpi prominent, very distinct, filiform ; *pulvilli* at the apex of the tarsi.

SPECIES. 1. *G. *antennæpes.* *Body* ovate, rufous, somewhat narrowed before, hairy and coriaceous ; edge of the abdomen membranaceous, white ; *feet*, anterior pair filiform, antennæform, longer than the body, remaining pairs much more robust, subequal, posterior thighs tridentate near the inferior tip ; origin of the palpi with five or six acute spines above.

Cabinet of the Academy.

I have frequently observed this species, inhabiting, in considerable numbers, the body of *Passalus cornutus*. The fore feet are, as their slender appearance indicates, used as antennæ to feel the way, and not as feet to support the body.

2. *G. *spinipes.* *Body* suboval, hirsute, rufous ; *feet* with rather longer distant hairs, *second pair* very robust, third joint armed beneath with a large, prominent, acute spine, which is nearly as long as the transverse diameter of the joint, compressed, slightly serrated on its anterior edge, and with an accessory tooth or two at its base, fourth joint with an obtuse tooth beneath, sixth joint with a robust spine before its inferior middle, *first* and *third pairs* unarmed, *fourth pair* dentate beneath the third and fourth joints.

Cabinet of the Academy.

Inhabits —————.

Remarkable by the prominent spine of the second pair of feet.

3. G. **musculus*. *Body* pale, oval, with scattered hairs more numerous each side; *feet* paler, with a few hairs above, two anterior pairs distant from the others, anterior pair longest, second pair rather more robust.

An active little animal, found in great numbers on an anonymous species of *Mus*, which inhabits East Florida.

4. G. **nidularius*. *Body* oblong-oval, somewhat depressed, with a slightly elevated margin, and with scattered hairs, whitish with internal blackish clouds, and two impressed points in the middle of the back; *feet* paler with a few hairs.

Cabinet of the Academy.

Less than one-fortieth of an inch.

Inhabits *Hirundo viridis* their nests and young. I am indebted for specimens to Mr. Reynall Coates.

5. G. **Juloides*. *Body* oval, pale brownish, depressed, behind vesicular and whitish, the coriaceous epidermis of the tergum terminating before the vesicular posterior margin in an emargination; *feet* short and very robust; *pulvilli* dilated, very short.

Cabinet of the Academy.

I obtained several specimens from the body of *Julus marginatus*. I have also observed it on *Polydesmus Virginiensis*.

GENUS *ORIBITA*. *Lat.*

Body coriaceous, capitate or rostrated before, palpi and mandibles concealed within the mouth; feet terminated generally by three nails, without pulvillus.

SPECIES.—1. *O. *concentrica*. Black, opaque; tergum concentrically lineated; venter plain.

Inhabits Pennsylvania.

Cabinet of the Academy.

Body spheroidal, black, opaque, rounded before and carinated behind, invested with a brown epidermis; disk with about four elevated concentric circles, connected by numerous interstitial elevated lines; posterior carina crenate in compliance with the concentric lines; *head* subtriangular, rugose; *oral aperture* oval, closed by a valvular mentum; *eyes* two, minute, brownish, elevated on an elongated, slender filiform peduncle; *orbits* elevated, rather large, placed near the base of the head above; *feet* rather short, deep black, minutely granulated, terminated by three incurved nails; *venter* plain, granulated, valves of the cloaca somewhat lineated.

A rather common insect, it moves very slowly, and inhabits beneath the bark of trees. I have found it, most frequently, beneath the bark of the common *Carya* (Nuttall) *tomentosa*.

2. *O. *glabrata*. Body glabrous, polished, globular-oval black.

Inhabits Georgia and East Florida.

Cabinet of the Academy.

Body spheroidal, somewhat oval. glabrous, polished, black; *head* longitudinally semi-oval; *eyes* sessile, near the base of the head each side, remote; *feet* hairy, pale testaceous, subequal, shorter than the body.

I found this species several times under stones, &c. It is sluggish in its movements, like other species of this genus; when alarmed or in danger the feet are thrown forward together over the mouth, and the whole of the thorax is then deflected upon the anterior part of the body; in this state the general form is a solid oval.

GENUS BDELLA. Latr.

Palpi elongated, terminated by setæ; rostrum conic; eyes four; posterior feet longest.

SPECIES.—R. **oblonga*. *Body* oblong-oval, bright red, paler in the middle and beneath, with a few scattered hairs; *rostrum* nearly half as long as the body, with two or three pairs of stouter hairs; *palpi* four jointed, resembling arms; first joint destitute of hairs and longer than the others conjunctly; second and third joints very short; fourth joint longer than the two preceding ones, attenuated towards the base and truncated at tip, with several short hairs and two terminal setæ longer than itself, of which the inner one is rather shorter; *feet* hairy, subequal, pale, the posterior ones rather longer.

Length rather more than one-twentieth of an inch.

Found in Georgia, under stones, under bark of decaying, trees, &c. in rather moist situations.

GENUS IXODES. *Latr.*

Palpi short, simple, valvular, forming with the haustellum a short rostrum; mandibles none; feet with a pedunculated pulvillus and two nails; eyes obsolete or wanting.

SPECIES—1. *I. *annulatus*. *Body* oval, pale reddish-brown, tinged with sanguineous, particularly behind, and with several longitudinal and oblique, black, abbreviated lines, scattered punctures, and three abbreviated, longitudinal impressed lines behind; *rostrum*, with the *palpi* dilated, rather suddenly contracted at base, and annulated more prominently beneath with about two elevated lines, which on the sides produce an angulated appearance, much shorter than the haustellum, rounded at tip; *haustellum*, the two superior organs emarginate at tip, exterior division dentate beneath, inferior organ with numerous resupinate teeth resembling fenestrate punctures; posterior to the origin of the palpi above is an orbicular, obscure assemblage of punctures resembling eyes; black dorsal lines of the male somewhat regular, consisting usually of a dorsal line divaricating before, and behind, the middle, furnishing a branch each side, which at the tip of the abdomen

is confluent with a lateral line, which also branches off in two or three short lines towards the feet; *feet* with a short robust nail, and a reclivate pedunculated pulvillus and nails.

Found in considerable numbers on a *Cervus Virginianus*, in East Florida.

2. I. **orbiculatus*. *Body* nearly orbicular, slightly narrower before, punctured, ten or twelve longitudinal, abbreviated, impressed lines on the posterior margin, marginal impressed line none, two longitudinal indented lines before the middle; *head* transverse subquadrate, posterior edge very obtusely rounded, the posterior angles complying with the general curve; *palpi* oblong, sublinear.

Cabinet of the Academy.

Found inhabiting *Sciurus capistratus* of the Southern States.

3. I. **crenatus*. *Body* ovate, with distant deeply impressed punctures, posterior margin lobated by ten or twelve profoundly indented lines, which are abbreviated by an impressed submarginal line, which becomes gradually obsolete before the lateral middle; posterior edge crenulated; *thorax* none, distinct; *head*, posterior edge transversely rectilinear, angles slightly arquated backward and rounded at tip; *palpi* oblong, sublinear and regularly rounded at tip.

Cabinet of the Academy.

Found in the Southern States, the colour is red-

dish, sometimes slightly varied with whitish, particularly behind, and the lobate divisions of the posterior margin are sometimes whitish above, and the disk is obsolete with black.

4. I. **erraticus*. *Body* oblong-ovate gradually narrowed before, sides hardly arquated, with distant punctures, those behind more deeply impressed, posterior margin with ten or twelve impressed lines which are abbreviated by a submarginal impressed line, two abbreviated lines before; *head*, posterior edge transversely rectilinear, angles extended backward abruptly, and subacute; *rostrum* rather short; *palpi* oval-orbicular.

Found in the Southern States; the colour is reddish or ferruginous, with acute black lines.

5. I. **variabilis*. *Body* oblong-ovate, gradually attenuated before; sides hardly arquated; a few remote deeply impressed punctures not more numerous behind; posterior margin with about twelve impressed, abbreviated lines; a lateral, impressed, punctured, submarginal line, obsolete behind; two deeply indented, abbreviated lines before; *head*, hind edge rectilinear, angles abruptly a little extended backward, acute; *rostrum* rather short; *palpi* ovate; *colour* reddish or ferruginous varied with white, incisures of the feet white.

Very much resembles the preceding in form; the white of the back is more or less reticulated, and the

ARACHNIDES OF THE

feet are white above, or only their joints. May not this be *I. lineatus*, if so, my name must of course be rejected.

6. I. **punctulatus*. *Body* oblong-ovate, gradually attenuated before, sides hardly arquated, crowded with impressed confluent punctures; *thorax* destitute of punctures, but with two impressed undulated lines; abbreviated lines of the posterior margin not deeply impressed, almost obsolete; lateral submarginal line deeply impressed, obsolete behind; *head*, hind edge rectilinear, angles abruptly a little projected backward, acute; *rostrum* rather short; *palpi* oval; *eyes* distinct, impressed; *colour* ferruginous, *thorax* white lineated or varied with ferruginous; incisures of the feet white.

Considerably like the preceding.

7. I. **scapularis*. *Body* red, with a few short whitish hairs; *thorax* blackish-red, well defined, with numerous punctures; *tergum*, punctures sparse, and four or five blackish, obsolete, dilated radii on the disk; a deeply indented submarginal line; no abbreviated marginal lines behind; edge rounded; *head* beneath and above blackish, posterior edge rectilinear, angles abruptly projected backward, very short, acute; *eyes* distinct, deeply impressed; *rostrum* slightly canaliculate above, paler than the head; *feet* blackish-red, ciliate beneath, terminal joint reclivate near the tip on the anterior edge; ori-

gin of the anterior ones, armed behind with a large acute spine.

Rather common in forests, and frequently found attached to different animals.

8. I. **fuscous*. *Body* fuscous, ovate, punctured; *tergum* with a few black, obsolete lines, and a profoundly indented submarginal line, posterior marginal impressed line none; no distinct thorax; edge rounded; *head*. posterior edge rectilinear, angles not prominent beyond the rectilinear edge; *eyes* not visible; *palpi* suboval, terminal joint rather longer than the preceding one.

Cabinet of the Academy.

A common species.

GENUS HYDRACHNA. *Mull. Latr.*

Rostrum advanced, conic; mandibles none; palpi projecting, terminated by a moveable appendage; body subglobular; feet natatory.

SPECIES.—H. **triangularis*. *Body* white; *eyes* two, sanguineous; *tergum* with a black triangular spot near the eyes, posterior portion black, with a white dorsal line terminating in the cloaca.

The specimen, from which this portion of a description was taken, I found in *Unio cariosus*, in which, possibly, it had adventitiously effected a lodgement.

GENUS **LIMNOCHARES**. *Latr.*

Rostrum hardly prominent; palpi incurved, simple; mandibles none; feet natatory.

SPECIES.—L. **extendens*. *Body* ovate, red, minutely lineated; *tergum* with a few indented points; *beneath*, origin of the feet paler red; *feet*, second and third pairs ciliate with very fine and long hairs, posterior pair destitute of cilia.

Length nearly three-twentieths of an inch.

A common species, inhabiting stagnant pools, &c. in forests, and shady places. The posterior feet being destitute of cilia, are only useful in walking; when the animal is swimming, they are extended behind, without distinct motion. The eggs are globular, surrounded by a white gluten, and are deposited on almost any object indifferently, from two hundred to three hundred in number, arranged somewhat symmetrically in parallel, rectilinear, or undulated series. I have found them about the middle of May.

GENUS **LEPTUS**. *Latr.*

Feet six; trophi forming a capitate body; palpi conic, quadriarticulate; an obtuse tube, subconic, advanced; body soft.

SPECIES.—1. L. **araneii*. *Body* oval, red, with short, distant hairs; *head* whitish, somewhat rounded,

contracted at base and acute at tip; *palpi* white, a little hairy, rather surpassing the tip of the head; *tergum* with a deeper red eye on each side over the interval between the anterior and second pairs of feet, anteriorly indented, and with two lines each of four or five indented points.

Length one-thirtieth of an inch.

Cabinet of the Academy.

Of this species, I have found a specimen adhering near the base of the palpi of an *Araña*.

The head-like process, is sometimes retracted so as to be not prominent, but is not long withheld in this position. The body is somewhat contractile, not perceptibly as regard its length, but in its breadth, by an irregularly undulated motion of the edge.

2. *L. *hispidus*. *Body* suboval; *head* with a distinct neck; *palpi* more robust at base; *feet* elongated, much longer than the body, filiform and furnished with numerous robust, incumbent, flexible setæ, about twice the diameter of the leg in length.

My Cabinet.

I took no less than ten of these animals from a *Phalangium*, to which they adhered very strongly; when feeding, they often are supported only by the rostrum and palpi, the body and feet being elevated so as to be sometimes perpendicular to the supporting surface.

GENUS OCYPETE. *Leach.*

Feet six; mouth rostrated, porrected, with mandibles; palpi elongate-conic, with a moveable appendage at base; body soft; eyes two.

SPECIES.—*C. *comata.* *Body* subtriangular, very obtusely rounded behind, hirsute, and narrowed by an arquated line to the rostrum; *rostrum* short, narrowed and emarginated at tip; posterior feet longer than the body, and with much longer hairs than those of the body.

Inhabits several species of *Tipula*.

This is readily distinguishable from the *O. rubra* *Leach*, by the elongated hairs of the feet. The specimens in my possession, are so disposed that the trophi cannot be examined, I therefore refer them to this genus by analogy, drawn from habit, &c.

Analysis of the Blue Iron Earth of New Jersey, made at the School of Mines at Paris, in the year 1819, by LARDNER VANUXEM.—Read, March 13th, 1821.

This is the same mineral that was examined by Judge Cooper, and an account of which was published by him in the first volume, (second series) of the Transactions of the Philosophical Society of Philadelphia. He considered it to be an Hydrate of the

Protoxide of Iron. The means which the Judge used were insufficient to shew the existence of Phosphoric acid, which is one of its essential constituents. For a description of this mineral the reader is referred to the above work, and to the mineralogy of Professor Cleaveland.

This mineral was analysed as an hydrated protophosphate of Iron, a preliminary examination having shewn that it contained no other substances.

A. 5 *Grammes* of the mineral were dissolved in nitro-muriatic acid with heat. Water was then added to dilute the liquor, and the iron was thrown down by ammonia, in union with the phosphoric acid; the precipitate separated from the liquor by filtering was washed and calcined: the resulting liquor was set by for future examination.

B. In order to decompose the ferruginous phosphate, it was treated with three times its weight of caustic potash, at a red heat, in a silver crucible, the mixture was constantly stirred and maintained at that temperature for half an hour; after cooling, it was diluted with water and filtered. As one fusion does not always free the oxide of iron from phosphoric acid, it was again fused with another portion of that alkali, again diluted and filtered. The oxide of iron was well washed with water acidulated with acetic acid, to separate it from the potash, then dried and calcined. It weighed 2.42 *grammes*. As the iron in

this mineral is in the minimum state of oxidation, the difference being eight per cent. the real quantity contained in it will be 2.227 *grammes* of Protoxide.

C. To the liquor, from which the oxide of iron had been separated, nitric acid in excess was added, and boiled to expel the carbonic acid that might have united with the potash during its fusion, &c. Ammonia was then added in excess which gave a slight precipitate having the appearance of alumine. It weighed, after calcination, 0.02 *gramme*

D. The above liquor by the addition of muriate of lime gave an abundant precipitate of phosphate of lime which separated as usual by filtering and being calcined weighed 2.60 *grammes*.

E. Supposing that the ammonia in the liquor A had decomposed a part of the phosphate of iron, it was examined as in C and D; thus treated it gave 0.21 *gramme* of phosphate of lime, making together 2.81 *grammes*; as this salt is composed of 54 parts of base, and 46 parts of acid, the quantity of phosphoric acid will be 1.2926 *grammes*.

F. To ascertain the quantity of water contained in this mineral, 5 *Grammes* were dissolved in nitric acid evaporated to dryness, and calcined to expel all the nitric acid. This was repeated a second time, to be certain that all the protoxide of iron was converted

into peroxide. It weighed 3.78 *grammes*: as no other volatile matter exists in the blue iron earth but water, the quantity of it ought to equal this loss, (1.22 *grammes*) and the difference between the protoxide of the mineral and the tritoxide obtained by the analysis, which is 0.193 *gramme*; together 1.413 *grammes*.

Hence we have for result,

	<i>grammes</i> or per ct.	
Protoxide of Iron . .	2.2270	. . 44.54
Phosphoric Acid . .	1.2926	. . 25.85
Water	1.4130	. . 28.26
Alumine	0.0200	. . 0.40
Loss	0.0474	. . 0.95
	5.0000	100.00

To show that the precipitate obtained with the muriate of lime, really contained an acid with a base of phosphorus, it was dissolved in nitric acid, then decomposed by oxalate of ammonia, which threw down the lime; this product was removed by filtering, the liquor was evaporated to dryness, then calcined at a red heat in a platina crucible; nothing remained but a vitreous matter, slightly soluble in water, of an acid taste, and reddening litmus paper; it resembled *glacial Phosphoric acid*. This acid, exposed to a red heat with charcoal in a coated glass tube, gave Phosphorus; hence, no doubt can exist as to this mineral being a phosphate of iron.

Lately this mineral has been re-examined, with

the assistance of Judge Cooper, in the laboratory of the College of South Carolina, in Columbia, with the same results.

Descriptions of several new species of Cuttle-fish.
Read March 20, 1821. By C. A. LESUEUR.

Having observed many species of the class *Cephalopoda*, and being desirous to arrange them agreeably to the new systematic distribution of this class, which Dr. Leach has published, (in the *Journal de Physique* for May, 1818,) I experienced much difficulty in disposing of one of my species. This species corresponds with those of his first order *Octopoda*, by having eight arms, similar to those of the *Eledona*, &c. and with those of his second order, by the form of the body, and the position of the fin, being similar to those of the species of the Genus *Loligo*. With these characters *it ought to form an intermediate section, between these two orders.*

Dr. Leach has appropriated the name *Octopoda* to those animals of this class, that have eight arms, and a body destitute of a fin; and the name of *Decapoda* to such as are furnished with ten arms, and with fins which margin the body (or sac) entirely, or partially.

The latter, constituting his second order, are in part referred to a family which he names *Sepiidea* and which is composed of the Genera *Sepia* and

Loligo of Lam, and he places the latter after the *Sepia*.

But the characters which he assigns to this family, do not appear to me to harmonize with those of the genus *Sepia* of Lamark, of which the body is oval, short, sub-obtuse, furnished with fins throughout its whole length; sustained by a very distinct, thick, sub-obtuse bone, which is sometimes armed with a spine posteriorly, is hard and solid towards the back, tender and cellular beneath, and is "*composed of calcareous, very thin, parallel lamina, connected together by thousands of very small, hollow columns, which are perpendicular to their surfaces,* (Cuv. Règne Animal.) Are not these last characters sufficient to distinguish and to separate entirely the genus *Sepia* from that of *Loligo*? inasmuch as this latter genus, on the contrary, has a body enclosed in a sheath, which is long, cylindrical, subulate, narrow, with the fins terminal, united or separate; a very thin, feeble bone, which is often narrow, transparent, sometimes partially gelatinous; this bone or cartilage, which belongs also to the *Sepiola*, appears to me to present a character which ought to approximate the *Loligos* to the *Sepiola*, as Mr. Cuvier has done, (Règne Animal, t. 2, p. 364,) and which will not admit of the interposition of the genus *Sepia*, as in the arrangement of Dr. Leach.

It may then be proper to establish a distinct family for the reception of the genus *Sepia*, to be distinguished by the name given to it by Dr. Leach, of

Sepiidea, with the characters which Mr. Cuvier has assigned to the genus (Regne Animal, p. 365.) For there is good reason to believe, that when the species of the Mediterranean and the other seas, shall be more critically examined, that many species will be discovered, that will require new divisions to be made in this family, as well as in the present genus *Loligo*.

It may also be proper to consider the *Loligos* as forming a separate family. It is of little consequence what characters we select for the distribution of these animals into families and genera, if our arrangement is the most convenient, and exhibits, as near as possible, a gradual transition from one to the other.

The order in which Mr. Cuvier arranged them is very natural, he places the *Polypus* of Aristotle, the *Eledona*, the *Loligo* and the *Sepia* in succession; and the new genus which I shall propose in this essay, may be readily intercalated in the series.

If we observe the form of the body; that of the fins, and their position; the form and the number of the arms; the disposition, the number, and the form of the suckers, their corneous circles either entire or divided, their detentations; the arms which have these suckers regularly or irregularly armed; in fine, those which have nails, either naked or covered by a membrane, upon the longer arms; and those which have nails and suckers; together with the form of the bone; we shall then have characters sufficient for the formation of new divisions.

A careful examination of all the species which exist in the cabinets, and which, from the general form of the body, are regarded as the same, would prove that many distinct kinds have been associated under one specific denomination.

Thus I regarded the species described in this paper, from the collection of the academy, and that from the Philadelphia Museum, as specifically the same, with one of which I made a drawing at Sandy-bay; but upon comparing them with each other, they all proved distinct.

In the following arrangement I have considered the form of the body, the number of the arms and their armature. To the family I apply the name of *Loligoidea*, of which the genera may be divided into those which have not long arms; and those which have long arms, and finally, those which have simple nails; those which have nails and suckers; and those which have suckers only.

FAMILY LOLIGOIDEA.

CHARACTERS.—Body enclosed in a sac, which is elongated, narrow, cylindrical, subulate posteriorly; fins terminal, united or separate; bone very thin, more or less transparent, sometimes partially gelatinous; arms as in the *Sepia*, with or without long arms.

* Arms sub-equal.

GENUS 1st, LEACHIA.

Eight unequal arms, the third pair longer and more robust.

L. **cyclura*. Terminal fin orbicular; head small; eyes large, prominent; body coniform.

Inhabits the Pacific Ocean.

Total length from the extremity of the tentacula to the tip of the fin five and a half inches; body three inches; tail one inch; the long tentacula one inch and a half. The first pair of tentacula very short, second pair longer, third pair still longer and more robust; inferior pair nearly equal to the superior ones; terminal fin orbicular, slightly embracing the tip of the body; *color*, tentacula and superior portion of the head light blue; *body* and *tail* tinged with bluish and red, irrorate with red points, ornamented with several irregular spots of a deeper red, and with remote, transverse, black, abbreviated lines, two large light brown, suboval, dorsal spots behind the middle, preceded by a black spot, and with a red one posteriorly.

This description is taken from a drawing made by Mr. Petit, from a specimen obtained in the Pacific Ocean, in lat. 37° South, and long. 33° East.

** Having long arms, furnished with suckers.

GENUS 2nd, LOLIGO, *Pliny. Lam.*

Fins, united, pointed at the base.

SPECIES.—1. L. **Bartramii*. Arms sub-compressed, with a large membrane at their inner angles.

The *sac* in this species is very firm, cylindrical to the base of the fin, where it contracts, and terminates

in a point; *fins* united, entire, forming the third part of a circle, of which the center is the extremity of the tail, they are superposed, terminated each side by an angle, thick upon the posterior side, very thin and pellucid on the anterior; *head* cylindric, truncated behind, so as to enable it to close the sac; *neck* on each side furnished with three small, rounded, compressed appendices, placed longitudinally; *eyes* free in their orbit, of which the aperture is small, with an anterior lacrymal emargination; no membrane annexed to the orbit for covering the eye. Ten arms, furnished with suckers, which, on the extremity of the long arms, are disposed in four series, with the larger ones central; the other eight arms have but two series, which extend from the base to the extremity. These eight arms are unequal, the first pair smallest; second pair longer than the first; third longer than the second, much compressed, and furnished with a large membrane interiorly and towards the anterior extremity; the fourth and inferior pair, as long as the second, the suckers oblique, elevated on the exterior, and depressed on the interior side, armed with a corneous, denticulated circle, the peduncles of the suckers repose upon the base of the transverse vermiform muscle, with which the interior lateral membrane is furnished; the two long arms feeble, slightly compressed, dilated at their extremity, which is margined on each side by an undulated membrane, and towards the superior extremity opposite to the suckers by another membrane; *beak* concealed and ce-

vered by a folded sphincter, which is furnished with six very short appendices, hardly surpassing the folded membrane of the mouth; *bone* very narrow, corneous, feeble, transparent, enlarged a little anteriorly, gradually diminishing, cylindrical, and terminated by a small hollow cone posteriorly, margined each side by two strong lines, in the middle by a single line; *color* violet-blue, passing into purpleish on the back, head and tail; a narrow, longitudinal, yellowish band on each side of the back; sides of a pale blue; beneath white; brown points disseminated over all the body, but more numerous above.

2. L. **Pealeii*. This species, which appertains to the fine collection of the Philadelphia Museum, was politely confided to my care, for examination, by the manager of that interesting and superb establishment Mr. R. Peale. It appears to me, not referible to any of the species figured by Seba, nor of those published by Montfort.

The sac is solid, firm, cylindrical, gradually attenuated to a point, and furnished with a flat appendice anteriorly; *fin* terminal, more than half as long as the body, united in a point posteriorly, lateral angles rounded, lateral and posterior sides thickened, anterior side thin, surface with transverse striæ, formed by small muscles; *head* small, compressed, with a small transverse membrane each side below the eyes; *neck* small, short; *eyes* covered by a mem-

brane; *arms* eight, of which six are subtriangular, the two superior ones a little shorter than the second pair, which are equal to the inferior pair, third pair very strong, rounded, and depressed, longer than the others, furnished with a membrane at their exterior part; all the arms furnished with two series of suckers, which are hemispherical, alternate and pedunculated; the *disks* are obliquely truncated, most elevated on the exterior side, beneath indented for the attachment of the conic peduncle, they are armed with six horny brown teeth above, of which two superior ones are narrow and pointed, and the four others broader; inferiorly and upon the narrow side of the disk is a long, horny, brown lamina; the *two long arms*, are subcylindric, dilated at their extremity, margined on each side by an undulated membrane, upon which the peduncles of the suckers repose; four series of suckers, of which the middle series are largest, and terminated at each extremity by smaller suckers; *disks* hemispheric, transversely truncated, armed with a corneous circle, and having strong remote teeth, with two or three smaller intervening ones, in the central disks; but I have not been able to determine the number of intermediate teeth in the lateral disks; besides the thin lateral membrane, there is another thicker one, placed obliquely upon the enlarged extremity of the long arms; the opening of the mouth, has three concentric folds, the exterior one of which is furnished with a much folded membrane, which is terminated

by six small appendices, or false arms, furnished with several suckers at their extremities, the two inferior appendices shorter.

The *bone* is broad, naviculiform, terminated in a point at each extremity, thin at the margin, carinated, and a little more robust at the anterior extremity, which is narrowest.

The superior part of the head, of the teutacula and of the back covered with reddish-brown points, which are less numerous upon the sides and abdomen.

Coast of South Carolina ?

When Mr. Maclure and myself were at Sandy Bay in 1816, we saw a great number of *Loligos* collected by the fishermen, and held in reserve as bait for Cod-fish, which they catch in great numbers on the banks of Newfoundland. The beautiful color with which they were ornamented, induced me to take a drawing of one immediately, but not then having leisure to complete it, I took a specimen with me to finish the drawing at my leisure. But recently upon comparing this specimen with my drawing, I was much surprized to perceive that I had brought with me a very distinct species from that which I had observed. I mention this circumstance to explain the cause of the brevity of the following description, taken from my drawing.

3. *LOLIGO *illecebrosa*. The body of this species is rather short, narrow, subequal anteriorly, terminated acutely posteriorly; *fins* approximated at their origin, terminated in a point, and taken together rhombiform; the two longer arms are narrow, dilated at their extremity, and furnished with two series of suckers, the eight arms are almost equal and provided throughout their whole length with two ranges of suckers; the arms are long, and with the head they measure two-thirds of the length of the sac; the bone is very narrow in the middle, dilated at each extremity, and terminated at the inferiority by a hollow inverted cone.

Colors vivid and beautiful, passing from a brilliant red to a deep and clear blue, upon the back, the head, arms, tail, and fin, which are covered with deeper points of the same color, the under part of the body is paler, region of the eyes finely tinted with yellow.

This species is known by the name of *Squid* at Sandy Bay, and is made use of by the fishermen as bait in the Cod-fishery.

4 *LOLIGO *Bartlingii*. Lateral arms compressed, and with the inferior pair, furnished with a membrane upon all their exterior length.

This species for which we are indebted to captain Bartling, who obtained it in the Gulf Stream, forms part of the collection of the Academy. It differs from the preceding by its arms, which are generally longer, filiform at the extremity; a broad, thin and

softer fin is situated at the superior part of the tail; its body also is larger. The bone presents a still greater difference, in being very much compressed at the base, and a little dilated at the opposite extremity.

Color, deep blackish brown; the four superior *arms* being very much compressed, have their interior surface very narrow and destitute of a lateral membrane; the suckers are very small and crowded, and seem to form but a single range, though in reality they are disposed in two series and are alternate; the eight arms are furnished with suckers throughout all their length, and are unequal, the inferior ones being longest, and the others diminishing gradually. The *long arms*, the extremities of which had been cut off by the fishermen, appear to have been very long; *suckers* hemispheric, placed upon a short peduncle; corneous ring, broad and mutic; the *body* is inserted very deep in the sac, which renders it very free at the superior part; *eyes* free in their orbit, which is dilated, rounded, destitute of nictitating membrane, and furnished with a lachrymal emargination anteriorly; *body*, back and tail covered with reddish brown points; a slightly depressed line on the superior part of the sac.

5. L. **Pavo*. Sac much elongated, rounded; eyes very large; arms very short, depressed; fin cordate, terminated in a point; bone very narrow anteriorly, somewhat dilated posteriorly, and subgelatinous.

This species is remarkable by its elongated, pointed, and very soft sac; by its bone, which is sub-equal in its greater length anteriorly, and enlarged towards the base, where it is terminated in an obtuse point. The fins are united and oblong-cordate, entire at base, and spreading from the sac, which is narrow, smooth, and, as well as the head and arms, covered on every part with very large ocellations, which are connected together by smaller intermediate ones. General colour, deep carmine-brown; head small; eyes large, prominent, and directed more forward than laterally; neck narrow, short; arms very short, furnished with two series of suckers, supported by narrow pedicles, which are fixed upon the margin at the base of the membrane and towards the narrowest side of the sucker, which is truncated very obliquely, the larger side being exterior, and the narrower interior; they are also distant from each other; the arms are destitute of lateral interior membranes; the large arms are thin.

I have not been able to ascertain whether this species is armed with hooks or suckers. The tips of the small arms, as well as the greater portion of the larger arms, had been cut off by the fishermen; an operation which they perform upon all they capture, for fear of receiving injury from them.

Length of the sac 10 inches. The figure represents the animal half its natural size; it was a female, the oviduct of which was exerted and pendant, as represented in the plate; it is an aggregation of small,

white globules, attached and sustained by a membrane.

Sandy-Bay, 1816.

*** Having long arms, furnished with nails, with or without suckers.

GENUS 3d. *ONYKIA.

O. **Carribœa*.—Arms eight, unequal; tentacula two, elongated, and armed near their extremity with suckers, and with corneous hooks, concealed, each in a membranous sac; fin truncated.

Inhabits, amongst fuci, in the Gulf of Mexico, and in the Gulf Stream.

Head rounded, short, crowned by eight arms and two tentacula; eyes large, lateral, and but little prominent, pupils black, iris blue; body enclosed in a sack, cylindric anteriorly, conic posteriorly, and terminated at this extremity by a sub-triangular fin, of which the inferior angle is truncated and rounded; the space between the origins of the wing which forms this fin is 2 lines long; their extent from one angle to the other, is 8 lines, their length is 6 lines; the diameter of the sack anteriorly 6 lines.

The eight arms are, in all their length, each furnished with two series of suckers; the two superior arms are the shortest, being only 10 lines in length; the six others are 9 lines long; the tentaculæ are one inch and an half long, and are armed at their extremity with two series of incurved hooks, which alternate with suckers at their bases; the series of suck-

ers extend further towards the head, than those of the hooks. These curved horny nails are each covered by a membrane when at rest, which resembles a small pocket. The inferior arms are furnished with a small longitudinal natatory membrane upon their exterior side, and at their base; the lateral arms have also a membrane towards their extremity and above. Colour, as usual in the species of this family, varying from a blue to a purple, or yellow, &c.

Total length from the extremity of the tentaculæ to the tip of the fin, 3 inches.

Head 5 lines; tentaculæ 1 inch and an half; body 1 inch.

OBSERVATIONS.—I have had for some time in my possession, a drawing of a *Loligo*, which was obtained during a voyage from the Canary Islands to the Isle of France, in latitude $36^{\circ} 40'$ south, and longitude 29° east. This drawing, which was executed by Mr. Petit, is very finely coloured; but as it is not sufficiently detailed, it was regarded as inadequate to establish the certainty of the existence of the species which it represented. All doubts, however, are now dissipated by our observations upon the species of the Gulf Stream, and by those recently published by Dr. Leach upon a species of the coast of Africa. Although Mr. Petit's drawing is not calculated to exhibit minute characteristics, yet the following differential traits are remarkable. The hooks are but slightly curved, and destitute of suckers at their base, the fin is rhomboidal, prolonged to a point at the

extremity. To this species I have applied the name of *O. Angulatus*. It has eight unequal tentacula, the two superior ones shortest. Total length from the extremity of the tentaculæ to the tip of the fin, 10 inches; body 5 inches; head very small, 8 lines long; the two superior tentacula 1 inch and 9 lines; the long tentacula 5 inches.

SEPIOLA cardioptera. Peron.

Peron has left no description of this species, which we saw in latitude 31° south, and longitude 48° east; the species appeared to belong to the genus *Sepiola*, and perhaps even to the unguiculated ones. The habit of living in many seas, amongst the fucus which floats upon the surface of the waters, is similar to that of the Gulf Stream, which is furnished with horny nails upon the long arms, as described above.



OBSERVATIONS.—I subjoin the names of the species that Peron and myself observed in New Holland, in order to note their existence. I have sent descriptions of them to France.

Peron designated them by the following names:

1. *SEPIA sepiola*. Peron. Very small.

Inhabits the coast of Endrach, in New Holland.

As this species does not appear to be the *sepiola* of Lin. I propose for it the name of *minima*, as it is very small.

Family of SEPIEDEA. Leach.

2. *SEPIA octopa*. Peron. Very small.

Inhabits the island of Dorre, Shark Bay.

This species can hardly be the *octopus* of Lin. I propose, therefore, the name of *Peronii* for it.

3. *SEPIA rugosa*. Bosc.—I do not think that our species is the same with that described by Bosc; I therefore propose for it the name of that naturalist, *Bosci*.

4. *SEPIA varietas*. Peron.

Inhabits the small island of Dorre.

The shores of King's island were covered with *Sepiæ*, many of which were living. We there observed also many groups of their eggs.

REFERENCE TO THE PLATES.

Plate 6. LEACHIA CYCLURA.

Plate 7. LOLIGO BARTRAMII.

fig. 1. lateral view.

“ 2. dorsal view.

“ a. b. sections of the arms magnified, exhibiting front and lateral views of the suckers.

“ c. a portion of the skin of the body magnified.

“ d. beak.

“ e. bone.

“ f. transverse section of the bone.

Plate 8. LOLIGO PEALEII.

fig. 1. dorsal view.

“ 2. side view.

“ a. bone—front view.

“ b. bone—side view.

“ c. beak, sphincter, and appendices.

“ d. d. d. suckers, magnified

Plate 9. fig. 1. ONYKIA CARRIBÆA, dorsal view.

“ 2. do. do. lateral view.

“ a. b. bone—profile, and front views.

“ c. transverse section of the bone.

“ d. extremity of one of the long arms magnified.

“ e. hook and sucker, magnified.

“ 3. ONYKIA ANGULATUS.

Descriptions of the Myriapodæ of the United States.

By THOMAS SAY. Read November 21st, 1820.

CLASS MYRIAPODA.

ORDER 1. CHILOGNATHA.

GENUS JULUS.

Body serpentiform, cylindrical; antennæ inserted on the anterior margin of the head, second joint longest, terminal one minute; eyes distinct; feet many.

SPECIES. 1. *J. *impressus*. Brown, a series of lateral black dots, beneath yellowish white; ultimate segment mucronate.

My Cabinet.

Body cylindrical, immarginate, above brownish, beneath yellowish-white appearing glabrous; segments each with a lateral black spot, whitish lines and dots sometimes obsolete, a transverse series of longitudinal abbreviated obsolete impressed lines, and beneath the stigmata with impressed, more distinct ones, ultimate segment mucronate, spiracles not prominent; eyes rather large, conspicuous, black; labrum yellowish white; antennæ brownish.

A common species inhabiting under stones, and in humid situations, a variety occurs with a very distinct, acute, longitudinal, dorsal line, and variegated head.

2. *J. *punctatus*. *Body* brownish, with an impressed dorsal line, impressed white dots and spots, ultimate segment unarmed.

My Cabinet.

Body cylindrical, immarginate, above dark brown, glabrous, an obsolete, dorsal, whitish, slightly impressed, acute line; *segments* each with a white dot on either side above, and a larger transversely oblong lateral one, which is gradually more completely bisected on the posterior segments into two distinct dots, which on the terminal segments resemble the dorsal ones, ultimate one abruptly narrower than the preceding and truncated, anterior segments attenuated to the head, which is wider than the anterior one, anterior segment as long as the second and third ones conjunctly; spiracles somewhat prominent; *eyes* very distinctly granulated, subtriangular, black; *head* dark-brown, labrum white.

Inhabits the same situations, and is similar in general form to the preceding species, but is less common and rather smaller. The dots, spots and lines are for the most part slightly impressed.

3. J. **annulatus*. Body with numerous, elevated, obtuse lines, of which four are above the stigmata; ultimate segment glabrous, unarmed.

Inhabits the southern States.

My Cabinet.

Body cylindrical, immarginate, above brownish with a slight tint of red, immaculate, beneath yellowish white; *segments* each with about fifteen elevated obtuse lines, of which four are equal dorsal, a pyriform, larger, oblique one on the stigmata, and about ten decreasing in size to the feet, anterior segment

as long as the three succeeding ones conjunctly and glabrous, posterior one glabrous reddish brown, as long as the two preceding ones, united and obtusely rounded at tip; *head* whitish before; *antennæ* white; *eyes* transverse linear, black; *vertex* not distinctly impressed.

A rather common species in the southern states, inhabiting with the preceding and in decaying wood.

4. J. **lactarius*. Body fuscous with a rufous dorsal line, numerous elevated lines, of which about fifteen are above the stigmata, ultimate segment unarmed.

My Cabinet.

Body cylindrical, above fuscous, with a dorsal rufous vitta and an obsolete one each side; beneath yellowish white; *segments* each with numerous, elevated, longitudinal lines, of which about fourteen are above the stigmata and about fourteen below, becoming smaller to the origin of the feet, line of the stigmata geminate, anterior segment as long as the second and third conjunctly, and glabrous on the anterior half, posterior segment not so long as the two preceding ones united, widely rounded at tip; *head* glabrous; *antennæ* reddish-brown; *eyes* triangular, granulated, deep black.

Not uncommon under stones &c. and when irritated discharges a lacteous globule from the lateral portion of each segment, diffusing a strong and disagreeable odour.

5. J. **marginatus*. Body cylindric glabrous, blackish, segments with a rufous margin; ultimate segment unarmed.

My Cabinet.

Body cylindric, glabrous, polished, blackish, beneath pale reddish; *segments* margined behind with rufous, anterior segment as long as the three succeeding ones conjunctly and entirely margined with rufous, second segment slightly, and obtusely angulated at the lateral tip of the anterior one, ultimate segment as long as the two preceding ones united narrowed to the tip which is rounded; *head* with an impressed line which is obsolete on the front; *labrum* pale, deeply and widely emarginated at the tip, with a submarginal, infracted series of ten or twelve punctures furnishing hairs, tip ciliated, reddish, obsoletely dentate.

Length more than three inches.

A very large species inhabiting decaying wood, &c. when irritated it diffuses an odor like that of muriatic acid, and is infested by *Gamasus Juloides*. It varies in colour; the margin of the segments and all beneath are sometimes white, the ultimate segment is sometimes almost acutely angled at tip, and there is a distinct lateral series of black dots.

6. J. **pusillus*. Body with a lateral series of black spots, terminal segment unarmed.

Inhabits the middle States.

My Cabinet.

Body cylindrical, immarginate, above pale, obsolete reticulate, and varied with reddish; a lateral series of large black spots, numerous longitudinal, parallel, impressed, acute lines beneath the stigmata becoming gradually shorter to the origin of the feet; beneath whitish; *head* white beneath the antennæ; *antennæ* two joints preceding the last somewhat dilated, not attenuated at their bases, nor separated by a contraction; *eyes* black, longitudinally sublunate; *ultimate segment* unarmed, longer than the penultimate one, rounded at tip and blackish.

Length nearly half an inch.

Resembles *J. impressus* in the character of lateral impressed lines, but is distinct by the unarmed terminal segment; I found it rather common on the Eastern shore of Virginia under the bark of *Pinus variabilis*.

GENUS POLYDESMUS, Latr.

Body elongated, linear depressed, segments with a prominent margin; eyes obsolete; feet many; antennæ, second joint shorter than the third.

SPECIES. 1. *P. *serratus*. Segments with a double transverse series of slightly raised squamiform elevations.

My Cabinet.

Segments depressed above, with four minute serratures each side, first segment transversely oblong oval, somewhat angulated on each side behind, second, third and fourth segments with but three serratures,

first rather longer than the second, and with a single obsolete serrature near the posterior angle, each segment with a double transverse series of twelve slightly elevated, squamiform divisions, anterior segment with but a single series; *head* glabrous, an impressed longitudinal line on the vertex; *antennæ*, *feet* and *terminal segment* hairy; *colour*, above reddish-brown, beneath yellowish white.

Common in similar situations with the preceding.

Julus Virginiensis of Drury, is also rather common, it appears to be synonymous with *J. tridentata* of authors. I have found specimens double the usual size, in the southern States. It seems also to vary in having only the second joint of the feet mucronate, and in being destitute of the robust ventral spines between the feet.

2. P. **granulatus*. Segments granulated, granules subequal, arranged in four series.

My Cabinet.

Body with short hair, pale tinged with red beneath, and feet paler; *head* dusky with short dense hairs; *labrum* whitish; *segments* somewhat convex, granulated, granules rounded, or longitudinally oblong-oval, elevated, obtuse, approximate and arranged transversely in about four nearly regular series, anterior segment transversely oval, narrower than the head or second segment; *stigmata* elevated.

Found in Pennsylvania.

GENUS POLLYXENUS, LATR.

Body membranaceous, pennicillate with setæ at tip; antennæ inserted under the anterior margin of the head.

SPECIES. P. **fasciculatus*. Body pale brown, linear, incisures ciliated, fasciculated each side; head deeply ciliated before.

Inhabits the Southern States.

Segments smooth, ciliate at the incisures and fasciculate with brown setæ each side, terminal pencil cinereous; *head* semiorbicular, depressed, deeply and densely ciliated on the edge with setæ; *eyes* small, oval, prominent, placed obliquely in the middle of the lateral margin; *antennæ* very short, thick reddish-brown; feet white.

Length rather more than one tenth of an inch.

Beneath stones &c. in humid situations, not very common.

ORDER 2. SYNGNATHA,

GENUS LITHOBIUS, Leach.

Antennæ conico-setaceous; dorsal scuta alternately much shorter and concealed.

SPECIES. L. **spinipes*. Joints of the feet with short spines at tip, and a single much longer one beneath the tips.

My Cabinet.

Body chesnut brown, polished, impunctate, with short sparse hairs; *segments* with reflected lateral edges, first one shortest, transverse, the second quadrate with rounded angles, five or six posterior ones each narrowed behind and emarginate on the hind edge, the posterior angles of those near the caudal segment more acute, caudal segment truncate conico-cylindric; *antennæ* pale testaceous, with dense, very short, rigid hair, terminal joint as long as the two preceding ones conjunctly; *feet* pale testaceous, joints spinous at tip, an elongated spine at the tip of each beneath, anterior pair shortest, posterior longest and more robust; *labium* longitudinally indented, impunctate, teeth of the tip black.

Length, more than one inch.

Very common under stones &c. The specimen from which this description was taken has but thirty joints to the antennæ.

GENUS CERMATIA.

C. coleoptrata, Villiers. Is an inhabitant of the Southern States; we observed it both in Georgia and East Florida. It is probable, that, like a vast number of the insects now common in our country, it has been introduced by our shipping from abroad.

GENUS SCOLOPENDRA.

Antennæ conico-setaceous; dorsal scuta subequal; eyes, four each side, hemispherical.

SPECIES. 1. *S. *marginata*. Body obscure olivaceous green; segments margined with dark green; *head* castaneous.

Inhabits the Southern States.

My Cabinet.

Body obscure olivaceous green, beneath whitish or fulvous; *segments* impunctured, margined each side and behind with black-green, first, third, and fourth shortest, five or six terminal ones more distinctly margined; *head* chesnut colour; *antennæ* green; *feet* pale, tipped with blueish green, nails blackish; *posterior feet* hardly longer than the three terminal segments of the body conjunctly; length of the joints hardly equal to double their breadth; first joint spinous beneath and within, and armed with an acute, strong, projecting angle at the tip.

Length more than two and an half inches.

Rather common in Georgia and East Florida; it is also found in the West Indies, but does not occur so far north as Pennsylvania.

2. *S. *viridis*. Body blueish green; base of the feet and all beneath, whitish.

Inhabits Georgia and East Florida.

My Cabinet.

Body above blueish green immaculate; posterior segments margined with pale yellowish; *mandibles* yellowish-white; *feet* whitish at base, terminal joints pale blueish-green, posterior pair pale yellow.

Length, about two inches and an half.

I have not known this species to inhabit so far north as Pennsylvania.

GENUS CRYPTOPS. *Leach.*

Anterior edge of the labium not denticulated, hardly emarginate; eyes obsolete; posterior pair of feet longest, basal joint unarmed.

SPECIES. 1. *C. *hyalina*. Body much depressed, white, with a double blackish internal line; hind feet, with the third joint five toothed.

Inhabits Georgia and East Florida.

My Cabinet.

Head reddish-brown polished, impunctured, with scattered hairs, no impressed clypeal line; *antennæ* reddish-brown hirsute, joints sessile, cylindric, terminal ones rounded; *body* white, polished, two black internal lines, a few sparse hairs, impunctured; *feet* with a few hairs; *posterior feet* reddish-brown, first joint not so long as double its breadth, and, with the second joint, armed with numerous short rigid setæ, with an indented line above, third joint four or five toothed within, fourth joint about two toothed.

Length three-fifths of an inch.

Numerous specimens of this species occurred beneath the bark of a decaying Live Oak (*Q. virens*) on the river St. John, East Florida. The appearance of the posterior feet approximates it to Scolopen-

dra; but the eyes exclude it from that genus, as the number of feet does from *Lithobius*.

2. *C. *seaspinosa*. First joint of the posterior feet two spined.

My Cabinet.

Body reddish-ferruginous, punctured; second segment shortest, then the fourth and sixth, terminal one indented at tip, and armed beneath with a double, prominent, robust spine; *antennæ* with very short dense hair, joints oval, separated by a very short peduncle; *feet*, two moveable short spines at the exterior tip of the fourth joint, fifth joint with one beyond the middle and one at tip; *posterior feet*, the base beneath a conspicuous, elevated, compressed, acute, sub-triangular spine, and a smaller one on the inner side above, nearer the middle.

Not uncommon in decaying wood. It varies in being impunctured beneath. I have a fortuitous variety, of which the antennæ are clavate and five-jointed.

3. *C. *postica*. Terminal segment of the body longest; posterior feet very short and robust.

Inhabits Georgia and East Florida.

My Cabinet.

Body rufous, paler beneath, punctured; segments with two impressed, longitudinal lines above, and a deeply impressed one beneath; ultimate segment longer than the two preceding ones conjunctly, with two

obsolete impressed abbreviated lines at base, and an intermediate more distinct continued one; *posterior feet* remarkably robust, hardly longer than the ultimate segment; nail very robust, as long as the two preceding joints conjunctly.

A very remarkable species, distinguished at once from all others, by the very thick and short posterior pair of feet, the nails of which cross each other, and are much used by the animal in its defence.

GENUS GEOPHILUS.

Posterior pair of feet not remarkably longer than the others; eyes obsolete.

SPECIES. 1. *G. *rubens*. Body attenuated before and behind; terminal pair of feet hardly longer than the preceding pair.

My Cabinet.

Body broadest in the middle, impunctured, red, with short hairs more numerous on the antennæ and feet; segments with two longitudinal impressed lines, and a transverse acute one near the base of each, ultimate segment somewhat longer than the preceding, narrowed and rounded at tip; *head* beneath, with a blackish spot each side at the base of the mandibles, and another at base of the terminal joint; *labium* with a profound fissure, not dentated; *antennæ*, terminal joint longer than the preceding ones, and of equal diameter, not attenuated; *feet* subequal.

Very common in decaying wood, under stones, &c.

2. *G. *attenuatus*. Body attenuated from the head, posterior feet longer than the others.

Inhabits the Southern States.

Body broadest before and gradually attenuated to the tail, reddish-brown, with a few hairs; *head* and *base* of the *mandibles* above punctured; *antennæ* setaceo-filiform, with numerous short hairs; *feet* paler than the body, posterior ones longer than the others.

Found under stones, &c.



A Description of some new species of Plants, recently introduced into the gardens of Philadelphia, from the Arkansa territory. By THOMAS NUTTALL. Read, August 7th, 1821.

1. *COREOPSIS *tinctoria*, foliis radicalibus pseudo-bipinnatis, foliolis subovalibus integris glabris, superioribus pseudopinnatis laciniis linearibus; floribus binatis ternatisve; calicibus exterioribus brevissimis; radiis bicoloribus; seminibus nudis immarginatis.

Habitat. Throughout the Arkansa territory to the banks of Red river, chiefly in the prairies which are subject to temporary inundation.—Flowering, from June to October.

DESCRIPTION. Annual and biennial, stem erect, smooth, and much branched, extremely variable in magnitude, being from one to five feet high. The

leaves, in common with the genus, are somewhat thick and succulent, the primary ones simple, radical pseudobipinnate, the segments also occasionally pinnate, oblong-oval, commonly smooth, and entire, the ultimate divisions largest. Flowers often terminating the branchlets by pairs, with the peduncles unusually short. Exterior calix, minute, much shorter than the interior, and in common with it, and the number of rays mostly eight-leaved. Rays three-lobed at the extremity, of a bright orpiment yellow and brown towards the base; disk brown, and rather small. Receptacle paleaceous, the leaflets deciduous. Seed small, blackish, immarginate, curved, and naked at the summit.

Economical Use. The flowers of this species afford a yellow dye, in common with those of the *C. senifolia*.

As an ornamental plant, of easy culture and uncommon brilliance, it promises to become the favourite of every garden where it is introduced.

2. *HELIANTHUS* **petiolaris*, annuus; foliis alternis ovatis acutis integriusculis, longissime petiolatis scabris; caule erecto ramoso; floribus longe pedunculatis; seminibus villosis.

Habitat. On the sandy shores of the Arkansa. Flowering in August.

DESCRIPTION. Annual, and with the stem much branched from the base. Leaves mostly alternate, ovate, or ovate-lanceolate, and somewhat undulated.

produced upon petioles of an extraordinary length, rather small, and as usual scabrous and three-nerved, appearing somewhat shining and almost destitute of serratures. Peduncles solitary, also of great length. Segments of the calix, linear-lanceolate, acute; leaflets of the receptacle mostly three-toothed. Rays of the flower numerous, bright yellow, the disk dark. Seeds small, and spotted, covered with a silky and fulvous down.

This curious species, so readily distinguished at the first sight, is an ornamental annual of easy culture, remarkable for the smallness of its leaves, and the length of their petioles. The flowers are about 3 or 4 inches in diameter, and the stem low, with spreading branches.

3. ASTER **graveolens*, viscosus; caule pumilo ramosissimo recurvato rigido; foliis crebris consimilibus lineari-oblongis acutis subamplexicaulibus integerrimis; ramulis exsertis unifloris; calicibus squarrosis.

A. oblongifolius. Nuttall's Genera, 2. p. 156.

Habitat. On the shelvings of rocks, on the banks of the Arkansa and Missouri.—Flowering time, from August to December.

DESCRIPTIVE OBSERVATION. Perennial. Stem about a foot high; under cultivation more than double that altitude, its texture somewhat woody below, and very brittle, the main branches are commonly recurved, and very copiously and regularly sub-divided so as to form a roundish annual bush of an almost

even contour. The leaves are somewhat crowded, and similar in appearance, covered with a minute and viscid pubescence, communicating to the plant a strong and somewhat balsamic odour, very similar to that of *Gnaphalium americanum*. The rays of the flower are of a violet blue, and the disk yellow.

This is a very elegant, hardy, and ornamental perennial, decorating the gardens with a profusion of flowers at a season when all the others are generally destroyed by the frosts. I have altered the unmeaning name, which I had first bestowed from the inspection of an imperfect specimen.

—B. *Subgenus* PHRYGIA.

4. *CENTAUREA* **americana*, annua; caule præalto parcè ramoso, sulcato; foliis sessilibus, inferioribus oblongo-ovatis repando-denticulatis, superioribus lanceolatis acutis; pedunculis apice incrassatis; foliolis calicinis ovalibus appendiculato-pennatis recurvatis.

Habitat. On the banks of streams, and in denuded alluvial situations, throughout the plains or prairies of the upper part of Arkansa territory.—Flowering time, July and August.

DESCRIPTIVE OBSERVATION. Stem 4 to 6 feet high, smooth; leaves a little scabrous when dry. The calix is large and partly globular, its segments furnished with pennate, recurved, sphacelous, and shining appendages, the internal ones purplish. Rays of the flower very long, and tinged with red. Receptacle copiously pilose; the seed also furnished with the

usual unequal pappus. This species appears scarcely distinguishable from *C. austriaca*. Like most of the genus, it is a hardy annual, or biennial.

5. *DONIA* **ciliata*, foliis oblongis obtusis subamplexicaulibus ciliato-serratis; laciniis calicinis linearibus planis seto acuminatis; caule herbaceo.

Habitat. On the alluvial banks of the Arkansa, and Great Salt River.—Flowering time, from August to October.

DESCRIPTIVE OBSERVATION. Biennial. The whole plant smooth and shining, with the calix less resinous than in *D. squarrosa*, the segments not filiformly reflected, and the receptacle partly paleaceous. The serratures of the leaves are somewhat distant, and obtuse, but setaceously pointed as in *Carthamus tinctorius*. Each branch and branchlet, as in the other species, is terminated by a sessile flower.

There are few more desirable ornaments for the autumnal flower garden than this and No. 3. The flowers are large and of a bright golden yellow. The plant also attains the height of 4 or 5 feet, and is perfectly hardy.

Locality.—Cultivated in the garden of the University of Pennsylvania.

6. *ŒNOTHERA* **triloba*, acaulis; foliis interrupte pinnatifidis dentatis glabris; petalis apice trilobis; capsulis quadrialatis magnis.

Habitat. In the arid and partly denudated prairies of Red river.

OBSERVATION. Annual and perennial; its duration, like *Æ. caespitosa*, being checked or extended by the incidents of its mode of growth. The leaves are larger and more deeply divided than is usual in this genus, the segments are directed upwards, are acute, and denticulated, the terminal portion being the largest. Flowers pale yellow, vespertine; petals three-nerved, and slightly three-lobed at the extremity. The capsules, which are large, are collected together in such dense clusters, as commonly to stifle the vegetative vigor, and render the plant annual.

This species, more curious than beautiful, but hardy, begins to flower about May, after surviving the winter, but somewhat later as an annual. The flowers appear toward sunset, and die at sunrise.

7. *ÆNOTHERA *speciosa*, puberula; foliis oblongo-lanceolatis dentatis subpinnatifidis; racemo nudo, primo nutante; capsulis obovatis angulatis; caule suffruticosa.

Habitat. On the plains of Red River.—Flowering in June and July.

OBSERVATIONS. Root perennial, and running; the stem, by protection suffruticose. Lower leaves oblong, entire, and irregularly denticulate, succeeded by others which are pinnatifid towards the base. Racemes mostly dichotomal and naked, the flower-buds nodding. Flowers very large and white, becoming rose red on withering; the petals obcordate; stamina exserted; stigmas very long and divaricated.

This very beautiful and ornamental species, opens towards evening, and endures nearly throughout the day ; the period of inflorescence is, however, remarkably evanescent compared with that of the rest of the genus, but it is a perennial of easy propagation.

Cultivated Locality.—The garden of the University of Pennsylvania.

8. *ŒNOTHERA* **linifolia*, foliis integris, radicalibus lanceolatis, caulinis linearibus confertis ; racemo nudo terminali ; capsulis obovatis angulatis pubescentibus ; petalibus obcordatis staminibus longioribus ; stigma quadrilobo.

Habitat. On the summits of arid hills and the shelvings of rocks, near the banks of the Arkansa. —Flowering from May to July.

OBSERVATIONS. A remarkably small and biennial species, somewhat allied to *Œ. pusilla* of Michaux. The whole plant, except the capsule, is commonly smooth, the radical and stem leaves are very dissimilar in appearance, the flowers scarcely two lines broad, and yellow ; the bractes of the raceme are ovate, the seeds very small, and the valves of the capsule, as is usual in this section of the genus, open by partial involution from the summit.

9. *ŒNOTHERA serrulata*, foliis linearibus spinuloso-serratis acutis ; floribus axillaribus ; calyces foliolis carinatis ; stigma quidrilobo ; capsulis cylindricis erectis ; caule suffruticosa.

Œ. serrulata, Nuttall's Gen. Am. Pl. 1. p. 246.

9. *STEVIA* **callosa*, annua; foliis linearibus confertis crassiusculis, apice callosis, superioribus alternis; floribus divaricatis subcorymbosis; pappus suboctophyllus erosus brevissimus.

Habitat. On the gravelly banks of the Arkansa; rare.—Flowering from September to October.

OBSERVATIONS. Annual. Somewhat scabrous; stem divaricately branched, brittle. Leaves mostly alternate, sessile, and somewhat succulent, constantly terminating in a yellowish sphacelous or callous point. Peduncles and flowering branchlets glandularly pubescent; the flowers reddish and dispersed, tending, however, to a corymb; the calix cylindric, consisting of about 8 linear leaflets disposed in a single series. Florets from 10 to 12? quite similar to those of *Marshallia* and *Hymenopappus*, bearing a slender tube and a funnel formed five-cleft border. Anthers

Habitat. On the summits of hills, on the plains of Red River and the Missouri.

OBSERVATIONS. This species which is low, perennial and suffruticose, is remarkable in the structure of the calix, the shortness and peculiar disposition of the stamina, and the almost undivided stigma, in all which characters it approaches the genus *Epilobium*, its flowers also expand in the morning in place of the evening. The present variety produces a stigma which is nearly *black*; and a stem considerably branched. It continues to flower nearly throughout the summer, experiencing only a temporary cessation of vigor in the month of August.

Cultivated Locality.—The garden of the University of Pennsylvania.

blackish. Stigma bifid. Receptacle naked. Seed conic, pentangular, terminated by a short eroded paleaceous pappus. This species, excepting in the calix, does not essentially differ from *Hymenopappus*.

Cultivated Locality.—Garden of the University of Pennsylvania.

11. *ASTRAGALUS micranthus*, decumbens ; foliis ellipticis emarginatis glabris ; pedunculis subbifloris, petiolo longioribus ; leguminibus falcatis bicarinatis glabris ; seminibus truncatis.

Habitat. On the plains of Red River.—Flowering from May to August.

OBSERVATION. Root apparently both annual and perennial, (perennial by cultivation.) Stems numerous and decumbent, a little pubescent, scarcely exceeding a span in length. Stipules subulate, adhering to the stem. Leaflets five to eight pair, smooth, and often deeply emarginated above. Peduncles producing mostly two flowers, sometimes three, which are also unusually small, and of a pale blue color. The divisions of the calix are subulated. The legumes curving upwards, are at length black, and of a thinnish substance, broad and flat beneath, presenting two carinated or angular margins, distinctly two celled. The seeds flattish, and situated so near to each other as to be mutually truncated at the extremities.

Cultivated Locality.—The garden of the University of Pennsylvania.

12. VERBENA, (subgenus *Glandularia*.) Genus GLANDULARIA, Gmelin.

Calix tubulosus, quinquedentatus, dentibus setaceis inæqualibus. Corolla limbus quinquefidus subæqualis, lobus emarginatus, ore villosus. Stigma bilabiata.

Foliis trifidis laciniatis oppositis; spica solitaria, pedunculata. Corolla *Buchneræ*.

— Gl. **bipinnatifida*, suberecta, hirsuta, foliis trifidis bipinnatifidis, laciniis linearibus; seminibus impresso-punctatis.

Habitat. On the open calcareous hills of Red River.—Flowering in May and June.

OBSERVATION. Perennial. Leaves trifid, divisions trifidly pinnatifid, somewhat hirsute. Bractes subulate, longer than the calix. Calix tubular, dentures subulate, unequal, the lowest segment very short. Tube of the corolla nearly straight, longer than the calix; border large and flat, five-cleft, the lobes obcordate and emarginate, and with the orifice villous. Stamina fertile, didynamous and included. Style at length exerted, stigma bilabiate, the lobes unequal. Corolla lilac blue, with the border equal and similar to that of *V. Aubletia*, which species the whole plant strongly resembles. These two similar species appear to justify a subgeneric separation from *Verbena*, which had formerly been attempted by Gmelin.

Cultivated Locality.—Garden of the University of Pennsylvania. A hardy perennial, increasing by cuttings.

Observations on several genera and species of fish, belonging to the natural family of the Esoxes. By C. A. LESUEUR.

On the Genus BELONA of Cuvier.

My observations on this genus incline me to believe, that the *Esox Belona*, described by Dr. Mitchell, is not, as he supposed, the same with that of Europe. The drawings of several species which I have made in the West Indies and the United States gave rise to this doubt, to all of which is alike applicable the short description given us by the Doctor, and it can therefore be merely regarded as a notice of the existence of one of these species in the northern atlantic, and on the coasts of the United States.

Mr. Cuvier observes, that the species of this genus are not yet well distinguished,† that they resemble each other so much, and present at the first view so little difference, that they all might apparently be embraced in the same description; that those who had observed them had been deceived by neglecting to obtain drawings, by which it would have been easy to observe their differences in a manner more sensible and more exact. It is from descriptions, and the comparisons of four different drawings from nature, made in different places, that I now consider myself authorized to distinguish three new spe-

† Regne Animal, Vol. II. p. 186.

cies, which no doubt have been previously observed and considered as one and the same, existing throughout various seas.

Essential Character.

In these fish the maxillary bone forms the whole border of the upper jaw, which, as well as the inferior, is extended into a long snout; they are both likewise armed with small teeth. The mouth has no other teeth than those of the pharynx, which are as it were paved. The body is elongated and covered with scales, which are not very apparent, excepting a longitudinal carinated range on each side, near the lower border. The back is remarkable for its colour, which is of a fine green. The species of this genus differ also somewhat from the *Esoces* in their intestines.

B. **argalus*.

Dorsal and anal fins unequal, their posterior extremities directly opposite, the anterior part of the anal more advanced; tail deeply forked, lobes arched, the inferior longer; the lamina of the operculum equal; the head depressed.

Body subquadrangular, attenuated to more than three times the length of the beak, the tail laterally carinated. Lower mandible a little longer than the superior. Eyes very large, a little oblong, the pupil somewhat depressed above. Lateral line very low, interrupted by the ventral fins, and beginning to rise above the base of the anal, are then continued

along the middle of the tail upon the carina. Anal and caudal fins falciform, posteriorly narrowed, high and terminating in points anteriorly. Pectoral fins small, longer than the half of the space which separates their base from the tail.

Color of a fine blue upon the back, the under side and the opercula silvery; the iris bluish and argentine. Scales very small.

P. 18.—V. 6.—A. 19.—D. 16.—C. 26.

Collected near the Island of Guadaloupe, in 1816.

B. **truncata*.

Lower mandible longer than the upper; caudal fin obliquely truncated, ventral small, lateral line passing above and prolonged to the base of the anal fin into its posterior part, where it rises to pass along the carina to the base of the caudal fin.

DESCRIPTION. Body almost quadrangular, more than three times the length of the mandibles, wider upon the back, which is flat and sloping on either side, so as to form a groove along its middle.

On each side towards the back there is a line with an elongated point, and a little lower a small deep blue band, which is continued almost to the base of the dorsal line. Jaws long and pointedly terminated, the inferior a little longer than the superior, armed with fine conic teeth, of which some are longer and distant with small ones between them; teeth of the throat collected upon tubercles. Head flat above;

throat edged; eyes large at the summit of the head, silvery; nostrils before the eyes, in a triangular cavity. Base of the caudal fin depressed and carinated as in the preceding species; caudal fin truncated, lobes arrounded. Anal and dorsal fins as in the preceding. First rays of the pectoral and ventral fins flat and edged. Pectorals small, pointed. Ventrals smaller truncated, situated between the tail and the eye.

Color, a deep blue on the back, with a deeper colored band on each side. Scales very fine, silvery upon the head and abdomen.

B. —P. 16.—V. 6.—D. 16.—A. 19.—C. 20.

Collected at New-York in October 1816; at Philadelphia, and at Newport in Massachusetts.

OBSERVATIONS. At New-York this species is called Gar-fish or Bill-fish. I have also seen it sometimes in the market of Philadelphia.

B. **carribæa*.

Mandibles equal, slender, and pointed; dorsal fin continued further backward than the anal, the last rays also longer; caudal fin scalloped, lobes arrounded, the inferior twice as long as the superior.

Body almost cylindric, more than four times the length of the snout. Head depressed, long and wrinkled above. Eyes large, at the summit of the head, iris blue and silvery, pupil black and notched above. Nostrils large, near to the eyes. Opercula

smooth and flat, the lamina silvery, not very distinct. Both jaws armed with conic pointed distant teeth, producing between them small velvet like teeth, with which the jaws are furnished on each side throughout their whole length. Pectoral fins in a line with the eyes, as long as the space which separates them; the first rays of the pectoral, ventral, and the second of the anal, are flat, strong and edged. The anal and the dorsal fins are narrow posteriorly, and very high and pointed anteriorly, in the form of a sickle. Ventral fins rather long, situated between the eye and the base of the caudal fin. The lateral line commences beneath the origin of the pectoral fins, its base touches the ventral and continues along the abdomen to the base of the anal, where it rises and continues along the carina, so as equally to divide the tail. Seven rays of the tail on each lobe are very flat.

Color, deep blue upon the back, the head, tail, and whitish silvery beneath. Scales as in the preceding species, small, and rounded.

P. 13.—V. 6.—D. 24.—A. 22.—C. 30 $\frac{7}{8}$ flat.

Inhabits the Carribean sea at Basseterre, near the island of Guadaloupe. Collected in 1816. Flesh good and firm.

4. BELONA **Crocodila*. Peron and Lesueur.

If we might judge from the imposing aspect of the individual which we saw, this species appears to attain a very considerable magnitude. It is distinguished from *Esox Belona* and the other species designated and described by a very strong conic straight pointed snout, the bony plates of which are strongly radiated in order to protect the head. The body is less elongated and thicker, more elevated and not carinated towards the tail, the terminating fin of which is lunulated with the lower lobe much longer than the upper. The dorsal and anal fins are falciform, and long, the anterior part elevated, terminating in a point, and equally placed, the posterior very low and straight, more prolonged to the dorsal than the anal fins, ventral rather long and pointed, lunulated, situated nearer the eyes than the tail, pectoral fin small, elevated, placed near to the angle of the operculum. Jaws strong, straight and equal, forming an elongated cone, pointedly terminated and scattered, all armed with strong conic straight and scattered teeth, between the bases of which there are numerous other smaller ones which cover the maxillary bones throughout their length. The scales which cover the body are small. The lateral line commences at the gorge, is undulated under the pectoral fins, passes above the ventrals, and rises a little to continue along the middle of the tail. The color is similar to the preceding species.

P. 14.—V. 6.—D. 22.—A. 21. Caudal 28.

The total length of this individual was thirty-one and a half inches, the head alone was nine and a half from the beak to the termination of the operculum, with a height of about two and a half inches, and nearly two wide between the eyes.

The armature of its jaws renders it dangerous and deservedly feared by those who swim or bathe in the places which it frequents. This was the species in all probability which had been observed by Renard and which is spoken of by Monsieur Delacépède, which had been confounded with the *Esox Belona*.

Collected on the coast of the Isle of France. In the Museum d'Histoire Naturelle, marked R. R. No. 4.

5. *BELONA* **Indica*. This species observed by Perron and myself, makes a near approach to that of Gaudaloupe, and I shall here endeavour to present the characters by which they differ. This species as well as *B. caribæa*, has jaws which are equal, but in this they are more robust, obtuse, and thicker at their extremity while in that they are slender and terminated by a flexible point, it is further recognisable by its obliquely truncated caudal fin, slightly scolloped with arrounded lobes, and the lower one longer : the dorsal and anal fins are likewise similar in form, placed exactly opposite each other, they are also elevated anteriorly, very low and straight, pos-

teriorly. Anal fin narrower. Ventral long pointed. Pectoral longish. Lateral line originating from the throat, passing above the ventrals and almost along the middle of the tail. Scales very small. Teeth as in the preceding species.

P. 14.—V. 5. D . 19.—Caudal 14.

OBSERVATIONS. Body subquadrangular larger towards the head, and attenuated towards the tail, where there is no visible keel. The back, head and tail blue, sides and abdomen silvery, a clearer coloured band towards the back.

We never observed more of this species than the individual which is now preserved in the Museum of Natural History at Paris, and the figure in my collection of drawings.

Inhabits the Indian Ocean.

SCOMBERESOX. LACEPEDE.

In this genus the structure of the snout is similar to that of *Belona*; the appearance of the fish itself the same and covered with similar scales, having a carinated range along the venter; but the latter rays of their dorsal and anal fins are detached into false ones as in the mackerel.

Monsieur Cuvier remarks that he had only seen a single species from the Mediterranean and the ocean. (The *Scomberoces camperien*, of Lacepede, v. VI. 3. *Esox Saurus*. Schneider 78.)

SCOMBERESOX **equirostrum*. Five false fins above and below the tail; jaws equal and flexible.

Body fusiform, about six times the length of the jaws. Head narrow, rather deep, pointed, eye small. The operculum prolonged behind. Pectoral fins situated a little further back and somewhat higher than the middle of the operculum and slightly arrouded. Dorsal and anal fins equal, low, opposite each other, ventral fins triangular, truncated. Caudal a little notched, with equal lobes.—The color of this individual appeared to me nearly the same as that of the *Belonas*.

P. 14, the first flat and broad. V. 6.—D. 11.—A. 14.—C. 20 rays.

The above notice is taken from an individual preserved and dried in the cabinet of the Linnean Society of Boston, under the name of *Saurus*. It cannot be regarded as sufficiently complete, but may serve to call the attention of others who may have a better opportunity of completing its description.

SCOMBERESOX **scutellatum*. Upper jaw very short, the inferior about twice its length; pectoral fins very short, situated towards the upper part of the opercula; six false fins above, and seven below; the body compressed and edged beneath.

OBSERVATIONS. The body of this small individual was compressed so as to resemble the blade of a knife. It is distinguishable from the preceding also

by the very small pectoral fins placed very high, and near the opercula. The depth of the head was more than twice the diameter of the eye. The ventral fins very small, approaching the anal, and situated a little more towards the head than the dorsal, all of them of the same form, a little elevated anteriorly and somewhat lower posteriorly. The tail is long and narrow, terminated by a lunulated fin. The lateral line was scarcely apparent. The upper and lower maxillar bones were furnished with small teeth, the upper maxillar the shortest, placed in a groove formed by the junction of the two inferior, and leaving a space betwixt them towards the angle of the mouth.

The back was blue, the sides silvery and blueish, and the abdomen argenteous.

P. 13.—D 11.—A. 12.—V. 6.—A 15

The individual here noticed, I found in the stomach of a fresh codfish which had been brought to Boston from the Bank of Newfoundland; it was still fresh, and had no appearance of putrefaction. Perhaps it might be referred to the *Scombresoces Camperien*, but that this has much longer jaws, a forked tail, and the pectoral fins placed over the middle of the opercula, which forms the distinctive mark between the *Sc. camperii* and the present species.

Another individual discovered by Peron and myself, bears also a considerable affinity to the *Sc. camperii*, in the form of the body and the jaws; but a distinctive character presents itself in the 6th and

7th false fins which are distant from the dorsal and anal fin, which are re-united by a membrane.

HEMIRAMPHUS. CUVIER.

In these the intermaxillary bones form the border of the upper jaw, the margin of the lower one is also furnished with small teeth, but its symphysis is prolonged into a long point, or half beak, destitute of teeth. In their general aspect, their scales and vicera, they still resemble the *Belona*.

They are found in the seas of both hemispheres ; and their flesh, although oily, is agreeable to the taste.

While Mr William Maclure and myself were passing the islands of the Antilles, we had occasion to observe two species of fish, appertaining to the new genus *Hemiramphus* of Cuvier. These no less than the *Belonas* and *Scombresoces* appear to have been confounded together without sufficiently appreciating the species which consequently still remain uncertain. One of those which came under my observation, appears to be that described under the name of *Esox Brasiliensis*. LIN. and BLOCK, 391, which is also the *Esox Marginatus* of LACEPEDE, v. VII. 2. The other appears to be new ; but for the sake of more accurate distinction, I have considered it useful to give the comparative descriptions which I made at different places as at Martinique, Guadaloupe, Dominique, &c. where these species are the object of a particular fishery, sufficiently interesting by the manner in which it is conducted.

The mode of procuring these fish whose flesh is so much esteemed, is with a large seine taken out into the deep water by a company of boats, when the weather is fine. On discovering a shoal of the *balao*, they amuse them by throwing some light body on the water, such as the leaves of the sugar cane, round which they delight to play and jump; the boats outside the fish then let fall the nets, by which they surround, and while drawing the net towards the land, *perogues*, each occupied by a single negro, follow the net outside, making a noise and throwing stones, in order to chase the fish towards the shore, and to prevent them from leaping over the net and escaping.

HEMIRAMPHUS marginatus. Body three times the length of the lower jaw; pectoral fins shorter than the half of the lower jaw; posterior fins almost equal.

DESCRIPTION. Body subquadrangular, short, equal from the head to the tail as far as the commencement of the anal and dorsal fins. Tail short, terminated by a deeply cleft fin, the lobes slightly arrouded, the inferior a third part longer than the superior. Pectoral fins pointed. Ventral small, and lunulated, pointed interiorly, placed more towards the tail than the head. Dorsal fin longer by a third part than the anal, their form considerably similar, straight, a little elevated anteriorly, the rays separated and free about a third of their length, these two fins also correspond posteriorly. The upper beak is shorter than

the semidiameter of the eye. The inferior very long and flexible. The eye is nearly black, with the upper part of the iris silvery. The scales large. The blue color is most prevalent, particularly upon the upper part of the body, paler along the sides, and argenteous upon the abdomen, the head of a clear blue, and silvery, the tail yellow and bluish; beak brown and deep blue.

P. 10.—V. 6.—D. 14.—A. 12.—Caudal 20 to 24.

HAB. near Guadaloupe and Martinique, where it is called *Balao*.

HEMIRAMPHUS **balao*. Body four times the length of the lower jaw, pectoral fin a third part shorter than the lower mandible; anal fin half as long as the dorsal fin.

It is sufficient to cast an eye over the two figures to recognize their difference, although the two species seem to be the same. In this the body is more elongated and less equal, more elevated upon the back, and more attenuated towards the tail, in this also the fins are longer, the lobes divided by a longer notch are pointed, narrower, and the inferior more elongated; the pectoral, dorsal, anal and ventral fins also more developed, the interior point of the ventral more prolonged; the snout shorter, and lower towards the throat, the lower mandible likewise shorter, but with the upper nearly as in the preceding species. The lateral line commences directly from the gorge, continues along the abdomen as far as the ventral fins,

where it is interrupted, and then proceeds to the tail, passing a little beneath the anal, as in the preceding species.

The colour is nearly the same as in the preceding, only a little deeper, and the caudal fin bluish. The fins contain the same number of rays. Not having time to open the species, I am unacquainted with its sex. It inhabits the Caribbæan sea, near Guadaloupe, Martinique, and Domingo, where in common with the other species, it is known by the name of *Balao*.

HEMIRAMPUS **erythrorinchus*.

Dorsal and anal fin equal in length and height; upper beak about the length of the diameter of the eye; pectoral fins half the length of the lower jaw; a blue and argentine band on each side continued from the pectoral to the caudal fin.

OBSERVATIONS. Body four times the length of the lower beak from the angle of the mouth to the extremity of the tail. The form of this species differs little from that of the preceding. The dorsal and anal fins, equal in length and height, are perfectly opposite, elevated anteriorly, and at the base posteriorly. Pectoral fins pointed; the ventral small and truncated; the caudal forked, the lobes pointed, the inferior lobe longer. The lateral line, more elevated, passes above the ventral and anal fins, but is not as in the preceding species interrupted by the ventral fin. The eyes are large, and a little oblong,

with an argentine iris. The scales large. Its color the same as the preceding.

P. 13.—V. 6.—D. 16.—A. 18.—C. 21.

In the Museum d'Histoire Naturelle, marked R. R. No 3, with a note, by Peron, under the above name, and No. 2568 of his Journal, he afterwards considered it as a new genus, which has now been established by Monsieur Cuvier in his *Regne Animal*.

B. A variety of *H. erythrorinchus*.

Near to Timor and the Isle of France, we met with a species which differs a little from the preceding in the form of its body, its color, and the argentine band on the side, but the form of whose dorsal and anal fins were, excepting some difference in the number of the rays, the only distinctive characters which could be remarked. The length of the body, moreover, was in this only three times that of the lower jaw. The dorsal fin is falciform, high, pointed anteriorly, and very low and straight posteriorly. The anal is as long as the dorsal fin, perfectly opposite to it, and almost straight, being only a little elevated anteriorly. The pectoral fins are shorter than the half of the lower jaw. The ventrals small and truncated. Caudal fin deeply forked, the lobes unequal, with the inferior longer.

P. 11.—V. 6.—D. 15.—A. 15.—C. 20. rays.

In the Cabinet of the Museum d'Histoire Naturelle, at Paris : marked R. R. No. 2.

One or other of these two individuals probably appertains to the species observed by Commerson, or the *Esoce* Gambaru of Lacepede, Vol. V. p. 313, tab. 7. fig. 2.

*Analyses of American minerals, by HENRY SEYBERT,
of Philadelphia.*

Of an Amphibole.

The specimen submitted to analysis was found at the Hagley powder mills on the Brandywine, near Wilmington, in the State of Delaware; it is associated with *Quartz*, and on some specimens, minute portions of pyrites were observed, although this mineral, in its external aspect, bears a strong resemblance to the *Hypersthene* and from that circumstance was generally believed, by our mineralogists, to belong to that species. I am inclined to consider it an *Amphibole*, because it is *fusible*, and differs essentially, from the *Hypersthene*, in its chemical composition.

The colour of this mineral in the mass, is dark brown, approaching to brownish black; when pulverized, it is grey; lustre metallic. Slightly translucent on the edges. Form indeterminate. Lamellar. Scratches glass, and gives sparks with steel, Magnetic. Specific gravity, 3. 250. *Fusible* before the blow-pipe into an opaque black glass.

Analysis.

A. 3 Grammes of the pure mineral, finely pulverized, were exposed to a red heat; after the calcination, the powder was of a brownish red colour, and it weighed 2. 97 grammes: then the diminution of

weight amounts to 0.03 grammes; but as the Deut-oxide of Iron, contained in the mineral must have absorbed 0.008 grammes of oxygen, in passing to the state of peroxide, the loss due to water, therefore, amounts to 0.038 grammes on 3 grammes, or 1.266 per 100.

B. The calcined mineral (A.) was heated to redness in a silver crucible, during 30 minutes, with 9 grammes of caustic potash; the mixture on cooling assumed a pale green colour; it was treated with water, to which it likewise communicated a greenish hue; this indicated a trace of manganese. Muriatic acid, in excess, was added to it, the solution was complete and of a yellow colour; it was then evaporated to a *dry gelatinous* mass, then treated with water, acidulated with muriatic acid, and again moderately evaporated; more water was then added, and it was filtered; on the filter there remained *Silex*, which, after being washed and calcined, weighed 1.565 grammes on 3 grammes, or 52.166 per 100.

C. The filtered liquor (B.) was neutralized with caustic potash, when treated with the hydro-sulphate of potash, it yielded a black precipitate; this precipitate was well washed and calcined, in a porcelain vessel, to expel the greater part of the sulphur; it was then treated with a small portion of nitric acid, and exposed to a strong red heat, in a platina crucible. The Alumine and per-oxide of iron, thus obtained, weighed 0.45 grammes; they were treated repeatedly with caustic potash, until the Alumine was completely separated, the per-oxide of iron then

weighed 0.33 grammes; as the mineral is of a blackish colour and magnetic, the iron exists in the state of a Deutoxide, and the 0.33 grammes of per-oxide are equivalent to 0.322 grammes of Deutoxide on 3 grammes, or 10.733 per 100. Then, by difference, we have Alumine 0.12 grammes on 3 grs. or 4 per 100.

D. The liquor (C.) when treated with the oxalate of potash, gave rise to an abundant precipitate, which when washed and exposed to a high temperature, yielded *Lime* 0.60 grammes, on 3 grammes, or 20 per 100.

E. After the separation of the lime, the liquor (D.) when treated with caustic potash, produced a precipitate of magnesia, which being washed and strongly calcined, weighed 0.34 grammes on 3 grammes, or 11.333 per 100.

According to the above analysis, 100 parts of this amphibole consist of

A. Water,	01 266	containing oxygen.	
B. Silix,	52 166		26.239
B Manganese, a Trace,	— — —		— — —
C. Deutoxide of Iron,	10.733		03 028
C. Alumine,	04 000		01.868
D. Lime,	20.000		05 618
E. Magnesia,	11.333		04.387
	<hr/>		
	99 498		
	100.000		
	<hr/>		
	000 502	Loss.	
	<hr/>		

2. *Of a Ferruginous Oxydulated Copper Ore.*

This ore occurs in Lebanon County, Pennsylvania, accompanied by oxydulated Iron ore; occasionally by minute portions of pyrites, and is frequently incrustated with green carbonate of copper. Its colour, both in the massive and pulverulent state, is reddish brown. It possesses little or no lustre. Opaque. Amorphous. Fracture, irregular. Fragments, indeterminate. Strongly magnetic. The specific gravity of a piece containing some slight traces of carbonate, was 4. 554.

Analysis.

A. 5 Grammes, of the pulverized ore, were exposed to a red heat, and it was stirred in order to allow the copper and iron to pass to the state of peroxydes. After the calcination, the powder was black, and the loss of weight was 0. 10 grammes; but the quantity of oxygen absorbed by the deutoxide of iron and the protoxide of copper, was found by calculation to amount to 0. 249 grammes; therefore, the loss in water amounts to 0. 349 grammes, on 5 grammes, or 6. 98 per 100.

B. The calcined ore (A.) was boiled with nitromuriatic acid, to which it soon imparted a deep green colour, when the argillaceous residue appeared flaky and colourless; the solution was evaporated to dryness, to expel the excess of acid, the residue of a green colour, was treated with water, and the solution was filtered: the argil remaining on the filter,

when washed and calcined, weighed 0. 19 grammes on 5 grammes, or 3. 80 per 100.

C. The liquor (B.) was treated with an excess of ammonia, an abundant precipitate was formed, part of which was immediately re-dissolved by the ammonia, and communicated to it a beautiful dark blue colour, the residue appeared red, and after 24 hours digestion it was separated from the ammoniacal liquor by filtration, when washed and exposed to red heat, it weighed 2. 16 grammes. A portion of this precipitate was re-dissolved in muriatic acid, and treated with an excess of ammonia, the copper was thus found to have been completely separated. Another portion was fused with caustic potash, but having obtained no mineral cameleon, it was ascertained that the ore contained no manganese. Therefore, the 2. 16 grammes were pure per-oxide of iron, but as the mineral was magnetic, the iron must be estimated in the state of a deutoxide, and the 2. 16 grammes of tritoxide are equivalent to 2. 108 grammes of deutoxide, on 5 grammes, or 42. 16 per 100.

D. The ammoniacal liquor (C.) was boiled to drive off the greater part of the excess of alkali, a slight excess of sulphuric acid was then added to it and a polished bar of iron, was allowed to remain in it, until the liquor, when tested with sulphurated hydrogen, was found to contain no more copper. The metallic copper thus precipitated, when well washed and expeditiously dried, weighed 1. 95 grammes, but from the colour of the ore, the copper must be considered to exist in the state of a protoxide, and the 1. 95 grammes of metallic copper, are equivalent

to 2 19½ grammes of protoxide, of copper on 5 grammes, or 43.88 per 100.

E. A portion of the liquor (D.) was found to contain neither lime nor magnesia, therefore, neither of these substances existed in the ore.

The constituents of this mineral, are

Per 100 parts	
A. Water,	06 98
B Argile,	03 80
C. Deutoxide of Iron,	42 16
D. Protoxide of Copper,	43 88
	96 82
	100 00
	003 18 Loss.

3. *Of a Green Phosphate of Lime (Asparagus Stone.)*

This mineral was found in London-grove township, Chester county, Pennsylvania. Externally it is incrustated with an opaque yellowish white matter; when broken, it is of a beautiful asparagus green colour; in the state of powder it is white. Lustre vitreous. Transparent. Chrystalized in six sided prisms; the specimens handed to me, presented no well defined terminations. Longitudinal fracture uneven; the transverse fracture, lammellar. Scratch-
es glass. It does not phosphorize by heat. Specific gravity 3.207. Infusible before the blowpipe.

Analysis.

From preliminary essays it was ascertained, that this mineral contained neither silex, alumine, magnesia, oxide of iron, nor oxide of manganese.

A. 5 grammes underwent no alteration from the action of heat.

B. 5 grammes treated with nitric acid, yielded an entire and colourless solution. Oxalic acid was added to the liquor, it occasioned an abundant precipitate, which, washed and strongly calcined, afforded, lime 2.565 grammes, on 5 grammes, or 51.30 per 100.

C. The liquor (B.) after the separation of the lime, was evaporated to perfect dryness; towards the close of the evaporation, the matter became black, owing to the decomposition of the oxalic acid; when the entire decomposition of the acid was supposed to have been effected, the residue was treated with water, and the liquor, after being filtered, was treated with ammoniac, which occasioned a colourless precipitate of phosphate of lime; this being a portion of the mineral, that resisted decomposition by the oxalic acid, it weighed 0.29 grammes on 5 grammes, or 5.80 per 100.

D The liquor (C.) when treated with the muriate of barytes, afforded phosphate of barytes, equivalent to phosphoric acid 2.042 grammes on 5 grammes, or 40.84 per 100.

According to the preceding results, we have

Per 100 parts.	
B. Lime,	51.30
D. Phosphoric Acid,	40.84
C. Phosphate of Lime,	05.80
	<hr/>
	97.94
	100.00
	<hr/>
	002.06 Loss.
	<hr/>

If the undecomposed phosphate of lime be omitted, the composition of this mineral will be

Per 100 parts.	
Lime,	55.67
Phosphoric Acid,	44.33
	<hr/>

This mineral was discovered by Doctor R. Alison, on Alison's Farm, London-Grove Township, imbedded in mica slate.

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On two veins of Pyroxene or Augite in Granite.
BY LARDNER VANUXEM.

“The substratum of the soil of Columbia (S. C.) and its vicinity, consists of Granite, the kind which is commonly considered to be primeval. This rock commences at Richmond in Virginia, and is visible to this place in most of the rivers and streams which cross the main road between these two towns. It is the only primitive rock known to exist east of this road. Its usual colour is grey, sometimes it presents very beautiful red varieties as on the Saluda river.

It is very barren in *extraneous* minerals; no marks of stratification appear in it, but it is every where divided by cracks and fissures breaking it up into irregular masses, of no great extent; very often it is traversed by small veins, of an extremely fine grained granite, of a light flesh or pink colour. Like most granite, it is susceptible of decomposition, and varies very considerably in different parts of the same mass, whether exposed to the surface, or covered with vegetable or other soil; thus along the lower canal of the Saluda, whole fields of it are in a decomposed state, here and there presenting among its ruins some masses, which from unknown causes have escaped uninjured. As commonly observed of this rock, it presents large masses rounded upon the surface, ascribable either to the progress of decomposition which commences with the angles and edges or as some have supposed to a species of concretionary arrangement of its minerals, during its consolidation.

Last year my attention was attracted by two parallel black veins in a mass of granite, occurring by the side of Rocky branch,* just below Dr. Fishers mill dam. The surface of the rock protrudes but a little above the ground. These veins lie near to each other, of from one to two inches in thickness, nearly vertical in their position, and of an unknown length and depth. The substance of these veins scarcely

* A small creek passing within a few hundred yards of the South Eastern boundary of Columbia, and emptying into the Congaree.

adheres to the granite, and breaks with ease into irregular fragments, whose sides are slightly changed or soiled, as we so often observe in the trap rocks. In the other fracture, the rock is extremely tough, presenting a very fine scaly texture, of a bluish black colour, opaque, excepting on the edges of the fragments, and enveloping as a base, numerous small imperfect crystals, of a dark green colour: sometimes also, though rarely, fragments of granite are also contained in it. By exposure to the air, the basis becomes of a light dirty olive green colour, whilst the crystals assume an ochery appearance. Examined, when in minute fragments, with a powerful microscope, it presents a confused mass of silvery particles. I was not able to ascertain with this instrument, if it consisted of more than one mineral species. It feebly attracts the magnet. Before the blowpipe, it fuses into a black globule, whose fragments, when viewed by transmitted light, are of a dark green colour. As a part of the rock, which encloses these veins, has lately been removed by blasting, I collected a considerable quantity of their substance, and on breaking it, I succeeded in obtaining some perfect crystals of the dark green substance above mentioned, which on examination, proved to be *Pyroxene*, or augite, presenting the well known form the *triunitaire* of Haüy, so abundant in the lavas of Auvergne, Italy, Sicily, &c. The *hemitrope* or macle of the same form also exists in it.

These veins appear to be almost entirely com-

posed of Pyroxene, more or less confusedly crystallised, and varying considerably in the size of its crystalline particles. It is probable that there is an intermixture of a small quantity of Feldspar, from the difference of colour, which the perceptible and imperceptible particles exhibit when in a state of decomposition. From the general character of these veins, their total dissimilarity with all rocks of the class to which the granite belongs, from their being composed of Pyroxene and of the *trivnitaire* form so common in almost all lavas, I think in the present state of our knowledge, (as to the origin of rocks,) that we are in some measure authorized in considering them to be of Volcanic, rather than of Neptunian origin."

Descriptions of Univalve shells of the United States.

BY THOMAS SAY.

The terrestrial and fluviatile shells which form the subject of the following pages, were chiefly obtained on the late expedition to the Rocky Mountains, under the command of Major Stephen H. Long. They are now deposited in the Philadelphia Museum, and constitute, in the collection of that institution, a distinct arrangement.

A few descriptions are added to this essay, of shells discovered in East Florida, Alabama, Pennsylvania, and New-York.

Type and Class.

MOLLUSCA GASTEROPODA.

GENUS HELIX.

† *Umbilicus none ; labrum reflected.*

1. H. **multilineata*. Shell thin, convex, imperforated ; of a brown colour, with numerous dark-red revolving lines, which are minutely and irregularly undulated ; *whorls* six, with elevated, subequidistant lines, forming grooves between them ; *aperture* lunated, not angulated at the base of the column, but obtusely curved ; *labrum* contracting the mouth slightly, reflected, white, more or less distinctly stained by the termination of the spiral red lines, and adpressed to the body whorl near the base ; *umbilicus* covered with a white callus.

Inhabits Illinois and Missouri.

Length of the columella about three-fifths ; greatest width rather more than one inch.

ANIMAL granulated ; *granulæ* large, whitish, interstices blackish ; *foot* beneath black.

An exceedingly numerous species in the moist forests on the margin of the Mississippi near the Ohio, and the Missouri as far as Council Bluff. The red revolving lines are numerous, varying from four or five to twenty-five or thirty and perhaps still more ; they are sometimes confluent into bands ; when viewed within the mouth, they appear sanguineous.

2. *H. *appressa*. Shell depressed, brownish horn colour; *whorls* five, depressed, forming an angle on the external one, more acute near the superior angle of the labrum, with numerous transverse, elevated, equidistant lines, with interstitial grooves; *umbilicus* covered over with calcareous matter, but concave within; *aperture* moderate; *labrum* dilated, reflected, white, margined with brownish; near the base, appressed to the body whorl, and covering the umbilicus; a slight projecting dentiform angle on the inner middle; *labrum* with a strong, prominent, oblique, compressed, white tooth, which gradually slopes and becomes obsolete towards the umbilicus.

Var. a. Labrum with two projecting angles.

Breadth, three-fifths of an inch.

ANIMAL—*foot* pale; *neck* above and each side blackish.

Inhabits the banks of the Ohio and Missouri.

This species is very common on the banks of the Ohio below Galiopolis: I also found it near Council Bluff. It very much resembles *H. tridentata*, but the umbilicus is covered over; the outer lip at base is flattened upon the shell; and there is but a single angle upon it. In Lister's conch. pl. 93, fig. 93, is the representation of a shell, which is most probably intended for this species. Lister's figure is quoted in the books, for *H. punctata*, but as the figure of a different species (Born mus. pl. 14, fig. 17 and 18)

is also referred to as the same, I conclude that two distinct species have been confounded together under the common name of *punctata*; certainly the character from which this name was taken, is never present on our shell. Specimens have been subsequently found by Dr. Thomas M'Euen, near the Falls of Niagara.

3. H. * *palliat*a. Shell depressed, with elevated lines, forming grooves between them; *epidermis* fuscous, rugose with very numerous minute tuberculous acute prominences; *volutions* five, depressed above, beneath rounded, forming an obtuse angle exteriorly, which is more acute near the termination of the labrum; *umbilicus* covered with a white callous; *aperture* contracted by the labrum; *labrum* reflected widely, white, two profound, obtuse, sinusses on the inner side above the middle, forming a prominent distinct tooth between them, and a projecting angle near the middle of the lip; *labium* with a large, prominent, white tooth, placed perpendicularly to the whorl, and obliquely to the axis of the shell, and nearly attaining the umbilical callus.

Inhabits Illinois.

Length of the column 7-20 of an inch.

Greatest breadth, four-fifths of an inch.

Var. a. A very prominent acute carina; destitute of minute prominences. Inhabits Ohio. Breadth nearly 1 inch.

This shell is found on the banks of the Mississippi in moist places. It very much resembles *H. tridentata* but is destitute of umbilicus, has a rugose epidermis, and is much larger. It is still more closely allied to *appressus* but its superior magnitude, teeth and epidermal vesture, distinguish it from that species. Specimens have subsequently been found by Dr. Thomas M'Euen near the falls of Niagara.

4. *H. *inflecta*. *Spire* convex; *volutions* five; wrinkled across; *suture* not profoundly impressed; *aperture* strait; *labrum* reflected, bidentate, teeth separated by a profound sinus, the superior teeth inflected, behind the lip a profound groove, which abruptly contracts the aperture in that part, so that although the lip is reflected, yet its edge is not more prominent than the general exterior surface of the body whorl, at base the lip is adpressed and covers the umbilicus; *labrum* with a large prominent oblique lamelliform tooth; *umbilicus* closed.

Greatest transverse diameter nearly 9-20 of an inch.

Inhabits Lower Missouri.

The teeth of the labrum somewhat resemble those of *tridentata*; but in the form of the groove behind the labrum, and the pillar tooth, it resembles *H. hirsuta*, several specimens were found, but all dead shells, and destitute of their epidermis.

5. *H. *clausa*. Shell fragile, slightly perforated, subglobular, yellowish horn-colour, above convex; whorls four or five; *aperture* slightly contracted by the lip; *lip* reflected, flat, white, nearly covering the umbilicus.

Inhabits Illinois.

Greatest breadth, from one-half to three-fifths of an inch.

A small and handsome species, which somewhat resembles *albolabris*, but is much smaller, more rounded, and is sub-umbilicate. This shell also occurs though perhaps rarely in Pennsylvania.

6. *H. *obstricta*. Shell depressed, with elevated lines forming grooves between them; *epidermis* pale brownish, naked; *volutions* five, depressed above, beneath rounded, with an acute projecting carina; *umbilicus* covered with a white callus, indented; *mouth* resembling that of *H. palliata*.

Inhabits Ohio.

Breadth nearly one inch.

This species is very closely allied to *Helix palliata*, but the epidermis is not covered with small elevations as in that shell, and the carina is very prominent and remarkable.

7. *H. *elevata*. Shell pale horn colour, *spire* elevated; *whirls* seven, regularly rounded; *umbilicus*

none; *aperture* somewhat angulated; *labrum* dilated, reflected, pure white, at base adpressed to the body whirl, abruptly narrowed on the inner edge beneath the middle, and continuing thus narrowed to the superior termination, leaving a projecting angle behind the middle; *labium* with a large, robust, very oblique, sub-arquated, pure white tooth.

Greatest breadth, 7-8 of an inch. Column, 9-16.

Found rather common in the vicinity of Cincinnati, Ohio, it seems to be distantly related to *thyroidus*, by the tooth on the labium, but this tooth is much more robust; it differs more essentially by the much more elevated spire, and by the superior half of the dilated lip being abruptly narrowed so as to form a prominent angle near the middle. It is also a much thicker shell.

†† *Umbilicus closed* ; *labrum simple*.

8. H. **interna*. Shell yellowish-red; *volutions* six or eight; *whorls* with regular, equidistant, elevated, obtuse lines across them separated by regular grooves; lines obsolete beneath; *spire* convex, little elevated; *aperture* very strait, transverse less than one half of the longitudinal diameter; *labrum* not reflected; *within*, upon the side of the labrum, two prominent lamelliform teeth, of which the superior one is largest, and neither of them attain the edge of the lip; *region of the base of the columella* much indented; *umbilicus* obsolete or wanting.

Transverse diameter more than 3-10.

Height of the columella above 3-20.

Inhabits Lower Missouri.

Of two specimens which I obtained, the larger one had six volutions, and the smaller one had eight; the superior tooth in the larger was concave towards the base of the shell. It is a remarkable and very distinct species.

9. H. **chersina*. Shell subglobose-conic, pale yellowish-white, pellucid, convex beneath; *volutions* about six, wrinkles not distinct; *spine* convex-elevated; *suture* moderate; *body whorl* slightly carinated on the middle; *mouth* nearly transverse, unarmed, the two extremities nearly equal; *labrum* simple; *umbilicus* none.

Inhabits the Sea Islands of Georgia.

Breadth 4-10 of an inch.

Cabinet of the Academy.

A very small species. But one specimen occurred in a Cotton field. It is rather larger than *H. labyrinthica*.

10. H. **gularis*. Shell subglobose, pale yellowish-horn colour, polished, pellucid, beneath near the aperture whitish-yellow opaque; *volutions* six or seven, with prominent somewhat regular wrinkles; *spire* convex, a little elevated; *suture* moderate; *labrum* not reflected; *throat* far within upon the side of the labrum bidentate, teeth lamelliform, of which one

is oblique and placed near the middle, and the other less elongated placed near the base; *umbilicus* none.

Breadth more than 1-4 of an inch.

Inhabits Ohio and Pennsylvania.

In general form it resembles *H. ligera*, but may be distinguished by the absence of umbilicus, and upon particular examination, by the teeth which are situated far within the aperture. In the collection of the Academy.

††† *Umbilicated* ; *labrum simple*.

11. *H. *ligera*. *Shell* subglobose, pale yellow horn colour, polished ; *body whorl*, pellucid, yellowish-white, opaque beneath near the aperture ; *volutions* rather more than six, all excepting the apical one wrinkled across ; *spire* convex, a little elevated ; *umbilicus* very small ; *suture* not deeply impressed ; *labrum* not reflected.

Inhabits Missouri.

Greatest length 3-10. Oblique length less than 9-20. Transverse diameter less than 11-20.

Approaches nearest to *H. glaphyra*, but is readily distinguished by the greater convexity of the spire, and the smaller umbilicus. Rather common. In Lister's conch. on pl. 81, fig. 82, a shell is represented which may be intended for this species.

12. *H. *solitaria*. *Shell* subglobose, with two or three revolving, rufous lines ; *spire* conico-convex ;

*volution*s five and a half, wrinkled across and rounded; *suture* rather deeply impressed; *aperture* wide, embracing a rather small portion of the penultimate whorl; *labrum* not reflected; *umbilicus* large, distinctly exhibiting all the *volution*s to the apex.

Greatest transverse diameter, nearly one inch and one fifth.

Inhabits Lower Missouri.

But a single specimen was found; it was a dead shell, destitute of its epidermis. It is a very distinct species.

13. *H. *jejuna*. *Shell* subglobular, glabrous, pale reddish-brown; *volution*s five, slightly wrinkled, regularly rounded; *spire* convex; *suture* rather deeply impressed; *aperture* dilate-lunate; *labrum* a little incrassated within, not reflected; *umbilicus* open, small;

Breadth rather more than 4-5 of an inch.

Inhabits the Southern States.

ANIMAL—light reddish-brown, with a granular surface, longer than the breadth of the shell; oculiferous tentacula elongated, and rather darker than the body.

This shell is very closely allied to *H. sericea*, of Southern Europe, but it differs from that species in being destitute of the hirsute vesture. I found several specimens of *jejuna*, during an excursion some

time since into East Florida, at the *Cow fort*, on St. John's river. It is in the collection of the Academy.

14. H. **concava*. Shell much depressed; sub-orbicular, horn colour, or whitish, immaculate; *volutions* five, irregularly wrinkled across, more convex beneath; *suture* distinctly impressed; *umbilicus* very large, exhibiting all the *volutions* to the summit distinctly; *aperture* large, short; *labrum* towards the base very slightly and inconspicuously reflected.

Inhabits Illinois and Missouri.

Greatest width 7-10 of an inch.

Found in moist places near the Mississippi river, on the Missouri as high as council bluff, and on the sea islands of Georgia. It is a much depressed shell.

15. H. **dealbata*. Shell conical, oblong, thin and fragile, somewhat ventricose; *volutions* 6-7, wrinkled across, wrinkles more profound and acute on the spire; *spire* elongated, longer than the aperture, subacute; *aperture* longer than wide, *labrum* not reflected; *umbilicus* small, profound.

Length more than 3-4 of an inch.

Breadth 9-20 of an inch.

In the Cabinet of the Academy and Philadelphia Museum.

Inhabits Missouri and Alabama.

Cabinet of the Academy.

In outline it resembles a *Bulimus*. Four speci-

mens of this species were sent to the Academy from Alabama, by Mr. Samuel Hazard; and a single depauperated specimen was found by myself on the banks of the Missouri.

†††† *Umbilicated* ; *labrum reflected*.

16. H. **profunda*. *Shell* pale horn-colour; *spire* convex, very little elevated; *whorls* five, regularly rounded, and wrinkled transversely; *body whorl* with a single revolving rufous line, which is almost concealed upon the spire by the suture, but which passes for a short distance above the aperture; *aperture* dilated; *labrum* reflected, white, and excepting near the superior angle flat, a slightly projecting callus near the base on the inner edge; *umbilicus* large, profound, exhibiting all the volutions to the apex.

Transverse diameter 19-20 of an inch.

Var. A. Mutilineated with rufous.

Var. B. Rufous line obsolete.

Inhabits Ohio, Mississippi and Missouri banks.

A pretty shell, neatly ornamented by the rufous zone; the spire is very much depressed. Specimens occurred near Cincinnati on the Ohio, and at Engineer Cantonment near Council Bluff, on the Missouri.

Besides the above new species, I have observed in the western regions, the following known species,

which I described in the American edition of Nicholson's Encyclopædia, and in the Journal of the Academy.

Helix albolabris common, as far as Council Bluff.

H. thyroidus, on the banks of the Ohio, Mississippi and Missouri. The Animal is of a pale whitish or yellowish colour, immaculate.

H. alternata. On the banks of the Ohio, Mississippi, and Missouri rivers; this species varies in being somewhat larger, and in having a rather more elevated spire. The Animal is of a dirty yellowish-orange colour, the foot obtusely terminated behind, head and tentacula pale bluish, eyes blackish. Shell 9-10 of an inch in breadth.

H. hirsuta, common, as far as Council Bluff.

H. labyrinthica ditto ditto.

H. minuta ditto ditto.

H. perspectiva, occasionally occurs on the banks of the Missouri, and other western streams, and in some parts common.

GENUS POLIGYRA.

*P. *plicata*. Shell convex beneath, depressed above, spire slightly elevated; whorls five, compressed, crossed by numerous raised equidistant lines, which form grooves between them; aperture sub-reniform, labrum reflected, regularly arquated, describing two-thirds of a circle, within two-toothed, teeth not separated by a remarkable sinus; labrum with a profound duplicature, which terminates in an

acute angle at the centre of the aperture; *beneath*, exhibiting only two volutions, of which the external one is slightly grooved near the suture.

Breadth 1-4 of an inch.

Inhabits Alabama.

Cabinet of the Academy.

This species is about the same size with *P. avara*, but, besides other characters, it is sufficiently distinguished by the acute fold of the *labrum*. It was sent to the Academy by Mr. Samuel Hazard.

GENUS PUPA.

1. *P. *armifera*. Shell dextral; oblong-oval or somewhat obtusely fusiform; *suture* distinct; *whirls* six, obsoletely wrinkled; *aperture* longitudinally subovate; *exterior lip* reflected, but not flattened, interrupted above by the penultimate whirl, and with five teeth, of which the superior one, and that which precedes the basal one, are smallest; *labrum* with an undulated lamelliform tooth, its anterior extremity little elevated, but elongated, so as almost to join the superior extremity of the exterior lip.

Length, 3-20 of an inch.

Inhabits Upper Missouri.

Var. A. The two smaller teeth obsolete or wanting.

Var. B. The basal tooth obsolete or wanting.

Very distinct from *corticaria* in being a much larger and proportionally more dilated shell, and with that species, and the next, seems to belong more pro-

perly to the genus *Carychium* of Muller and Ferrussac.

2. *P. *rupicola*. *Shell* dextral, attenuated to an obtuse apex, white; *whorls* six, glabrous; *suture* deeply impressed; *labium* bidentate; superior tooth lamiform, emarginate in the middle, and at the anterior tip obsoletely uniting with the superior termination of the labium; inferior tooth placed upon the columella, and extending nearly at a right angle with the preceding; *labrum* tridentate, teeth placed somewhat alternately with those of the labium, inferior tooth situated at the base and immediately beneath the inferior tooth of the labium.

Length, about 1-10 of an inch.

Inhabits East Florida.

I formerly found it abundant on the banks of St. John's river, in E. Florida, and more particularly under the ruins of Fort Picolata, under stones, &c.

It is about the size of *P. corticaria*, and considerably resembles that species, but is sufficiently distinguished by the circumstance, of its gradually decreasing in diameter from the body whirl, to its obtuse tip, and in the character of the mouth, it is widely distinct.

GENUS SUCCINEA.

S. ovalis. (Journ. Acad. Nat. Sciences, vol. 1. p. 15.) A large variety of this species, is found very common on the Missouri, of the length of about 4-5

of an inch. I observed one specimen, which was upwards of an inch long.

GENUS PLANORBIS.

1. *P. *armigerus*. Shell dextral, brownish-horn colour, wrinkles obsolete; *spire* perfectly regular, slightly concave; *suture* well impressed; *umbilicus* profound, exhibiting the volutions; *whorls* four, longer than wide, obtusely carinated above, carina obsolete near the aperture, a carina beneath continued to the aperture; *aperture* longitudinally sub-ovate, oblique; *labrum* blackish on the edge; *throat* armed with five teeth, placed two upon the pillar side, of which one is large, prominent, perpendicular, lamelliform, oblique, and rounded abruptly at each extremity; near the anterior tip, is a small prominent conic acute one; on the side of the labrum, is a prominent lamelliform tooth near the base, and two slightly elevated, oblique, lamelliform ones above.

Length, 1-4 of an inch nearly.

Inhabits Upper Missouri.

Remarkable by the teeth; but these are only discoverable by the microscopical examination of the mouth, and they are situated far within it.

P. trivolvis bicarinatus and *parvus* inhabit ponds of water, in the vicinity of Council Bluff.

2. *P. *parallellus*. Shell dextral, with very minute transverse wrinkles, and regular, revolving.

equidistant, parallel, slightly elevated lines; *spire* a little convex; *volutions* four; *aperture* longer than wide; *umbilicus* exhibiting all the volutions.

Breadth, less than 3-20 of an inch.

Inhabits Upper Missouri.

This shell has evidently the habit of a *Helix*, and may probably belong more properly to that genus, but having found it only in a dried up pond, in company with a vast number of aquatic shells, I refer it for the present to this genus.

B. P. **exacuus*. Dextral, depressed, with an acute edge.

Inhabits Lake Champlain.

Cabinet of the Academy.

Shell depressed; *whorls* four, striated across, wider than long, not elevated above the suture, but a little flattened, sides obliquely descending to an acute lateral edge, below the middle; *spire* not impressed; *suture* not profoundly indented; *beneath*, body whirl flattened, on the inner edge rounded; *umbilicus* regular, exhibiting all the volutions to the apex; *aperture* transversely sub-triangular; *labrum* angulated in the middle, arquated near its inferior tip, the superior termination just including the acute edge of the penultimate whorl.

Greatest Breadth, rather less than 1-4 of an inch.

This species was found in Lake Champlain by Mr. Augustus Jessup, who deposited it in the collection of the Academy. Only two specimens oc-

curred. It may be readily distinguished from *P. parvus*, by its more convex form above, the spire not being impressed, and by its very acute lateral edge. It appears to be pretty closely allied to *Planorbis nitidus* of Europe, but it is larger, the umbilicus much more dilated, and the aperture does not embrace the penultimate whorl so profoundly.

4. *P. *campanulatus* Sinistral; whorls longer than wide; aperture sub-campanulate.

Inhabits Cayuga Lake.

Cabinet of the Academy.

Shell sinistral, not depressed; *whorls* four, slightly striate across, longer than wide; *spire* hardly concave, often plane; *body whirl* abruptly dilated near the aperture, and not longer behind the dilatation than the penultimate whirl; *suture* indented, well defined to the tip, the summits of the volutions being rounded; *aperture* dilated; *throat* narrow abruptly; *umbilicus* profound, the view extending by a minute foramen to the apex.

Greatest length of the body whorl, 1-4 of an inch.

Breadth from tip of the labrum, 1-2 inch; at right angles to the last, 2-5 inch.

This shell abounds in some of the small streams, which discharge into Cayuga lake, where it was collected by Mr. Jessup, who presented specimens to the Academy, and to me. It is readily distinguished from our other species, by the sudden dila-

tation of the outer whirl, near the aperture in the adult shell, forming a large oval chamber. The summit of the outer whirl, behind the dilated portion, is not, or hardly elevated above the summits of the other volutions.

GENUS LYMNEUS.

1. *L. *elongatus*. Shell horn colour, tinged with reddish-brown; *spire* elongated, tapering, acute; *whirls* six or seven, slightly convex, wrinkled across; *body whirl*, measured at the back, more than half the total length; *suture* moderately indented; *aperture* less than half the length of the shell; *labium* with calcareous deposit.

Length, one inch and three-tenths.

Inhabits in considerable numbers, the ponds and tranquil waters of the Upper Missouri. It is very distinct from *L. catascopium*, by the much greater proportional length of the spire.

2. *Lymneus columellus*. (Jour. Acad. Nat. Sciences, vol. 1. p. 14.) Var. a. Small, black—from Cold water creek of the Missouri. This is most probably a distinct species, we obtained but a single specimen of it.

3. *L. *reflexus*. Shell fragile, very much elongated, narrow, honey-yellow, tinged with brownish, translucent, slightly reflected from the middle; *volutions* six, oblique, wrinkled transversely; *spire* more than one and an half times the length of the

aperture, acute, two or three terminal whirls vitreous; *body whirl* very little dilated; *aperture* rather narrow; *labrum* with a pale margin, and dusky red or blackish sub-margin.

Inhabits Lakes Erie and Superior.

Total length, 13-10—of the aperture 11-20 of an inch.

This shell is remarkable for its narrow and elongated form, and for the consequent, very oblique revolution of its whirls. When viewed in profile, it has a slightly reflected appearance. It was kindly sent to me for examination by my friends Messrs. S. B. Collins and D. H. Barnes of New York, and was found in Lake Superior by Mr. Schoolcraft. I recollect to have seen a specimen two or three years since brought from Lake Erie, by James Griffiths. It is proportionally longer than *elongatus*.

4. *L. *appressus*. Shell elongated ventricose; *volutions* six; *spire* regularly attenuated to an acute tip, rather shorter than the aperture; *body whirl* dilated, proportionally large; *aperture* ample; *columella* with the sinus of the fold profound, callus perfectly appressed upon the shell, to the base.

Inhabits Lake Superior.

This shell exhibits very much the appearance of *L. stagnalis*, but its body whirl is less proportionally dilated. The callus of the labrum is perfectly appressed to the surface of the whorl even to the base, exactly as in *stagnalis*. I have seen but a single weathered and broken specimen, which was sent me

for examination by my friends Messrs. Collins and Barnes, of New York. It was found in Lake Superior, by Mr Schoolcraft.

Since writing the above, Mr. Jessup presented me with several specimens, which he collected in Canandaigua and Cayuga lakes.

5. *L. *elodes*, Shell oblong conic, gradually acuminated, reticulate with transverse lines and longitudinal wrinkles; *whirls* rather more than six; *spire* acutely terminated; *suture* moderately impressed; *aperture* shorter than the spire; *labrum*, inner submargin reddish obscure; *labium*, calcareous deposit rather copious, not appressed at base, but leaving a linear umbilical aperture; *body whirl* on the back longer than the spire.

Inhabits Canandaigua Lake.

Var. a. Whirls simply wrinkled across, the calcareous deposit at base, appressed to the surface of the whirl.

This species was found by Mr. A. Jessup; it bears the most striking resemblance to *L. palustris*. The variety was found by the same enterprising mineralogist at Morristown, New-Jersey. I have subsequently received specimens from Mr. S. B. Collins, of New-York, who procured them in a marsh near the Saratoga springs.

6. *L. *desidiosus*. Shell oblong sub-conic; *whirls* five, very convex, the fourth and fifth very small, the second rather large; *suture* deeply indented; *aperture* equal to or rather longer than the spire; *la-*

bium, calcareous deposit copious, not perfectly appressed at base, but leaving a very small umbilical aperture.

Inhabits Cayuga Lake.

Length 7-20 of an inch.

Found by Mr. Augustus Jessup. It is closely allied to *L. elodes*, but the whirls are more convex, one less in number, and the two terminal ones are proportionally smaller; the callus of the labium, also, near its inferior termination, is applied still more closely to the surface of the body whirl.

7. *L. *macrostomus*. Shell sub-oval; whirls five, body whirl somewhat reticulated; suture not profoundly indented; spire about two-thirds of the length of the aperture, acute; aperture much dilated; labrum not thickened on the inner sub-margin.

Inhabits Cayuga Lake.

Length one half of an inch, and upwards.

Imperfect specimens of this shell were found on the shore of Cayuga Lake by Mr. A. Jessup, but they are sufficiently entire, to exhibit considerable similarity to some varieties of *L. auricularius* of Europe. It may readily be distinguished from *L. catascopium*, by its much more dilated aperture.

8. *L. *emarginatus*. Shell rather thin, translucent; volutions four, very convex; body whirl large; suture deeply impressed; spire somewhat eroded; mouth two-thirds of the length of the shell.

Length nearly 4-5 of an inch; of the mouth half inch.

Inhabits Lakes of Maine.

This species was discovered by Mr. Aaron Stone.

It is a rather larger, and considerably wider shell than *L. catascopium*, and the emargination visible on a profile view of the umbilical groove, is far more profound.

GENUS PHYSA.

1. *P. *gyrina*. Shell heterostrophe, oblong; whirls five or six, gradually acuminating to an acute apex; suture slightly impressed; aperture more than one half, but less than two-thirds of the length of the shell; labrum a little thickened on the inner margin.

Length rather less than one inch.

Inhabits waters of the Missouri.

Of this species, I found two specimens at Bowyer creek, near Council Bluff. It differs from *P. heterostropha* in magnitude, in having a more elongated spire, and less deeply impressed suture.

2. *P. *elongata*. Shell heterostrophe, pale yellowish, very fragile, diaphanous, oblong; whirls six or seven; spire tapering, acute at the tip; suture slightly impressed; aperture not dilated, attenuated above, about half as long as the shell; columella much narrowed near the base, so that the view, may be partially extended from the base towards the apex.

Inhabits shores of Illinois.

Length 7-10 inch.

Greatest breadth 3-10 nearly.

ANIMAL deep black, immaculate, above and beneath; *tentacula* setaceous, a white annulation at base.

In the fragility of the shell, this species approaches nearest to *columella*. It is very common in stagnant ponds on the banks of the Mississippi. When the shell includes the animal, it appears of a deep black colour, with an obsolete testaceous spot near the base on the anterior side. Its proportions are somewhat similar to those of *P. hypnorum*.

P. heterostropha (Nicholson's Encyc.) Is very common in ponds of the Missouri as far as Council Bluff.

GENUS CYCLOSTOMA.

*C. *marginata*. Shell turreted, pale horn colour, or dusky, obsoletely wrinkled across; *suture* rather deeply impressed; *volution*s six; *aperture* mutic, sub-oval, truncated transversely above by the penultimate whirls, nearly 1-3 the length of the shell; *labium* nearly transverse, colour of the exterior part of the shell; *labrum* equally and widely reflected, thick, white; *umbilicus* distinct.

Inhabits Upper Missouri.

Length 1-5 of an inch.

Size of *Paludina lapidaria*. Lister represents a species on plate 22 fig. 19, which, although rather larger, may possibly be intended for this species; he

denominates it "*Buccinum exiguum Rufum quinque orbium.*" This shell does not perfectly correspond in character with *Cyclostoma*; it is most probably a Pupa, and if so the specific name must be changed, as the present name is pre-occupied in that genus.

GENUS VALVATA.

V. tricarinata (Nicholson's Encyc.) occurs in considerable numbers in ponds, in the vicinity of Council Bluff.

GENUS PALUDINA.

1. *P. *ponderosa.* Shell somewhat ventricose, much thickened, olivaceous or blackish; *spire* not much elongated, much shorter than the aperture, eroded at tip, but not truncated; *whirls* five, slightly wrinkled across; *suture* profoundly impressed; *aperture* sub-ovate, more than half the length of the shell; *labium* with much calcareous deposit, and thickened into a callosity at the superior angle; *within* tinged with blue.

Inhabits Ohio River.

Greatest length one inch and 11-20.

Transverse diameter one inch and 1-10.

This shell is common at the falls of the Ohio, and is a very remarkably thick and ponderous species. It bears a striking resemblance to *P. decisa*, and has without doubt, been generally considered as the same; but it differs from that species in being much more

incrassated and heavy ; and although much decorticated and eroded upon the spire, the tip is not truncated. In the labrum also is a distinctive character ; by comparison this part will be perceived to be less arquated in its superior limb, than the corresponding part in *decisa*.

2. *P. *integra*. Shell olivaceous, pale, conic ; whirls six, wrinkled across ; spire rather elongated, entire at the apex ; suture profoundly indented ; aperture sub-ovate, less than half of the length of the shell.

Inhabits the waters of the Missouri.

Length 1-4 inch.

Very much resembles *P. decisa*, the spire however is more elongated, and never truncated at the apex, but always acute.

3. *P. *porata*. Shell obtusely-conic or subglobose ; volutions four, convex, obsolete wrinkled across ; spire obtuse ; labrum and labium equally rounded, meeting above in a sub-acute angle ; the upper edge of the latter appressed to the preceding whirl ; umbilicus very distinct.

Inhabits Cayuga Lake.

Cabinet of the Academy.

This species which was found by Mr. Jessup, is rather larger and more globose than *P. limosa* to which it is allied, and has a more distinct umbilicus. It resembles *P. decipiens* of Ferrussac, but is much less acute, and rather smaller.

4. P. **lustrica*. *Shell* conic; *whirls* slightly wrinkled, convex; *suture* profoundly indented; *aperture* oval nearly orbicular; *labrum* with the superior edge not appressed to the preceding whirl, but simply touching it; *umbilicus* rather large, rounded.

Length less than 1-10 of an inch.

Cabinet of the Academy.

The smallest species I have seen. The aperture somewhat resembles that of a Valvata, to which genus it may probably be referrible. Mr. Jessup obtained two specimens, on the shore of Cayuga Lake.

GENUS MELANIA.

1. M. **canaliculata*. *Shell* tapering, horn-colour; *volutions* about seven, slightly wrinkled; *spire* towards the apex much eroded, whitish; *body* with a large obtuse groove, which is obsolete upon the whirls of the spire, in consequence of the revolution of the suture on its inferior margin; this arrangement permits the superior margin of the groove, only, to be seen on the spire, in the form of an obtuse carina on each of the volutions; *aperture* bluish-white within, with one or two obsolete revolving sanguineous lines; *labrum* slightly undulated by the groove, and with a distinct sinus at the base of the columella.

Inhabits Ohio River.

Length one inch and one tenth.

Breadth 3-5 of an inch.

Greatest transverse diameter more than 2-5.

Very common at the Falls of the Ohio River. It is probably the largest species of this genus in the United States, and may be readily distinguished from its congeners by its broad groove.

2. *M. *elevata.* Shell gradually attenuating to the apex, slightly and irregularly wrinkled, olivaceous; *suture* not deeply impressed; *volutions* nine or ten, with several more or less elevated revolving lines, of which one being more conspicuous gives the shell a carinated appearance; *aperture* oblique, equalling the length of the second, third, and fourth volutions conjunctly.

Length one inch.

Breadth two-fifths.

Inhabits Ohio River.

Distinct from our other species, by the elevated revolving lines.

3. *M. *conica.* Shell conic, rapidly attenuating to an acute apex, very slightly wrinkled, olivaceous; *suture* not deeply impressed; *volutions* seven or eight; *aperture* oblique, equalling the length of the second, third, and fourth whirls conjunctly.

Var. a. With from one to three, revolving, rufous or blackish lines.

Length nearly 3-5 inch.

Of the aperture 1-4 inch.

Inhabits Ohio River.

May be readily distinguished from *M. virginica*

by the much more rapid attenuation of the spire, and in the proportional difference in the length of the aperture, which in the *virginica* is not more than equal to the length of the second and third whirls.

4. *M. *prærosa.* Shell subglobular, oval, horn colour; *volutions* three or four, wrinkled across; *spire* very short, much eroded, in the old shell, so much so as to be sometimes not prominent above the body whirl, *body whirl* large, ventricose, with a very obtuse, slightly impressed revolving band; *aperture* suboval, above acute and effuse; *within* on the side of the exterior lip about four revolving purplish lines, sometimes dotted, sometimes obsolete or wanting; *labium* thickened, particularly at the superior termination near the angle, and tinged with purplish; *base* of the columella somewhat elongated and incurved, meeting the exterior lip at an angle.

Length about 4-5.inch.

Inhabits Ohio River.

Found in plenty at the falls of the Ohio, the spire is remarkably carious in the older shells, and the penultimate whirl, between the aperture and the spire is also remarkably eroded in many older shells. The spire in the young shell is entire, and but little prominent though acute, and the bands are distinct on the exterior of the shell. This shell does not seem to correspond with the genus to which I have for the present referred it, and owing to the configuration of the base of the columella, if it is not a *Melanopsis*,

it is probable its station will be between the genera *Melania* and *Acathina*. I propose for it the generic name of ANCULOSA.

5. *M. *armigera*. *Shell* tapering, brownish-horn colour; *volutions* about six, slightly wrinkled; *spire* near the apex eroded, whitish; *body whirl* with a revolving series of about five or six distant, prominent tubercles, which become obsolete on the spire, and are concealed by the revolution of the succeeding whirls, in consequence of which arrangement there is the appearance of a second, smaller, and more obtuse subsutural series of tubercles on the body whirl; two or three obsolete revolving reddish-brown lines; *aperture* bluish-white within; a distinct sinus at the base of the columella.

Inhabits Ohio River.

Length about one inch.

Distinguished from other N. American species, by the armature of tubercles.

GENUS BULLA.

B. fluviatilis. *Shell* sub-oval, pellucid, pale yellowish white, finely wrinkled; *volutions* three; *body whirl* large with a prominently carinated shoulder bounding the spire; *spire* perfectly flat or slightly concave, giving to the shell a perfectly truncated appearance in that part; *aperture* longer than the columella, oblong-ovate, extending beyond the tip of the spire; *umbilicus* profound, edged by a slight carina.

Length of the aperture 1 5 of an inch.

Greatest breadth somewhat less.

Inhabits the River Delaware.

This species seems to be rather rare; it was discovered by Mr. Aaron Stone, deeply imbedded in the mud; Mr. William Hyde of this city, has since found specimens of it, amongst some dead shells of other genera assembled in a small inlet of the river.

Descriptions of rare plants recently introduced into the gardens of Philadelphia. By THOMAS NUTTALL. Read March 5, 1822.

* NEMOPHILA.†

Calix decemfidus, laciniis exterioribus reflexis. Corolla subcampanulata quinquelobata, lobis emarginatis, ad basin foveolis marginatis staminiferis. Stamina brevia, filamentis nudis. Capsula carnosae unilocularis bivalvis. Semina quatuor.

Herba succulenta annua, caule triquetro; foliis alternis pinnatifidis, pedunculi longissimi uniflori oppositifolii et terminali subracemosi, racemis incurvis, fructibus deflexis. Corolla æstivatione convoluta. *Hydrophyllum* affinis.

N. *Phacelioides*.

DESCRIPTION. Root fibrous annual, but more commonly biennial. Stem fragile, smooth, some-

† From γέμος, a grove, and φιλέω, I love, a plant peculiar to shady woods.

what tender and diaphanous, plano-convex, 12 to 18 inches long, branching from the base and decumbent, possessing a tenaceous and elastic centre. Leaves alternate, pinnatifid, somewhat succulent, and on the upper surface a little scabrous, segments 5 or 6 pair, subovate, or lanceolate, acute, partly falcate, and presenting a few incisions; petiole ciliated, its internal base lanuginous. Peduncles one-flowered, terete, very long, sometimes near upon a span, and attenuated towards their extremities, at first remote, and coming out opposite the leaves, but at length, as the period of inflorescence advances, approximating into a kind of raceme, which is primarily curved. Calix campanulate, ten-cleft, the segments ovate and acute, ciliate, the larger connivent and erect, the exterior much smaller and reflected. Corolla pelviform-campanulate, flax flower blue, the lobes oval and naked, obliquely emarginated, before expansion convolute, the exterior base producing 10 purple spots, the internal base furnished with five foveolate nectariferous cavities, with tomentose margins, bearing the stamina. Stamina about half the length of the corolla, the filaments filiform and smooth; anthers sagitate-oblong, brownish-yellow. Style one, bifid, below hirsute. Capsule oval, covered by the connivent calix, somewhat hirsute, one-celled, four-seeded, the seeds by pairs alternately immersed in a fleshy succulent receptacle occupying the whole cavity of the capsule.

HAB. In the shady woods of Cedar prairie, ten miles from Fort Smith, and from thence in similar

situations to the sources of the Pottoe. Flowering in May.

It is a hardy biennial, the seeds germinate in autumn, and the seedlings after surviving the winter, flower in the succeeding spring.

* CALLIRHOE.

Calix simplex, quinquefidus. Capsulæ plurimæ monospermæ in annula congestæ.

Habitu *Sida* consimilis.

C. digitata, glauca, foliis inferioribus pseudo-digitatis, subpeltatis, laciniis linearibus subdivisis glabriusculis, supremis tripartitis simpliciusque, pedunculis subracemosis longissimis.

HAB. In the open prairies near Fort Smith, in bushy places, not very common. Flowering in May and June.

DESCRIPTION. Root tuberous, somewhat fusiform and perennial. Stem simple or sparingly branched, smooth and glaucous, about three to four feet high. Radical and lower leaves like those of a *Delphinium* but the divisions partly peltate, the segments 8 or 9 in number, 3 or 4 inches long, linear, simple, bifid and trifid, the primary radical ones occasionally somewhat hispid, the succeeding foliage smooth. Branchlets merely floriferous, naked, the peduncles a foot or more in length, attenuated and articulated a little below the calix, which is simple and 5-cleft, attenuated at its base, the segments ovate, acuminate. Flowers carmine red, about the size of those

of the common cultivated Mallows; the petals crenulate and distinctly unguiculate. Capsules one seeded, and roughened with depressed punctures, not spontaneously opening, and as in *Malva* and *Althæa* disposed in a ring.

This genus, of which the species are hardy ornamental and perennial, appears to afford an additional link of connection between the genera, *Sida* and *Malva*.

Cultivated by Mr. William Dick in the garden of the University of Pennsylvania, by whom it has been dedicated to the author.

Description and Analysis of the Table Spar, from the vicinity of Willsborough, Lake Champlain.
By LARDNER VANUXEM. Read March 5, 1822.

This mineral, which by some was considered to be Ichthyophthalmite, and by others Grammatite, appears in masses, composed of imperfectly tabular crystals, irregularly grouped together, of a white colour, and presenting a slight pearly lustre in almost every direction in which it is viewed. The crystals present natural joints, parallel to a quadrangular prism, with a rhombic base, whose angles are about 94 and 86°; other cleavages again divide this prism according to the diagonals of its base; all the joints are easily separated with a knife, and all of these apparently presenting the same degree of smoothness and lustre: no joints are perceptible in the direction of the base. It is fusible into a transparent

colourless glass. Hardness between common glass and carbonate of lime. Specific gravity 2. 89. Accompanying this mineral are small grains of coccolite, whose colour is brown and green; the former ones, no doubt belong to Garnet, the latter, from possessing natural joints, seems to be a distinct substance.

The mineral in question, forms a jelly with muriatic acid: loses nothing by calcination, although maintained for half an hour at a red heat: on examination, I found it to consist of Silex, of Lime, and a small quantity of oxide of Iron. Its analysis was made in the following manner.

150 grains were boiled with muriatic acid, as long as any part appeared to be unattacked; water was then added and the solution filtered, the Silex an insoluble part when calcined, weighed 77 1-2 grains. That no uncertainty should exist with respect to the quantity of Silex, it was a second time repeated upon another portion of the mineral, with precisely the same result.

To the liquor from which the Silex had been separated, carbonate of ammonia was added until it ceased to give any further precipitate; this was separated by filtering, when well dried, it weighed 124 grains; and consisted of carbonate of lime, slightly coloured with oxide of Iron. It was set aside for further examination. The ammoniacal liquor was evaporated to dryness, then calcined; nothing remained but 4 1-2 grains of muriate of Lime, which had escaped decomposition.

Sulphuric acid was added to the Carbonate of Lime, which converted it into Gypsum and dissolved the Iron mixed with it. It was filtered and the Iron so held in solution, was thrown down by ammonia thus separated and calcined, it weighed 2 grains.

The result of this Analysis, gives us on estimating the quantity of lime by difference,

Silex	-	-	77. 5	or per cent.	51. 67
Lime	-	-	70. 5	-	47. 00
Oxide of Iron	-		2. 0	-	1. 35
			100. 0		100. 00

But as the Iron appears to be an accidental ingredient in this mineral, the real composition of it will be,

Silex	52. 36	} Containing according to this presumed composition,	{ 26. 71 } of ox-	{ 13. 38 } gen.
Lime	47. 64			
100. 00				

Hence this mineral is a bisilicate of Lime, if the oxygenous composition of these earths be correct; the quantity of oxygen in the Silex being twice that contained in the Lime.

From the external and other characters of this mineral, and from its chemical composition, it appears to be identical with the rare mineral called *Schaulstein* or Table Spar, although according to the Analysis of Klaproth, this mineral contains 5 per cent. of water. But Berzelius in his new system of mineralogy published in 1819, at Paris, says, "from ex-

periments which I have had occasion to make with this mineral, I am induced to consider the water as accidental. I have examined very pure specimens of Table Spar, which did not contain any at all."

Geological and Mineralogical notice of a portion of the North-Eastern part of the State of New-York.

By AUGUSTUS E. JESSUP. Read March 19, 1822.

On the eastern, and a considerable part of the western shore of Lake Champlain, as far north as Burlington in Vermont, shell Limestone is the only rock that appears; hence, I am induced to believe, that the bed of the lake rests on the Secondary or Flætz formation. This rock extends in some places four and five miles from the lake on the eastern side, but is seldom found to extend more than a few paces from its western shore: it abounds with fossil reliquiæ; such as Terebratulites, Encrinites, Orthoceratites, and Corallines. Its colour is generally bluish-gray. To the west, it appears to rest on the Primitive, and I think, also to the east. My reasons for supposing it to rest on the primitive, on the Vermont shore of the lake, are the following: 1st. That many of those minerals which occur in the vicinity of the western shore of the lake, are also found imbedded in the same rocks near the eastern shore. 2nd. Near Crown Point in New-York, are very extensive beds of magnetic oxide of iron, and the same variety is also found north-east of this, near Vergennes in Ver-

mont. I think that the Transition, does not interpose between the Primitive and Secondary formations in this vicinity; or, if it does, but partially so. The hills in the vicinity of Lakes George and Champlain, extend in a line nearly north and south; they consist of detached masses, the tops of which are either rounded, or extend nearly in a horizontal line of greater or less extent; their sides are generally very abrupt; their height varies from five to fifteen hundred feet above the level of the adjacent lakes.

At Essex in New-York, the hills of Lake Champlain, retire from its western shore, about six miles; their usual height at this place, is about eight hundred feet. Nine miles north-west of Essex, in the town of Willsborough is a detached mountain mass, which extends from east to west: on its northern face, near its base, is a bed of Garnet-resinite, in primitive Trap: the bed is from six to ten feet in width; it extends from South-east, to North-west, and dips towards the North-east, making an angle of inclination with the horizon, of about thirty-five degrees. The Garnet resinite is accompanied by Tabular Spar, common massive, and granular Garnet, and Pyroxene. This locality was first visited in 1810, by Doct. William Meade; by whose directions I was enabled to find it. The Garnet resinite is also found imbedded in primitive Trap, at Charlotte, in Vermont, eight miles east of Essex.

Three miles south of the upper falls of Lake George, is an abrupt acclivity, the eastern face of which, presents a surface composed apparently of

an entire rock, destitute of herbage, and constituting about three-fourths of the whole height of the mountain; which I suppose to be about twelve hundred feet. The foot of this rock terminates abruptly at the margin of the lake, and extends along its shore for more than half a mile: it is commonly known by the name of **Roger's Rock**. Near the northern extremity of this rock, a spur sets out towards the east, which is apparently about two-thirds as high as the main body of the mountain: it is on this spur, that the following minerals occur either in veins, or imbedded in primitive Trap, Sienite, or Carbonate of Lime; viz, Augite; Cocolite (*Pyroxene-granuliforme* of Haüy); Spkene; granular and massive Garnet; and Plumbago.

The primitive Trap is well characterised, the Hornblende being in distinct crystalline laminae, not unlike that which occurs in many places in the vicinity of Philadelphia, particularly at the head of the old canal road, on the Schuylkill, and on the Brandywine, near Wilmington. The rock which I have called Sienite, is composed of Hornblende, and compact Feldspar; it therefore differs from the common Sienite in as much, as the Feldspar does not possess a crystalline structure: the colour of the Hornblende is black, and greenish-black, that of the Feldspar is white and reddish-white, or flesh coloured: the proportion of the Hornblende is very small: this is the most abundant rock in the neighbourhood of this part of lake George.

The Carbonate of Lime is white; its structure is coarse-grained, crystalline: the grains, which are generally about the size of a pea, after having been exposed to the action of the atmosphere, for a considerable length of time, are easily separated between the fingers. In one place I saw a bed of reddish-brown Serpentine, throughout which small specks of Bronzite were thickly interspersed; it was apparently situated in Sienite. It was impossible to ascertain the order of the strata; they appear to dip, towards the north-east and north, and were much interrupted and broken.

Garnet Resinite.

This mineral, constitutes almost the whole of the large bed in the primitive Trap at Willsborough, mentioned in the preceding Geological sketch; its colour in the mass, is brownish-black and reddish-brown; by transmitted light, hyacinth-red, inclining to crimson; by exposure to the air, many specimens, become beautifully iridescent; external lustre, semi-metallic; internal, resinous: translucent: form, indeterminate: fracture, slightly conchoidal: structure, coarse, and fine grained, and compact; grains feebly adhering. Specific Gravity 3.52.

Common Garnet.

This accompanies the preceding: colour light hyacinth-red: lustre, resinous: transparent: structure, granular; in some specimens indistinctly la-

mellar; grains, less than in the preceding variety: this is not abundant.

Tabular Spar.

This is found interspersed in small beds, in the bed of Garnet resinite, with which it is more or less intimately mixed. Colour, pure and greyish-white; by exposure to the air, it becomes more opaque, than when first taken from the bed; lustre, pearly: the tables are semi-transparent: it occurs in tables confusedly intermixed; a few of which have a tendency to the hexagonal form; this was noticed by Karsten in some of the European specimens of this mineral: the tables are longitudinally striated. It possesses a double cleavage, parallel to the sides of a slightly rhomboidal prism, its angles by the common goniometer are 93° and 87° ; longitudinal fracture fibrous; transverse, uneven: scratches glass: moderately frangible: structure, crystalline: specific gravity 2.98. Phosphoresces by friction and heat.

Augite. First Variety.

This accompanies the Garnet resinite and Tabular Spar, among which it is sparingly interspersed, in grains, of about the size of a small pin's head. As the term, Coccolite, has been applied to granular Pyroxene, it is probable, that this mineral ought to be classed under that name. Its colour in the grains is emerald green, in powder, greenish white: exter-

nal lustre, dull; internal, glistening: semi-transparent: scratches glass: cleavage, distinct.

Augite Second Variety.

This variety occurs at Roger's Rock, near Ticonderoga, associated with Feldspar, crystallized Spheue, and Plumbago. Colour of the mass, light blackish-green, by long exposure to the atmosphere, it becomes dark blackish-green; colour of the powder, greenish-white; lustre, dull: opaque, in mass; in thin fragments, slightly translucent: form, regular, octagonal prisms, generally without distinct terminal faces: I have one specimen on which there are two terminated crystals; but I do not know that the form is described: it is an octagonal prism terminated by four faces, two of which correspond with the two principal faces of the *Pyroxene sexoctagone* of the Abbe Hauy; the two other faces may be considered as the result of a decrement upon the edges, formed by the junction of the third terminal face of the sexoctagone with the two principal ones above named: its cleavage, is imperfect: transverse and longitudinal fracture, splintery: fragments, angular: scratches glass: tough: structure, crystalline: the crystals vary from a few lines, to near three inches in diameter. Specific Gravity, 2. 33.

Coccolite, (Pyroxene granuliforme of Hauy.)

The geological position of this, is the same, as the preceding mineral; of which (both from its physical

and chemical characters,) it may be considered as being only a variety. The south face of the bluff near Roger's rock, presents an entire mass, which is composed principally of this mineral; its height is about fifty feet, and length eighty.

Colour, light blackish-green, and black: lustre, generally feeble, sometimes resinous: semi-transparent: fracture in mass, fine grained: scratches glass: structure, granular: the grains, which are small; in some specimens, adhere firmly, in others, feebly. It is accompanied by Sphene, Garnet, Carbonate of Lime, and Feldspar.

Sphene.

This accompanies the Pyroxene and Cocolite. Its colour is reddish and yellowish-brown: lustre resplendent: nearly transparent: crystalline: form *diocædre* of Hauy: that which occurs with the cocolite has no regular form.

Granular Garnet.

This accompanies the Cocolite; and is also found in large masses unmixed with any other mineral: It has been called by some mineralogists, red Cocolite.

Its colour is red, of various shades: grains small, and feebly adhering.

Massive Garnet.

This is found in large masses: it passes into the preceding variety.

The Publishing Committee have great pleasure in acknowledging the very valuable donation lately received by the Academy from their president, William Maclure, Esq.

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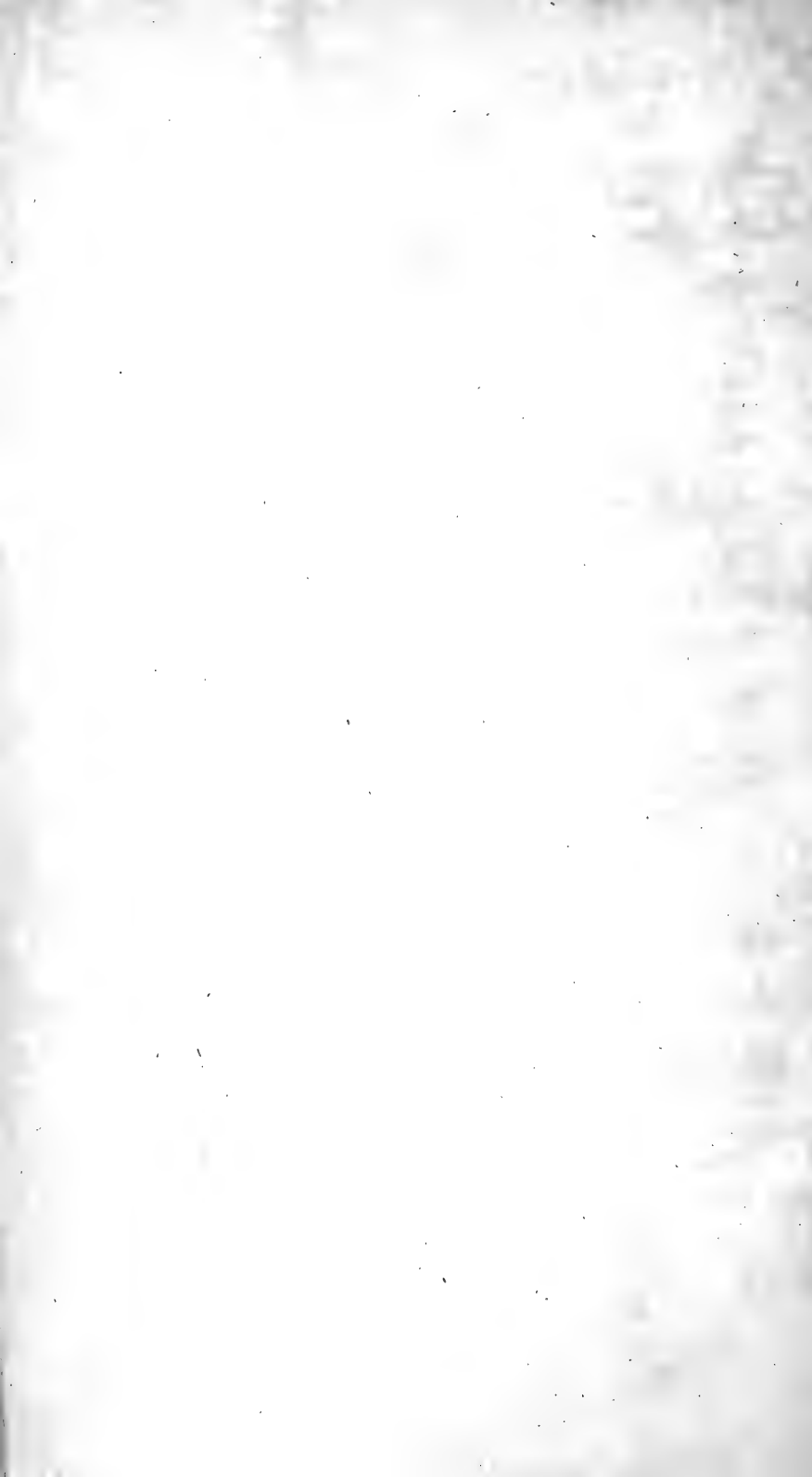
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