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NATURE OF THE STRATA, AND GEOGRAPHICAL DISTRIBUTION OF THE ORGANIC REMAINS IN THE OLDER FORMATIONS OF THE UNITED STATES. By JAMES HALL. Read before the Association of American Geologists and Naturalists, at their Fourth Annual Meeting, held in Albany, April, 1843.

THE investigation of all sedimentary deposits reveals to us the conditions of the bed of the formerly existing seas, and the character of their inhabitants, whose history and fate are easily read, in the imbedded remains which characterize the successive strata.

The gradual diminution in thickness of strata in one direction, and their augmentation in another, points to the direction of the source of the material, and implies the existence of oceanic currents, by which the same has been transported from one place to others more or less distant. The detritus, perhaps of a mighty river, is by this means spread widely over the bed of an ocean, which is inhabited by myriads of living beings. By these means alone the productions of one latitude are transported to different and distant ones.

The present Gulf Stream carries forward, we know not how many miles, the mud and other detritus furnished by the Amazon, the Mississippi and other streams, and the lighter materials are often stranded on the north-west coast of Scotland. At the same time the solid substances have doubtless formed a deposit upon the bed of the ocean over a large part of the area it has traversed. Thousands of living shells are annually covered by the sudden deluges of mud near the shores; while those at a greater distance live more quietly, or are perhaps able to escape from this overwhelming destruction.

The scenes now enacted in our present oceans, have been the same through successive periods in remote ages, though perhaps under different circumstances. We know, however, that our deposits of sand and mud, and to some extent also the calcareous deposits, have been derived from certain sources, and that they have been spread in like manner over the bottom, enveloping the living forms thereon. It is evident that the comparative thickness or tenuity of a deposit, and the coarser or finer condition of its particles, indicate its proximity to the source, perhaps the shore of a continent, or perhaps a few granite peaks, near to, or above the surface of the water. The presence of pebbles often points conclusively to the proximity of land; while a finely comminuted mud is evidence of greater distance from shore.

Under these circumstances we may expect that the living beings, inhabiting the bed of this ocean, would vary in character, not only upon *different kinds of bottom*, but at *different distances* from land, and at different depths of water.

I have met with no essay upon the geographical distribution of fossils in the older rocks; and the few facts here and there gleaned, serve rather to stimulate than to satisfy curiosity. It has been a favorite opinion of many, and frequently advanced, that the condition of this ancient ocean was uniform, and its depth *moderate;* and that the uniformity of organic products affords proof of the same. Without pretending to refute any theories or to establish general conclusions for the whole continent, or for the whole globe, I shall merely offer a few facts which have fallen under my own observation, and this with the hope of calling the attention of other observers to the subject, and aid in deciding the true cause and amount of variation in palæozoic characters when examined over wide districts. We shall doubtless be led, eventually, to see in all these changes the influences *of depths of water, distance from, or proximity to land*, and the *influence of the nature of that deposit* which formed the bed of the ocean, on which the animals lived. Every one of these causes, and perhaps other minor ones, have influenced the present character and condition of our older fossiliferous deposits. All these circumstances influence the organic productions of our present ocean, whatever may be the climate; and we have every proof that the same causes operated in this ancient sea; where, although depth and temperature may have been more uniform, yet these could not have been paramount to all other influences.

These rocks, which are generally known by the terms of Cambrian, Silurian and Devonian Systems, and to which we have, in New York, applied the term New York System,[1] are known to be of great extent in this country. The researches of Mr. Murchison, in England and upon the continent of Europe, likewise show the immense extent of these formations on the eastern continent; and fossils, characteristic of certain strata in England, are known to be abundant even in Siberia.

The very perfect development, the wide range, and comparatively undisturbed condition of these rocks in our country, afford an opportunity of ascertaining the condition of the bed of this ancient ocean over wide areas; and whether it varied in depth, whether it was bounded by dry land, or limited by

[1] This term was adopted to avoid confusion, since at that time the system was divided into Cambrian, Silurian and Devonian, all of which are evidently one system in this country; and it is also well ascertained that the Cambrian System, as heretofore known, is, to a great extent, if not entirely, composed of partially altered strata of the Silurian period.

reefs, can be satisfactorily determined by the organic contents of the strata.

I have, in other connections,[1] endeavored to point out the comparative developments of the different strata extending from the valley of the Hudson to the Mississippi River. Having travelled over this ground, I am acquainted, for the most part, with the variations in lithological and palæontological characters. I have also profited largely by the labors of the western geologists; and I may here again acknowledge my obligations to Dr. Locke, Dr. Owen, Dr. Houghton, and other gentlemen who have freely communicated to me information concerning the west.

In this investigation we will first consider the changes in lithological character which these strata undergo in a westerly direction, as well as their greater or less development.

The lower rocks which the section on the Hudson valley exhibits and which are well developed in several parts of New York, are only seen at a few points within the range of my observations westward. One of these is at Frankfort, Ky., and in the neighborhood of that place; and the same strata, according to the observations of Dr. Owen, appear upon the Mississippi at Prairie du Chien and about the mouth of Wisconsin River.

At Frankfort, Ky., it is impossible to say what is the comparative development of the Potsdam sandstone and calciferous sandrock, but the succeeding limestones bear the same character as those of New York, and contain the same fossils.

Upon the Mississippi, Dr. Owen has represented a sandstone below the limestones which are the equivalent of the birdseye and Trenton limestone. This sandstone holds the place, and is probably the continuation of the two lower rocks of the system, as seen in New York.

[1] See section across the country from New York to the Mississippi River, Transactions of the Association of American Geologists and Naturalists, Vol. I. Plate XII. Also, Report on the Geology of the 4th District, N. Y. Geol. Survey. Pl. XIII.

The same fossils which typify these limestones in New York are likewise found in Kentucky and near the mouth of the Wisconsin River. The large Orthocerus, and some other shells from the latter place cannot be distinguished from those of New York, and if we may credit the observations, made many hundred miles to the northward of this place, similar fossils are equally typical of the strata. In this instance, therefore, we find a uniform composition or material over an extensively wide area, with little apparent difference in the degree of development, and the same association of organic remains. In this instance, therefore, we are forced to admit a very uniform condition in the depth and character of bottom of this primeval ocean.

What facts would appear from an examination farther south and west we cannot infer, but we already know that there is sufficient width from north to south to disprove any inference that this great east and west extent was merely the margin of an ocean. The strata extend northward from New York far into Canada, and from the eastern part of that province stretch westward over a great breadth of country on the north of Lake Ontario. Again they appear in an isolated patch in Kentucky and in Tennessee; while in Virginia and Pennsylvania, as shown from the Reports of Professors W. B. and H. D. Rogers, they form a broad belt upon the eastern margin of the sedimentary formations, thus proving uniform conditions over this wide ocean. Many species of fossils, which in New York are regarded as typical of the lower limestones, are found both in Pennsylvania and Virginia, accompanying the same strata.

The next group which we have to consider, occurs in New York, in the form of shales, shaly sandstones, and sandstones with a very small proportion of calcareous matter. As we trace the line of section westward we find these rocks rëappearing in Ohio, but with some change in their lithological features. The prevailing character here, and also in Indiana, Kentucky, and on the Mississippi River above Dubuque, is that of a calcareous aggregation of strata, with interstratified marl, and more rarely impure sandstone. The whole of this group, together with the inferior calcareous strata, has received, in the Ohio reports, the name of BLUE LIMESTONE. The thickness of the deposit is apparently less than in New York ; the arenaceous matter has nearly disappeared, while the argillaceous portion is much diminished, and instead of shaly slate, is, for the most part, an incoherent marl, or soft shale. Calcareous matter at the same time has greatly increased, so that from forming scarcely an important feature at the east, it is the predominating material. We are now to inquire what changes, during the period of this deposit, occurred in the organic beings inhabiting the ocean bed.

In New York, shells of the Dimyaria, as Modiola, Cypricardia, and Nucula, with Pterinea, are the prevailing forms ; while the Brachiopoda, with the exception of two or three species, are rare. In Kentucky, Ohio and Indiana, the Brachiopoda, in the forms of Atrypa, Delthyris, Orthis and Strophomena abound, to the almost entire exclusion of the predominating genera of New York. It is true that the fossils characteristic of the same strata in New York are found, but would by no means be considered the typical fossils of the rock at the west. *Cyrtolites ornatus, Pterinea carinata,* and one or two *Modiola-like* fossils, which are the reliable forms with us, are found associated with a far greater proportion of *Strophomena, Orthis, Delthyris, Atrypa,* being in fact the least prominent fossils of the group.

The same character of strata, just noticed, holds good upon the Mississippi River, and the same fossils are found as in Ohio and Kentucky. The Pterinea carinata and a species of *Strophomena* are usually the only New York fossils of this group at the west, which attract notice.

Corals and Crinoidea, are infinitely more abundant in this group throughout all western localities than in New York. These are probably dependent upon, and in some degree a source of, the great predominance of calcareous matter. The Crustacea have greatly increased in numbers over those of the same group in New York, though the species there common, are continued, with several others. Among the new species are two of the genus Isotelus, which differ essentially from the species of that genus in the Trenton limestone. At the same time, however, the species of the genus occurring in the Trenton limestone in New York, and which are rarely or never known in the Hudson River Group, are quite abundant in this position, at the west. In this instance, their continuation to a higher position, seems due to an increased proportion of calcareous matter, and perhaps also to other more favorable conditions. The dark and highly calcareous mud of the Trenton limestone, appears to have been the favorite resort of these animals in New York, while as the deposit became more purely argillaceous, they disappeared. At the west, on the other hand, this deposition of calcareous mud continued almost to the close of the period.

Of the *Shawangunk*, or *Oneida conglomerate*, we have little or no knowledge in the west, the only representative of this rock and the *Medina sandstone* being some impure sandy strata at the termination of the group last described. These, at all the localities examined, consist of gray calcareous sandstone, with an admixture of green shaly matter in spots, giving to the rock in some places a speckled appearance. Since fossils are few in these rocks, even in New York, it may be passed without further notice for the present object.

The *Clinton Group* in New York is one of the most variable assemblages of materials of any known group. In some places it consists of a large development of shales and thin flagstones, sandstones and conglomerates, with oölitic iron ore, and a small proportion of carbonate of lime. In other places it consists of an almost equal development of shale and limestone with iron ore, and again the shale or iron ore have nearly or entirely disappeared.

At the west, this group appears to be scarcely separable from the limestone above, and consists almost wholly of calcareous matter. One of the most characteristic fossils of this group in New York is the *Pentamerus oblongus*, which, however, in that State, is scarcely found to the west of the Genesee River. In Ohio, Indiana, and even in the Territory of Iowa, on the west side of the Mississippi River, this fossil abounds, but often so associated with calcareous strata as apparently to be a fossil of the next group; and I am by no means quite satisfied that it does not ascend into the Niagara Limestone. This fact proves conclusively that the Pentamerus oblongus lived in great numbers in the central part of New York, while over an immense area, between this point and the western part of Ohio and the Peninsula of Upper Canada, it did not exist. At the same time fragments of Crinoidea, apparently identical with those of the Clinton Group in New York, occur in various places in Ohio and in the same position.

The *Niagara Group* consists of a shale and limestone, and is one of the most interesting groups in the State of New York. The shale is highly fossiliferous, containing corals, crinoidea, shells and trilobites, while the limestone abounds in corals, almost to the exclusion of all other forms.

This group, at the west, appears as a great mass of limestone, the shale, so characteristic of it in New York, having entirely disappeared. The fossils of the limestone at the west are also corals, with few of any other character. The fossils of the shale are consequently absent over all the great tract of country occupied by the States of Ohio, Indiana, Kentucky, Illinois, Wisconsin and Iowa.[1]

There is here evidence of a vast augmentation of calcareous matter in a westerly direction; for this group, which, in the centre of New York, is but a few feet in thickness, gradually increases in that direction until, at Niagara Falls, it is about two hundred and fifty feet, including the shale; while at the west it has acquired a thickness little less than one thousand feet. This, it will also be remembered, is wholly limestone,

[1] This remark may require qualification, for I have recently seen a peculiar Crinoidean from Kentucky, which is known in New York only in the shale of the Niagara Group. June 3d, 1844.

with the exception of nodules and irregular layers of chert, which increases in proportion as we advance westward.

The *Onondaga Salt Group*, which in New York, at the point of its greatest development is about one thousand feet thick, has greatly diminished at the west, and in all situations where I have examined it, is but an insignificant mass. It retains, it is true, the essential characters of the same in New York, but from being destitute of fossils is of less interest than many of the other rocks, and of little consequence for illustrating the present subject.

Helderberg Limestones. Succeeding to the Salt Group we have an extensive series of limestones which are well developed at the Helderberg and Schoharie. These are highly fossiliferous, abounding in the Brachiopoda, Cephalopoda, Trilobites, Crinoidea, Corals, &c. We are greatly indebted to my friend John Gebhard, Jr. for the extensive knowledge we possess of those fossils, and to him, more than to all others, is due the credit of bringing to light the numerous and beautiful collections of the organic remains of that region.

These limestones, except the two upper ones, all disappear before reaching the western limits of New York. The two higher divisions of the series are well developed in Ohio, Indiana, and Kentucky, and rēappear on the Mississippi River. The general character of the rock remains the same, and the fossils are identical, proving that throughout this wide range of country the condition of the ocean bed was uniform, and the character of its inhabitants the same. Specimens, collected in Ohio, in Indiana, or Kentucky, can scarcely be distinguished from those of the Helderberg; the color of the mass, it is true, is somewhat lighter, but otherwise there is no perceptible difference.

The Odontocephalus selenurus and a species of Calymene (C. crassimarginata) seem to be quite as characteristic at the west and south-west as in New York. It is true that some of the New York fossils disappear at the west, and it is also true that other species make their appearance. Still, the occurrence of the same species of Trilobites, Strophomena, Orthis, Delthyris and Atrypa, while the nature of the deposit is unchanged, proves a condition in nowise essentially differing from the same period in New York.

With the limestones, just described, terminate all the important calcareous formations of New York.

The *Marcellus Shales* and *Hamilton Group*, consisting of shales and shaly sandstones, succeed the limestone, forming an important part of the series in New York. The thickness of the whole is scarcely less than one thousand feet, and it probably contains more individual fossils than all the rocks and groups below this point.

In the eastern part of the State these formations consist of dark or black slaty shales, and dark or olive-greenish sandy shales, and impure sandstones; towards the west the arenaceous matter diminishes, and there is a great increase of mud; and finally, in western New York, the whole consists of an immense development of grayish blue shales still abounding in fossils. Farther west, as in Ohio, Indiana and Illinois, the lower member of this great group, consisting of black shale alone, is visible, having diminished from one thousand feet in thickness to one hundred or even fifty feet, in some places.[1] The same group, from being highly fossiliferous, as in New York, has become apparently non-fossiliferous in its western extension, though in Ohio a few species do occur.[2]

This group also furnishes one of the most interesting and instructive examples of the gradual change in lithological characters and final disappearance of fossils, of any in the system.

As just remarked, the prevailing character of the mass in eastern New York is that of a sandy shale. The most numerous fossils in this part of the State are of the Cypricardia and Modiola-like forms, with Nucula, and large numbers of Avicula; the Brachiopoda, as Delthyris, Orthis, &c., are in the minority,

[1] Dr. Clapp and Dr. Owen.

[2] Professor H. D. Rogers says he has discovered fossils in this shale near the Falls of the Ohio.

except in a few instances, and even here they do not bear the marks of great perfection. Although one or two species appear in great numbers, they do not acquire that perfect development of form which they do farther west; as for example, Delthyris mucronata. As we go westward, however the Avicula, Cypricardia, &c., gradually diminish in numbers and the Brachiopoda become far more numerous in species and abundant as individuals.

This group, therefore, at the two extremes of the State, presents a very different lithological character, and an association of fossils so unlike, when the most common forms are considered, that they would scarcely be recognized as the same. In the western part of the State there seems to be a larger proportion of calcareous mud, and there are also immense numbers of corals which are not common in the eastern part of the State.

The lithological changes, here enumerated, are strictly in accordance with the common laws relating to mechanical deposits. If the source of this great group was in the east or south-east, the sandy matter would first fall to the bottom of the ocean in its transport, the fine mud would remain longer suspended, and its greatest development would only occur after the sandy deposit had begun to diminish; and such precisely we find to be the actual condition. The sandy matter diminishes, the finer particles only continue to be transported, and there becomes a gradually increasing admixture of finer mud. At length the finer siliceous portions are almost lost, and finally too, the soft mud itself has all sunk to the bottom, and the ocean beyond is clear — a deep blue sea.

Now it is very natural to inquire (when we are able to trace a deposit almost uninterruptedly over more than a thousand miles of extent, which must have been covered by an ocean,) what were the conditions of its bed? In what direction was the continent that bounded it, or the islands which raised themselves above its surface? And what evidence have we, if any, of increasing depth as we recede from that ancient shore?

From the facts before us it would appear, both from the nature and condition of the organic remains, that a greater depth and a more quiet state of the waters prevailed in a westerly direction. The increased number of the Brachiopoda, and their more perfect development, are strong facts in favor of this view, while the great numbers of Cypricardia and Avicula in the eastern part of the State, upon the sandy mud, prove a more shallow sea and greater proximity to land. In truth, the nature and condition of the deposits, with all circumstances attending them, alone, proves clearly the increasing depth of water and distance from shore as we progress westward. The nature of the organic remains proves them to have been influenced both by distance from shore, depth of water, and nature of the sediment.

With the exception of a thin bed of limestone, all the succeeding deposits, as far as the Old Red Sandstone, may, for the present purpose, be considered as one group, which includes the Genesee slate, Portage and Chemung Groups.

This series consists of shales and alternations of their sandy layers, and flagstones, with more rarely thick-bedded sandstones. The lower portion is mostly shale, while the arenaceous matter increases toward the upper part. Their calcareous bands sometimes occur, and these are often entirely composed of organic remains.

Towards the west there is a gradual increase of shale and a constant diminution in thickness of the whole mass. In the central portion of the State it attains its maximum in number of *fossils* and also in the thickness of the strata. The fossils are mostly unlike those of the group below, though several of the same species are known to occur. The diminution in thickness, which takes place within the State of New York, is accompanied by a decrease in the number of fossils. In this group as well as the one below, the same change in the character of fossils is perceptible as we proceed westward, namely, the increase of the forms of Brachiopoda over those of Cypricardia, Avicula, &c., or the Dimyaria and Monomyaria. True it is, however, that during the deposition of this great series we discover evidence of changes in the condition of the ocean which are accompanied by changes in the organic remains. We sometimes find a series of strata where the Delthyris, Atrypa, and Orthis abound; and again, above or below this point may be a series where few of these forms are seen, while the strata are crowded with Avicula, Cypricardia, and Modiola, with perhaps a few Strophomena. Large numbers of Fucoides appear in this group, which continue for a long distance east and west, and are of essential service in recognizing certain portions.

As we pass into Ohio, this group, which in its greatest extension in New York is scarcely less than two thousand feet thick, has diminished to four hundred or five hundred feet. Here we find a few of the prevailing forms of Delthyris, Strophomena and Atrypa, while others are exceedingly rare. Still farther west, in Indiana, the mass may be said to be almost non-fossiliferous, scarcely any fossils being noticed throughout its whole thickness. From its constant decrease in thickness in a westerly direction, it doubtless entirely or very nearly disappears from thinning out, in the vicinity of the Mississippi River.

This group must be considered the termination of the rocks of the New York system, which attain a greater development in this part of our country than perhaps in any other part of the world.

The facts show that in all the calcareous formations where there is uniformity of composition, there is little change in organic remains over wide areas. Again when we find a change in the lithological character of strata, there is a corresponding change in organic contents. This is fully illustrated in the Hudson River Group and some of the higher rocks. The gradual change in mechanical deposits at different distances from their source is also attended by a change in the nature of the fossils, as exhibited in the Hamilton and Chemung Groups.

In taking a view of the great area between metamorphic ranges on the east and the Mississippi River, we find that during the period elapsing from the commencement of fossiliferous deposits to the termination of the Hudson River Group, which may be termed the first grand era in organization, there is evidence of a higher degree of vitality over the western portion than in the eastern. The number of species and individuals greatly predominated over those of New York, particularly towards the close of the period.

When we come to the second period, which includes the great calcareous deposits, we find that organization was more fully developed in that portion now the State of New York, than at any other known point to the west or south-west. As proof of this, we need only point to the beautiful series of fossils from the Niagara Group, and the lower part of the Helderberg limestones, few of which are known beyond this State.

In the third division, which includes all the rocks of the system above the limestones of the Helderberg, we find even a greater difference between New York and the south and west.

In this series we have more forms than in all the rocks below, while the individuals of many species can only be enumerated by myriads. The sea emphatically teemed with life; and if vitality gives pleasure, then the sea was filled with happy existences, which flourished in full vigor, and in the greatest perfection.

Look, however, at the great portion of that ancient ocean bed occupied by Ohio, Michigan, Indiana, Kentucky and Illinois, and over the far west beyond the Mississippi. From the period of the final deposition of the Helderberg limestones to the commencement of the carboniferous era, this vast expanse was a comparative solitude. Instead of the busy multitude thronging every part of the sea farther east, this was cold, dark, and deep; presenting no beautiful corals, nor the still more beautiful and singular Crinoideans, and with but few of the shells of the eastern waters, it more resembled a primeval sea, where vitality had but just assumed its place among the laws of nature.

We here learn that our most fossiliferous strata may, at one extreme, be destitute of these characters, or that these forms may be so extremely rare, that they cannot be relied upon. We can thus easily perceive how these strata, when in proximity to hypogene or metamorphic rocks, and where the superior connexion is obscure, may be mistaken for the older slates, reliance being placed upon the presence or absence of organic remains.

Such were the different conditions of this wide expanse of ocean during the period which elapsed from the commencement of organization to the period when this system of rocks terminated. We must now be prepared for even greater changes in this ocean, both in its organic contents and in the comparative conditions between its eastern and western extremes.

Succeeding what we have denominated the Chemung Group, we find in New York a considerable development of red sandstones, greenish and red shales and gray sandstones with conglomerates. The whole series constitutes the equivalent of the *Old Red Sandstone* of Europe. This series is distinguished from the rocks below, not only by its different lithological character, but by its organic remains, which clearly identify it with the formation just named.

Its greatest thickness may be about two thousand feet in the eastern part of New York and in Pennsylvania, but it thins rapidly westward, and in New York, can scarcely be identified beyond the Genesee River. Here is the most rapid thinning out of vast thickness of strata which, so far as we know, do not rëappear in a westerly direction. The organic remains consist of a few shells, unlike those below, with an immense number of scales and fragments of the bones of fishes. In this rock within the State of New York, no species of the Brachiopoda have been found; the only fossils, besides the scales and bones of fishes, being a shell allied to Cypricardia and great numbers of vegetable remains.

Succeeding the Old Red Sandstone is a coarse conglomerate, made up of white quartz, pebbles and coarse sand.

Now after the thinning out of the former rock, this conglomerate rests upon the rocks of the Chemung Group. This is seen throughout the whole of western New York and in Ohio, as far as the western limit of the Alleghany Coal Basin. After taking up the same line of observation where these rocks reappear in Indiana, we find the following arrangement.

The rocks of the Chemung Group are succeeded by fine, gray argillaceous sandstone, which contains intercalated beds of oölitic limestone, with fossils entirely different from any at the east. This sandstone passes upwards and is succeeded by a limestone differing essentially from any limestone below it, and holding a place which presents no rock of this kind at the east. Succeeding this limestone we have the same conglomerate, which in New York, some parts of Pennsylvania, and in the eastern part of Ohio, rests upon the Chemung Group.

During one period in the eastern part of this ocean, while the Old Red Sandstone was being deposited, there is apparently no equivalent deposit in the west, unless the gray sandstone and oölitic limestone are its equivalents. Should this prove to be true, on farther examination, (and I have little doubt of it) then we have a more gradual passage and intermingling of products in the passage of the Old Red, or even from the Chemung Group of New York to the Carboniferous period than from the Chemung to the Old Red as it appears in New York.

Again, in the western part of this ocean, was accumulated that immense deposit of limestone, occupying so much of the Mississippi valley, during which period there was no deposition of importance at the east, and during both these periods a large portion of surface appears to have received no deposit at all.

We have, then, the lower members of the Great Coal Formation resting in one place upon the Chemung Group, again upon the Old Red Sandstone, and finally upon the Limestone, which underlies the great coal basin of Illinois. What may have been all the operating influences it is perhaps impossible to say, but such are some of the facts.

It will be perceived that, with a single exception, all the mechanical deposits diminish in a westerly direction, while the calcareous or chemical deposits increase in the same direction.

The origin, therefore, of the deposits of sand and mud has been at the east, while circumstances more favorable to the production of corals and the formation of calcareous matter, have existed at the west.

We also find that dependent upon, or connected with these operating influences, have been the character, degree of development, and number of organic forms which inhabited the ocean. We find that all those forms which flourished most upon, or were dependent upon, a calcareous bottom, increase in a wonderful degree toward the west, while those affecting sandy or muddy bottoms, are more abundant at the east, becoming nearly or entirely lost at the west. The intermediate stages are marked by admixtures of the two kinds of forms, and a great abundance of forms which flourish in calcareous mud.

The speculations in regard to the conditions of this ancient ocean during these periods, would occupy too much time at present, and we can only hastily glance at some conclusions. It is evident, from the fact that these calcareous deposits are often succeeded by immense mechanical depositions in the form of mud and sand, that the condition of the ocean bed changed at intervals. The growth of corals would only take place at certain depths, and below this they would all perish. Now it would seem that the bed of the ocean was subject to oscillations, by which in one place, covered with corals and calcareous matter, it sank down and allowed an immense deposition of sand and mud to accumulate; and again, this deposit ceasing, the bed of the ocean gradually returned to the condition in which it again supported a growth of corals and their accompanying organic forms. The thinning out therefore of a calcareous deposit, implies a condition of the ocean unfit for supporting these forms, which were the principal agents in giving origin to those immense calcareous deposits of our country. Such we may infer was its condition over much of the eastern portion of this continent, during the formation of the great limestone beds of the Mississippi valley.

In New York we find every one of our limestone formations succeeded by a deposit of mud, which would put an end to all growth in the corals, and many times it appears that this mud was rapidly accumulated.

This immense ocean was evidently margined on the east by a continent which supplied all the detritus forming the mechanical deposits; perhaps by the influx of mighty rivers, bringing down mud and sand; that during some periods there was a cessation of these deposits, and at the same time the calcareous formations were preserved, with their infinite variety of organic forms. The influence of these mud deposits and turbid waters did not however, extend throughout the whole area; and beyond their reach, the corals of various kinds, the Crinoidea, and many other beautiful forms flourished in security, while they were prevented from extending beyond their own domains.

Such simply appear to have been the conditions which existed in the bed of this ancient sea, and such some of the causes which have influenced the distribution of organic remains, over its bed, during the period of the Silurian or New York system.

If we find such changes in the nature and condition of the strata over portions of country which can be examined continuously, what may we not expect should we undertake to compare rocks of the same age when separated by three thousand miles of ocean? It is very plain, that all mechanical deposits must essentially change, when traced over such great distances. Calcareous deposits, also, whether supplied from springs or formed by corals, must essentially change in development or condition, both from inequalities in the ocean bed, and from intermixture of mechanical deposits as well as other causes. Since, also, we find a considerable variation in the aspect and contour of the same species of fossils at distant localities within the United States, it seems natural to infer that an equal, if not greater difference from the normal type[1] may exist upon the two sides of the Atlantic.

It is very clear that we are not to expect perfect identity in formations at distant points, but it is equally plain, that there is such a general similarity that, by the aid of organic remains, we are able to decide with certainty the approximate age and position of any stratum; the greater or less proportion of calcareous matter must, at all periods, have operated in a very essential manner upon the development of the corals and testacea, as we have abundant evidence in the examples cited. It is, therefore, of the first importance that the lithological character be studied in connection with the organic remains, in order to enable one to form a correct judgment, in relation to identity in the age and position of strata. We have already pointed to an important case of this kind where the augmentation of calcareous matter at the west, during the period of the Hudson River Group, has caused a continuation of the fossils of the Trenton Limestone in great numbers, almost entirely to the close of that period. It is doubtless, in a great degree, owing to such differences in lithological characters, and the consequent development of peculiar organic forms, that we find so much difficulty in the comparison of our strata with those of Great Britain and Europe. The difficulties, however, which have heretofore attended this comparison are becoming less, and we confidently believe that when we shall become better acquainted with the geographical distribution of organic remains, and their dependence upon the lithological nature of the strata, we shall find little difficulty in harmonizing all apparent difficulties.

[1] It may not be an easy matter, in all cases, to decide what form shall be regarded as the normal one, when we find the same species so variable in a range of one thousand miles, that it has been described under at least four different names, and regarded as distinct, though the individuals of each were accessible. This has happened to more than one species, and each one may claim his particular form as the type; and the person who describes two individuals of the same under different names, may likewise claim each one as the type, refusing to notice the intermediate forms which unite not only the two, but the four nominal species.

NOTE. — *May*, 1844. Since this paper was read to the Association in 1843, some opportunity has offered of comparing the organic forms in the older strata of New York, and those of the same age to the west and south-west. The result has proved, that among the Brachiopoda, several species which, from external differences, chiefly in size, and somewhat in form, were regarded as distinct, are, in fact identical; and that in nearly all cases, the western and south-western individuals have acquired a much greater development than those in New York. Thus the same species is known by different names in New York and Ohio, and even in Ohio and Kentucky the old and young of the same species are known by different names.

Within the past few months I have also had an opportunity of comparing a collection of fossils from Eastern Canada with those of New York and the west. This collection was obligingly submitted to my examination by Mr. Logan, the Provincial Geologist. Among the forms there presented, are several which do not occur in New York, and are unknown in the United States, so far as I am aware; yet they are figured either in the Silurian System of Mr. Murchison or by Captain Portlock, in his report on the county of Londonderry, and parts of Tyrone and Fermanagh. Several forms figured by the latter, are identical with species found in the Hudson River Group in New York, while their associates, as just remarked, do not occur here. The mingling, in Eastern Canada, of forms which before appeared to be peculiarly American, with what were regarded as European, is a matter of great interest. The numerous forms also, presented in the work of Captain Portlock, just referred to, and which are plentiful in New York, shows that we may yet expect to discover a more close alliance between the strata on the two sides of the Atlantic. The researches of Mr. Logan in Canada East, will be of the most essential importance in bringing to light the connecting links, and in developing this most interesting and important subject, the Geographical Distribution of Organic Remains in the Palæozoic strata.

ART. II. — DESCRIPTIONS OF THE FISHES OF THE OHIO RIVER AND ITS TRIBUTARIES. BY JARED P. KIRTLAND, M. D.

(Continued from Vol. IV. page 308.)

LABRAX. Cuv.

L. multilineatus. The Striped Bass of the Ohio river. White Perch. White Bass of Lake Erie.

Perca chrysops. Rafinesque, Ichthy. Ohiensis, p. 22.
" *multilineata.* Le Sueur. Cuv. et Valenc., Hist. Nat. des Pois. t. iii. p. 488.
Labrax multilineatus. Cuv. et Valenc., Hist. Nat. des Pois. t. iii. p. 488.

Plate VII. Fig. 1.

Head triangular, subcylindric, scarcely compressed on the sides, one fourth the total length of the fish; *lower jaw* prominent, longer than the upper; *operculum* and *preoperculum* scaly; the two former spined at its superior and posterior edge, with a membranous expansion extending between the two spines, the superior less prominent. The posterior and inferior edge of the preoperculum serrated. *Eyes* large, convex and full. *Irides* a golden yellow. *Mouth* large and diagonal. *Lips* and *tongue* asperous, from numerous minute teeth.

Body regularly oval; *abdomen* full and round; *lateral line* nearly straight, slightly influenced by the curvature of the back.

Dorsal fins two, distinct; the anterior spinous, posterior soft; the interstitial membrane of the latter imbricate with scales to one fourth its height. *Caudal fin* slightly bilobed, the lobes rounded obtuse. *Anal fin* extends further back than the dorsal. The interstitial membrane of the caudal and anal fins imbricate with scales in a similar manner to the second dorsal.

Length 8 to 12 inches.

Color. The back and head dark olive and blue; sides blue, silvery and iridescent, with several interrupted brown or dark blue stripes extending the whole length of the fish. Throat and abdomen white. Dorsal, caudal, and anal fins dusky, bluish, or sometimes livid. Pectorals yellowish, with dusky lines extending along the rays. Ventrals pale and diaphanous.

Habitat. Common in Lake Erie, rare in the Ohio River.

D. 9 — 1-14; C. 16 $\frac{4}{4}$; A. 3 — 13; V. 1 — 5; P. 16 rays.

Observations. I have met with but three specimens taken in the Ohio River. They were more dusky colored, and had shorter and more acutely lobed tails than those in Lake Erie, where the species is very abundant. This fish readily takes the baited hook, and is much esteemed for eating. Lesueur discovered his species in the Wabash River, and sent it to France under the name of *Perca multilineata*; this specific name is retained by Cuvier in his "Histoire Naturelle des Poissons." The specimens we have seen did not have so many longitudinal stripes as that described by Cuvier.

PLATIROSTRA. Le Sueur.

P. edentula. Le Sueur. The Toothless Spoonbill.

Platirostra edentula.	Le Sueur.	J. A. N. S. Vol. i. p. 228.
"	"	" "	Say's Appendix to Long's Expedition.
"	"	" "	Kirtland, Rep. on Zool. of Ohio, 197.
"	"	" "	Dekay's Rep. on the Fishes of N. York, p. 347.

Plate VII. Fig. 2.

This fish has in a few instances wandered up the Ohio River, but I have never been so fortunate as to obtain a view of a specimen. I shall therefore copy Lesueur's description of this species, contained in the first volume of the Journal of the Academy of Natural Sciences.

"*Snout* not so long as one third of the body, dilated and rounded at the end. *Body* nearly round, pointed at the tail; *skin* rather smooth than rough, covered with small irregular osselets, which are more abundant on the head. The *head* and *snout* covered with long osseous plates, which are radiated, and interlocked at their extremities: these are in pairs, two on the head, and about six other pairs along the snout. Between the extremities are other smaller plates so as to fill the vacancy. The orbiculars are strong, forming the base of the snout, and extend to about half its length. Both its sides are occupied with small stelliform discs, the rays of which cross each other, and present the appearance of an osseous reticulation, supporting the membranous skin of the snout. *Eyes* small, oblong, above the articulation of the upper jaw; *nostrils* small, double, one above the other, in front of the eyes, but a little more elevated. *Jaws* equal, without teeth, maxillar and intermaxillar close together, and in length equal. Inferior mandibles simple and narrow; opening of the mouth large; *spiracles*, as in sturgeons, behind the eyes, and in front of the articulation of the analogue of the preoperculum. At the other extremity is an opercular plate, radiating backwards, and below this, the analogue of the suboperculum and interoperculum, which articulate with each other. A large skin supports all these bones, expanding and attenuating to a point posteriorly almost to the end of the pectoral fin, and covering the wide branchial aperture on each side.

"*Branchiæ* large: the arcs have two rows of long rigid bristles, in close connexion, directed towards the front. These rows defend a broad membranous expansion, that accompanies the interior centre of each arc, between the bristles, the base of the membranes being furnished with small and very compact cartilaginous laminæ, and behind the arcs is a branchiferous membrane, to support the pectinated structure, with free extremities. The shoulder bones are covered with trifid papillæ, which resemble a small insect.

"*Fins* very like those of the sturgeon, rays bony, articulate and divided, the first usually strong; at the upper part of the tail they are very strong. The inferior rays have a long articulation. *Tail* large, notched, with pointed lobes.

"The *lateral line* commences on the head, branches towards the eyes, towards the sides in front of the preoperculum, across the neck, extends on each side of the back, beginning to decline a little in front of the dorsal fin, and terminates at the tail. In its whole length are to be seen minute ramifications, straight and curved, more or less distant from each other.

"Length from the end of the snout to that of the tail three feet ten inches. Snout, from its extremity to the eyes, twelve inches long, and three inches wide.

"P. 26; D. 58; V. 40—50; A. 56; C. $\frac{15 \text{ sup.}}{84 \text{ sup.}}$"

As Lesueur's description was drawn up from a dried specimen, the colors are not portrayed. We copy therefore the following from the Appendix to Major Long's expedition to the source of St. Peter's River, &c., prepared by Mr. Say. The description is from life.

"*Color* above livid brown, immaculate on the body, but with small blackish spots placed in circles or ovals on the head as far back as the gill opening, on the upper part and sides of the rostrum, about the eyes and on the unwrinkled part of the gill-cover; over the upper jaw, and on the wrinkled part of the gill-cover, with abbreviated lines of small blackish spots; *belly* white, with a few spots on the middle; *fins* dusky, pectorals and ventrals white before and behind; *gill-covers* capacious, broadly united beneath, and each side tapering gradually to a somewhat obtuse point, which nearly attains to the line of the anterior origin of the ventral fins; on the upper basal portion of the gill-cover, and extending for a short distance along the side of the head, the surface is wrinkled to permit the great dilatation of the part; *mouth* entirely destitute of teeth, or of roughness to the touch; *tongue* with large dusky spots; *jaws* within margined with dusky; posterior bone of the gill-opening covered with papillæ pointing backwards; a yellow oblong-oval cartilaginous bone on the tail, beneath the termination of the caudal fin.

"Total length four feet eight inches.

"Rostrum, from the anterior canthus of the eye to the tip, fourteen and a half inches.

"In the gills of this fish were several lamprey eels (Petromyzon) of a small species. The paddle-fish is frequently seen to leap out of the water in the manner of the sturgeon. They grow to a somewhat larger size than the measure above recorded."

Observations. I am indebted to Dr. B. B. Brown, President of the Western Academy of Natural Sciences at St. Louis, for the accompanying sketch. Drs. King and Engelman, of that city, inform me that this fish inhabits the large lakes on the American bottoms which are connected with the Mississippi River. One specimen which Dr. Engelman examined, weighed seventy-nine pounds; and another, taken at the same time, is said to have weighed more than ninety, or even one hundred pounds.

The color above was dark, nearly black, inclining to greenish gray; below grayish white; flesh oily, taste disagreeable. Total length seventy inches; length of the shovel sixteen and a half inches; breadth, one fourth of the distance from the tip, four inches; breadth of the tail, twelve inches. Tail bilobed, semicircular; lobes equal.

This fish is undoubtedly confounded by the fishermen along the Ohio with the *Polyodon folium*.

Acipenser. Lin.

A. platorynchus. Raf. The Shovel-nosed Sturgeon.

Acipenser platorynchus, Raf. Ichthol. Ohiensis, p. 80.
" " Kirtl. Rep. on the Zool. of Ohio, p. 170.

Plate VIII. Fig. 1.

Head one fifth the total length, oval, slightly convex above, entirely flat beneath.

Mouth oval-oblong; lips eight-lobed. *Nostrils* double, the posterior and inferior opening the larger.

Body pentagonal, asperous. Dorsal scales 15, carinated and spinous. Lateral scales 40 serrated, abdominal scales 11, similar. Dorsal-fin trapezoidal; caudal very long, the upper lobe scaly above, and with a long, filiform, terminal process.

Length from one to eight feet.

Color. Head and body above brownish, beneath pure white.

Hab. Ohio River at Cincinnati.

D. 25; C. inferior lobe 18, superior 60; A. 14, V. 20; P. 45.

Observations. The form of the head and snout of this singular fish, resembles somewhat that of the *scoop*-shovel, and hence originates its common name. It is taken in considerable numbers in the vicinity of Cincinnati during summer and autumn, and is often exposed for sale in the markets. The flesh is eatable, though not much esteemed. The most common observer will at once distinguish it from the other species of the genus by its peculiar characters.

Leuciscus. Klein.

L. plagyrus. Raf. The common Shiner of Ohio.

Rutilus plagyrus. Raf. Ichthyol. Ohio, p. 50.

Plate VIII. Fig. 2.

Head obtuse; *nose* slightly truncated; *mouth* diagonal.

Eyes large, circular.

Body compressed laterally; *abdomen* cylindric, and not carinated; breadth of the body equal to one fifth the total length of the fish.

Color. Olivaceous and brown on the back and head, white and silvery on the sides, and operculum; occasionally iridescent,—a brown band extends from the base of the head to the caudal-fin, and involves the lateral line in its posterior half; beneath this band a delicate blue or purplish tint is finally lost in the pure white of the abdomen.

Length. Four inches.

Hab. Every permanent stream in the State of Ohio.

D. 9; C. 20; A. 9. V. 9. P. 15—20.

Observations. Some doubt exists whether this is the *plagyrus* of Mr. Rafinesque, yet it is so common in every western stream, that he could not have overlooked it, and probably he had it in view when he made out his description, as it is noticed under no other name that I can discover. His description is not, however, satisfactory. Our specimens are furnished with diagonal and not vertical mouths; the color of the fins is usually white and not olivaceous; and the number of rays in the caudal-fin is not the same as in his.

Luxilus. Raf.

L. Kentuckiensis. Raf. The Kentucky Shiner.

Luxilus Kentuckiensis. Rafinesque, Ichthyol. Ohiensis, p. 48.
" " Kirtl. Rep. on the Zool. of Ohio. Catalogue, p. 169.

Plate VIII. Fig. 3.

Head rather small and elongated, smooth on its sides, but studded with minute tubercles on its upper surface in the males. Jaws equal, eyes circular and large.

Body fusiform, compressed laterally, the back makes a slight angle at the commencement of the dorsal-fin. Lateral line flexuous. Scales large, those of the sides above the lateral line iridescent at their centres, reflecting a bluish hue, which is less evident towards the abdomen.

Dorsal-fin quadrangular; anterior to the anal, the interstitial membrane opaque, whitish, blotched occasionally with irregular brown or blackish spots, the rays yellowish.

Caudal-fin large, acutely lobed, the lobes often separated down to the base. The rays white or yellowish brown. The inferior fins opaque, whitish on their margins and yellow at their bases.

Color. The upper surface of the head and back dark umber, running into a lighter brown as it descends the sides, which are of a faint blue, that fades into silvery white on the abdomen.

Length from three to five inches.

Hab. Mahoning River.

D. 8; C. 22; A. 8; P. 12.

Observations. The caudal and dorsal fins were not red in the specimens I examined, as they are described to be, by Rafinesque, and the anal fin contained 8 rays, instead of 7, the number he mentions, still I have no doubt we both had the same species in view. It can hardly be mistaken for any other, unless it is the Luxilus compressus. The color of the fins, the size of the scales, and fuller form of the body will at once distinguish it.

CENTRARCHUS. CUV.

C. fasciatus. Le Sueur. The Black Bass.

Lepomis pallida; trifasciata; and flexuolaris.	Raf. Ichth. Ohiensis, p. 30, 31.
Etheostoma calliura.	Raf. Ichthyol. Ohiensis, p. 36.
Cichla fasciata.	Le Sueur. Journ. Acad. Nat. Sciences, vol. ii. p. 216.
" "	Kirtland, Report on the Zoology of Ohio, p 191.
" *Ohiensis.*	Le Sueur. Journ. Acad. Nat. Sciences, vol. ii. p. 218.

Plate IX. Fig. 1.

This species has been so well described by Le Sueur, that we cheerfully substitute his account for our own.

" Specific character. Fourteen or fifteen transverse brown bands on each side of the body, and two or three oblique ones on the opercula, scaly, margined with black; spinous and soft parts of the dorsal fin equal in length, the fin less arcuated upwards than the posterior one.

" *Description.* Body elongated, compressed, tapering at the two extremities, three and a half times as long as the head, by one length in depth; head of moderate size, narrow, destitute of scales between the eyes, and upon the snout, which is short; mouth extending beneath the eye; jaw large, truncated posteriorly, intermaxillary long and narrow; *teeth* very small, numerous, pointed, curved, and serrated in the manner of a card, on the jaws, palate and extremity of the vomer; inferior jaw hardly longer than the superior jaw, mandible strong, enlarged spoon-shaped; *eye* small and round; *iris* white, brown and red; *pupil* small, and of a deep color; *dorsal fin* high, rounded behind, arcuated before, and very low at its junction with the soft part, the spinous rays imbricated and reclined into the longitudinal cavity of the back; *anal* rounded, shorter than the soft parts of the dorsal, with three spinous rays anteriorly; *pectorals* moderate, rounded, *thoracics* truncated, hardly longer than the pectorals, distant from the anals, and armed with a strong spinous ray; *caudal* slightly emarginate, lobes rounded, with seventeen principal rays, including the lateral flat ones, beyond which are eight smaller ones; *scales* rounded, not denticulated, sub-irregularly placed, large on the sides, smaller on the back, small upon the back of the neck, very small under the belly, throat and cheek, and a little larger on the preoperculum, and sub-operculum; there are also very small ones between the rays of the anal and caudal fins; general color brownish-olivaceous, deep and fuliginous upon the back, lighter on the sides, the middle of the scales browned with a black margin; anal fin greenish; posterior part of the dorsal and the caudal violaceous, abdomen and throat bluish and violaceous. The thirteen, fourteen, and sometimes fifteen bands with which this species is ornamented, are a little deeper than the general tint; they are more perceptible in the fresh state of the fish, when but recently taken from the water; the opercula are also traversed with many olivaceous bands, the lateral line is undulated oblique. The color changes in the dying fish; it is then sometimes all blue or bluish, or entirely black, and the transverse bands disappear.

"Length 18 or 20 inches.

"This is one of the best fish of Lake Erie for the table, and with that which the fishermen call *herring salmon* (*Core-*

gonus Artedi, Le Sueur, vol. i. part 2, p. 231,) it is salted, to preserve it till sold. They are taken at all seasons of the year, by the seine and hook and line. We observed them at Erie in the month of July, 1816, and at Buffalo, at which latter place we captured many with the seine. A variety occurred at Lake George, of which the specimens appeared to us to have the lower jaw more advanced. The fishermen name them Black Bass.

"B. 6; P. 18—20; T. 5; D. 10—15; A. 3—12; C. 17 $\frac{8}{8}$."

Observations. This species presents such a variety of forms, colors and habits, and is so much influenced by age, sex, seasons and locality, it is not remarkable that its varieties should have been described as distinct species. Still I am convinced that the synonymes I have here enumerated embrace only one true species, and am inclined to add to them the *Cichla minima* of Le Sueur, as I have never been able to find in the *lagoons* about our rivers and the lake, any fish that answers to his description, except the young of the Black Bass at a certain stage of growth.

This species is found universally in our western waters. It frequently is taken by hooks, and in seines, and also gives amusement to our marksmen in the spring, when it runs into shallow water for the purpose of spawning. At that time it is often shot with rifles. Its flesh resembles in flavor that of the Black Fish (*Tautoga Americana*, Cuv.) and by many persons is esteemed as the best fish for the table that our western waters afford.

The drawing was made from an unusually elongated specimen from Lake Erie.

Leuciscus. Klein.

L. Storerianus. Kirtland. Storer's Leuciscus.

Plate IX. Fig. 2.

Head quadrangular, disproportionately small, flattened between the eyes, angulated above the nostrils, which are separated by a longitudinal sulcation; *nose* obtuse, somewhat conical, projecting beyond the mouth; *nostrils* large, on a line with the eye. *Eyes* oblong-oval; *iris* silvery, and slightly gilt, on inner margin; *pupils* black, *operculum* and *preoperculum* smooth, lustre bright, silvery. *Mouth* diagonal, and when closed the lower lip is nearly concealed beneath the snout.

Body elongated, slightly compressed laterally; *back* rises rapidly from the head to the dorsal fin, from thence to the tail it slopes more gradually and uniformly. Abdomen expands beneath the pectoral fin and then continues of the same size to the vent. It then rapidly diminishes to the tail. *Lateral* line straight, except that near its base it curves as high as the upper edge of the operculum.

Dorsal fin elevated, trapezoidal; *caudal* elongated, bilobed, with the tip of each lobe acute; *anal fin* falls short of the dorsal; *ventral* horizontal, and reaches to the vent; *pectoral* falcate, nearly horizontal, does not attain to the ventral by half an inch.

Length 8 inches. Head 1 $\frac{3}{8}$ inch. Tail 1$\frac{5}{8}$. Depth of the body at the commencement of the dorsal fin 1$\frac{5}{8}$.

Color. Back and upper surface of the body and head olivaceous, sides silvery, and of a brilliant metallic lustre, with a brownish band extending the whole length of the lateral line. Pectoral and ventral fins yellowish, anal white and translucent. Three or four exterior rays of each lobe of the caudal fin, sometimes milky and opaque, and the intervening dusky.

D. 9; C. 23; A. 9; V. 9; P. 15.

Hab. Lake Erie.

Observations. This species is confined, I believe, to Lake Erie, where it is not uncommon, and is known as the *Lake Minnow.* I formerly considered it a variety of the *R. plagyrus* of Raf. but further observation has satisfied me that it is a well marked and distinct species. The young, when two inches long, are silvery and almost translucent, and are so much attenuated in their forms that they would not at first be recognized as any relatives of the full-grown specimens, while the young of the true *plagyrus* bear a close resemblance to the old. This last species is found in every spring, run and rivulet in Ohio, and the former I have never met with except in the waters of the lake, where it is frequently taken in seines while fishing for other species. It affords me pleasure to dedicate it to my friend D. Humphreys Storer, M. D., to whom I am indebted for essential aid, and many important suggestions, in arranging and describing our western fishes.

Art. III.—A MONOGRAPHY OF THE NORTH AMERICAN HISTEROIDES. By John Le Conte, F. L. S., &c. Communicated Sept. 10, 1844.

The little attention which has been paid to Entomology in this country, has left the greater portion of our insects entirely unknown; and we are chiefly indebted to foreigners, for the names and descriptions of those with which we are acquainted. The difficulty of ascertaining even these is justly much complained of; for nowhere can be found collected together the various works through which they are scattered. In order, as far as possible to remedy this inconvenience, I have proposed, in conjunction with my son, to draw up from time to time monographies of such genera of Coleoptera as may appear most worthy of investigation. Those which contain the greatest number of new species, may not always prove the most so; therefore, in selecting the family of the Histeroides for the first of the series, although the greater part of the species have been long known, it is hoped that it will not prove one of the least interesting.

In the year 1811, when Baron Paykull published his Monographia Histeroidum, he was able to describe but ninety-three species, of which, he considered about fourteen as natives of North America. Twenty-six years after this, Count Dejean, in his catalogue of the insects in his collection, enumerated two hundred and fifteen, of which, thirty-three had been received from this country. In the following pages seventy-five species are described; probably not more than one half of what may be hereafter discovered; for we have seen none that inhabit the northern and western parts of the continent, the region of the Rocky Mountains, and the country beyond them, where all the productions of nature differ so remarkably from what are found on the Atlantic coast. One species of Saprinus from the Oregon Territory, which we have seen, differed remarkably from every other species of the genus; it could not be considered as having any striæ on the elytra. Eleven other species of this genus are said to have been brought from the same country, but not a single Hister.

Hereafter it may be necessary to add a supplement to this paper, which we shall not fail to do, whenever a sufficient number of species shall be collected to render it proper.

In following Mr. Erichson's distribution of this family into the genera which he has proposed in Klug's Entomological Annual, it is by no means to be understood, that an unqualified approbation is given to the arrangement of that distinguished naturalist. Many of the generic characters on which he seems to place the greatest reliance, are far from being so apparent as he supposes; and they frequently bring together species whose form, or habit, or manners ought to have placed them far from each other. We have not however, attempted to remove any of these from the genera in which he has placed them; but have been satisfied with pointing out the more evident discrepancies.

The figures have been drawn by my son with the greatest care, and it is hoped, will in all cases, be found entirely correct. The Saprinus dimidiatipennis scarcely differing, except in color, from the S. palmatus, the invariable marks on both being the same, it was thought that one figure would answer; they have accordingly been both referred to the same.

In the nomenclature, the name given to the insect by the first describer, has been scrupulously preserved, and in no instance has any species been considered as new, when it was possible to ascertain that it had been previously described, or even named in any catalogue or private collection.

As there can be no difficulty hereafter in determining what species of this family are known, I invite all those whose attention is turned towards the study of Entomology, to communicate to us any which may not be noticed in this Monography, that they may be hereafter added, with such as we may ourselves detect, to a supplement; and we shall be pleased in return, to furnish any of which we have duplicates that may be wanting in their collections.

Familia insectorum Coleopterorum cui nomen Histeroidûm vel Histeridarum imponitur, characteribus sequentibus facilè dignoscitur.

Antennæ angulatæ sive fractæ, scapo elongato, funiculo 7-articulato, clava 3-articulata, scilicet articulis arctè junctis.

Maxillæ corneæ, malis plerumque membranaceis, barbatis.

Labium corneum; ligula plerumque obtecta, paraglossis membranaceis, porrectis.

Palpi omnes filiformes.

Thorax, lateribus leviter marginatis, anticè profundè emarginatus, posticè elytris arctè contiguus.

Elytra abdomine breviora, posticè truncata, interdum paulo rotundata, margine laterali plus minus inflexo.

Abdomen segmentis quinque compositum, obtusum, breve, segmenta postrema compressa, superiore et inferiore manifestè disjunctis, tertioque superiore margini postico segmentorum superiorum a latere solum conjuncto, ita ut extremitates ejus inter tertium et quartum penultima segmenta superiora, triangulum parvum, angustum formant. *Pedes* posteriores basi distantes.

Corporis formâ, insecta hæcce variant; rotunda, ovalis, oblonga, nunc valdè convexa est, nunc tenuis et depressa: in excrementis, cadaveribus et fungis putridis plurima vitam degunt, multa tamen sub cortice arborum emortuarum occultant. Capta mortem simulant. Colore obscuro gaudent;

pauca tinctibus lætioribus adornantur. Omnia ferè striis distinctè insculpta sunt in capite, thorace et elytris; hæ sculpturæ tamen, interdum in capite aut in thorace nonnullorum cessant; perpauca omnino lævia sunt. Stria in fronte impressa, impressio frontalis vocatur; striæ quæ thoracis latera occupant, striæ thoracicæ laterales; harum si una solum adest, anticè aliorsum tendit, interdum ambiens; si duæ, interior solum ambit. Elytrorum pagina superior, a margine ad suturam utrinque, septem striis longitudinalibus adornatur, quarum exteriorem (ad normam Paykullianam) marginalem signo; hæc in multis speciebus deest; sex aliarum, quinque primæ a margine introrsum numeratæ, dorsales audiunt; sexta vero, suturæ proxima, suturalis. In epipleuris striæ alteræ laterales conspiciuntur: præterea in humerum, ad basin elytrorum, altera stria brevis et obliqua adest, versus marginem tendens, quæ humeralis nuncupatur. Pro ratione formæ, dispositionis, et longitudinis relativæ harum striarum, species optimè designantur.

Omnes hujus familiæ species, exemplum sequens Ill. Dom. Erichson, in tres turmas distribuimus, prout caput retractile vel porrectum, et prosternum lobatum vel simplex sit.

Turma prima. *Caput* porrectum. *Prosternum* simplex, id est, sine lobo anteriore: unum hujus turmæ genus nostras est Hololepta.

Turma secunda. *Caput* retractile, et lobo anteriore elongato prosterni obtectum: hujus turmæ genera sunt Platysoma, Omalodes, Hister, Epierus, Tribalus, Dendrophilus, et Paromalus.

Turma tertia. *Caput* retractile, prosterni simplicis margine anteriore obtectum. Saprinus, Teretrius, Plegaderus, Onthophilus et Abræus nobiscum inveniuntur.

TURMA PRIMA.

Corpus planum, valdè depressum.

Caput retractile, mandibulis porrectis.

Labium corneum, latum, breve, profundè emarginatum, laciniis divergentibus, subacuminatis.

Ligula cum palpis medio labii lateris inferioris inserta.

Scrobiculi antennales nulli.

Genus HOLOLEPTA. Paykull.

Mandibulæ æquales.

Maxillæ sub labio insertæ, coriaceæ, edentulæ, elongatæ, intus ciliatæ.

Ligula bifida.

Palpi inæquales, articulis cylindraceis.

Labrum corneum, convexum, subemarginatum.

Antennæ funiculo sensim incrassato, articulis duobus primis subæqualibus, clavatis, tertio, quarto et quinto subrotundis, sexto et septimo disciformibus.

Corpus planum, valde depressum, tenue.

Caput, fronte lateribus acutè terminato, super antennarum insertionem in dentem parvum prolato.

Thorax posticè leviter bi-emarginatus, angulis posticis plus minus obtusis.

Prosternum latum, planum, anticè plus minus rotundatum, posticè in mucronem obtusè rotundatum porrectum.

Elytra posticè obliquè truncata, angulis posterioribus exterioribus rotundatis.

Tibiæ anticæ dilatatæ, 4-dentatæ, spinula basali interiore sulco femoris congruo adaptata; intermediæ et posticæ latæ, extus sulcatæ, illæ 4-dentatæ, hæ 3-dentatæ apparent, spinæ omnium terminales inæquales.

Tarsi filiformes, graciles, articulis quatuor primis posticè setis duabus subtus instructis, quarum una minuta.

Abdomen planum, segmento superiore penultimo grandi, elytris complanato, ultimo angustissimo, perpendiculariter declivi.

Sub cortice arborum emortuarum habitant. Larva valdè depressa, corpus cute corneo obtectum, mandibulæ validæ; antennæ breves, tri-articulatæ, articulis longitudine subæqualibus, duobus primis apice incrassatis, ultimo graciliore, terete. Abdominis segmentum ultimum superius, duobus cornibus validis, basi unidentatis; inferius, utrinque bidentatum, dente interiore majore. Linea longitudinalis a capite per omnia corporis segmenta imprimitur. Larva Hololeptica quæ in Monographia Ill. Baronis Paykullii depingitur, revera cujusdam muscæ larva fimicola est.

1. H. FOSSULARIS. Tab. I. Fig. 1.

♂ *Capite* et *thorace* foveatis; ♀ *thorace* sub-foveato vel simplici. *Elytris* striis rudimentalibus.

♂ *Hololepta fossularis*, Say. ♀ *Hololepta æqualis*, Say. Journ. Acad. Nat. Sc. Philad. Vol. V.

Habitat sub cortice arborum emortuarum, præsertim Robiniæ pseudo-acaciæ.

Atra, nitidissima. *Caput* utrinque foveolatum, antennis piceis. *Thorax* leviter marginatus, margine antice ambiente, angulo anteriore foveato, interdumque linea longitudinali anticè abbreviata per medium leviter impressa; lateribus pauci punctatis. *Elytra* striis duabus rudimentalibus basalibus, exteriore longiore, sulco laterali subintegra, punctata. *Sternum* læve; prosternum apice non punctatum; mesosternum apice vix emarginatum. *Abdominis* segmentum penultimum superius læve, lateribus pauci et grossè punctatis; ultimum punctatum; segmenta inferiora, exceptis lateribus, lævissima.

2. H. LUCIDA. Tab. I. Fig. 2.

Capite foveato; *thorace* ♂ foveato, ♀ simplici; *Elytris* striis duabus; exteriore integra, interiore valde interrupta.

Hololepta lucida, Dejean Cat.

Atra, nitidissima. *Caput* utrinque foveatum; antennæ piceæ. *Thorax* tenui-marginatus, margine ambiente, linea longitudinali ponè medium anticè abbreviata, sæpius obsoleta: lateribus punctatis. *Elytra* striis duabus, stria exteriore integra basi dilatata, interiore valdè abbreviata, punctum oblongum basilare referente, punctoque simili apicali, sulco laterali punctato, subintegro. *Sternum* læve, prosternum apice punctatum; mesosternum anticè non profundè emarginatum. Abdominis segmentum penultimum superius læve, lateribus grossè punctatis. Ultimum punctulatum, segmenta inferiora lateribus exceptis, lævissima.

TURMA SECUNDA.

Corpus convexiusculum aut depressum.

Caput retractile.

Maxillæ propè labium insertæ.

Ligula lateri inferiori labii haud procul ab apice affixa, vix unquam labio æqualis.

Scrobiculi antennales semper adsunt, interdum tamen minimè profundi.

Tibiæ anticæ dilatatæ.

Genus PLATYSOMA. Leach.

Mandibulæ exsertæ, æquales, dentatæ.

Maxillæ intus barbatæ.

Palpi maxillares articulo tertio secundo paulo longiore, quarto vero, secundo duplo longiore.

Palpi labiales articulo tertio, secundo paulo longiore.

Labrum triangulare, subdeflexum.

Labium semicirculare, interdum emarginatum.

Antennæ funiculo sensim incrassato, articulis obconicis, primo longiore, cæteris longitudine æqualibus, capitulo ovali.

Scrobiculi antennales profundi.

Thorax posticè, rectè truncatus aut subrotundatus, angulis posterioribus rectis.

Prosternum sub-elevatum, posticè rotundatum, lobo anteriore lato, acutè prominente.

Mesosternum breve, anticè, profundè et latè emarginatum.

Tibiæ omnes extus denticulatæ, anteriores angustæ, spinis terminalibus inæqualibus, quarum una brevissima, altera longa et valida.

Tarsi subgraciles, subteretes, articulis quatuor primis seta inferiore apicali instructis; unguiculi bini æquales.

Abdomen segmento superiore penultimo plus minus angusto, ultimoque semicirculari, perpendiculariter declivibus.

Corpus plus minus depressum, interdum elongatum, aut etiam cylindricum.

Frons concava.

Species omnes hucusque cognitæ sub cortice arborum emortuarum inveniuntur; in quibusdam thorax striâ notatur quæ margini contigua est, sed ab angulo anteriore recedit, et postea anticè ambit, sive cum margine confluit.

1. P. Carolinum. Tab. I. Fig. 3.

Thorace stria marginali. *Elytris* striis tribus primis dorsalibus integris, quarta, quinta et suturali anticè abbreviatis. *Tibiis* anticis 5-dentatis.

Hister Carolini, Paykull, Monog. Hist.: *Hister sordidus*, Say, loc. cit. supra.

Habitat sub cortice arborum.

Nigrum vel piceum, nitidum. *Frons* sub-concava, linea transversali impressa, antennis ferrugineis. *Thorax* subconvexus, stria marginali anticè ambiente, angulo anteriore a margine satis remota, postea verò margini valdè approximata. *Elytra* subconvexa, striis primis dorsalibus tribus integris, æqualibus, quarta et quinta paulo ponè medium, suturali ad medium anticè abbreviatis, interstitiis striarum ad elytrorum apicem, puncto oblongo sive striola; marginali nulla, humerali satis conspicua; lateralibus quatuor anticè profundioribus, epipleuræ lineato-punctatæ. *Sternum* puncticulatum, prosternum apice punctatum; segmenta abdominis inferiora lævia, et excepto ultimo, lineâ postica punctata. *Tibiæ* anticæ 5-dentatæ, dentibus anterioribus approximatis, intermediis et posticis spinosis.

Variat totum rufum; unum vidi striâ suturali utrinque abbreviata.

2. P. DEPRESSUM. Tab. I. Fig. 4.

Capite et *thorace* lateribus punctatis. *Elytris* striis tribus primis dorsalibus integris, suturali utrinque abbreviata. *Tibiis* anticis 4-dentatis.

Hololepta depressa, Paykull.

Habitat cum priore.

Supra nigrum, nitidum, infra piceum. *Caput* læve, fronte concavo, linea transversali impressa. *Thorax* striâ laterali, anticè ambiente, angulo anteriore a margine satis remota, posticè vero margini valdè approximata; lateribus punctatis. *Elytra* apice rufo-submarginata, lateribus medio coarctato-impressa, striis primis tribus dorsalibus integris, æqualibus, prima et tertia basi dilatatis, quarta medio, quinta pone medium anticè abbreviatis, suturali utrinque abbreviata aut nulla, marginali nulla, humerali distincta, lateralibus duabus integris. *Sternum* punctatum; segmenta abdominis inferiora lævia, parcé punctata. *Pedes* picei, tibiis anticis 4-dentatis, dentibus binis anterioribus a cæteris remotiusculis, intermediis 3-dentatis, dente apicali bifido, posticis bidentatis.

Variat totum piceum. Refert priorem, sed corpus angustius, et puncta pygidialia grossiora sunt. Etiam in Europâ invenitur.

3. P. PARALLELUM. Tab. I. Fig. 5.

Elytra striis dorsalibus omnibus integris, æqualibus, suturali antico paulo abbreviata.

Hister parallelus, Say, loc. cit. sup.

Habitat in provinciis australibus.

Nigrum, vel nigro-piceum. *Caput* punctatum, fronte concavâ, linea transversa leviter impressa; antennis piceis, clavâ pallidiore. *Thorax* punctatus, marginatus, margine anticè non ambiente. *Elytra* puncticulata, striis punctatis, dorsalibus omnibus integris, suturali anticè versus basin paulo abbreviata, marginali obliterata, vix conspicua, humerali distincta; lateralibus duabus, superiore anticè lata, profunda. *Corpus* totum subtus punctatum, abdominis segmenta superiora grossè punctata. *Tibiæ* anticæ 4-dentatæ, intermediæ 3-dentatæ, posticæ bi-dentatæ.

* 4. P. COARCTATUM. Tab. I. Fig. 6.

Elytris striis quatuor integris æqualibus, quinta et suturali abbreviatis, hac breviore.

Habitat cum priore.

Nigro-piceum. *Caput* punctatum, fronte concava, linea transversa. *Thorax* punctatus, marginatus, margine anticè ambiente. *Elytra* puncticulata, striis profundioribus punctatis, dorsalibus quatuor primis integris, quinta ante medium abbreviata, punctoque oblongo adverso ad basin ; suturali ad medium abbreviata, humerali distincta, marginali nulla, lateralibus duabus superiore anticè lata, profunda. *Corpus* totum subtus punctatum, abdominis segmenta superiora punctata. *Tibiæ* anticæ 4-dentatæ, intermediæ 3-dentatæ, posticæ bi-dentatæ.

Refert prius, sed corpus angustius et puncta pygidialia minora.

5. P. GRACILE. Tab. I. Fig. 7.

Elytris striis dorsalibus quatuor integris, æqualibus, quinta et suturali abbreviatis, illa breviore.

Hister frontalis. Say. loc. cit.

Habitat cum priore.

Piceo-nigrum. *Caput* punctatum, fronte concavo, linea transversa, antennis rufis. *Thorax* punctatus, marginatus, margine ambiente. *Elytra* lævia, linea apicali punctorum, striis punctatis, dorsalibus quatuor primis integris, quinta et suturali anticè, hac ante medium, illa vero ad medium abbreviatis, marginali nulla, humerali distincta, lateralibus duabus superiore anticè lata, profunda. *Corpus* totum subtus punctatum, abdominis segmenta superiora sparsè punctata. *Pedes* picei, tibiis anticis 4-dentatis, intermediis 3-dentatis, posticis bi-dentatis.

Nomen *frontalis* ad speciem aliam a Paykullio olim datum est.

6. P. cylindricum. Tab. I. Fig. 8.

Fronte excavato. *Thorace* stria marginali. *Elytris* striis quatuor dorsalibus et suturali integris.

Hister cylindricus, Paykull. *Cylistus cylindricus*, Godet, Dejean Cat.

Habitat cum prioribus.

Cylindricum, nigrum, vel rufum. *Caput* punctatum, fronte acutè emarginatâ, valdè excavatâ, stria transversa nulla; antennis ferrugineis. *Thorax* punctatus, marginatus, stria marginali profundiuscula, anticè cum margine confluente, et ambiente. *Elytra* puncticulata, striis profundis punctatis, dorsalibus quatuor primis cum suturali integris, quinta anticè paulo abbreviata, suturali basi extrorsum arcuata, humerali distincta, marginali nulla; lateralibus duabus, superiore profundiore. *Corpus* totum subtus punctatum, mesosternum acutè emarginatum. Abdominis segmenta superiora grossè punctata. *Tibiæ* anticæ 4-dentatæ, intermediæ 3-dentatæ, posticæ 2-dentatæ, harum duarum dente apicali bifido.

Species hæcce cum sequente ab aliis recedit, forsan revera genus distinctum, sicut a Dom. Godet, haud ita pridem habita, sed ab Ill. Erichson ad hoc genus relata. Frons subacutè lateribus terminatur, et super antennarum insertionem in dentem parvum profertur, non solum concavus est, sed etiam profundè excavatus, parsque posterior prominet et acutè emarginata est.

* 7. P. attenuatum. Tab. I. Fig. 9.

Fronte excavato. *Elytris* striis dorsalibus quatuor primis et suturali integris, quinta e serie punctorum constituta.

Habitat cum prioribus. Amicitiæ Dom. Zimmerman insectum hoc debemus.

Cylindricum, nigrum vel piceum. *Caput* punctatum, fronte acutè emarginato, valdè excavato, stria transversa nulla; antennis ferrugineis. *Thorax* punctatus, marginatus, stria marginali anticè cum margine confluente et ambiente.

Elytra inconspicuè puncticulata, striis punctatis, dorsalibus quatuor primis cum suturali integris, quinta, e serie punctorum constituta, post medium anticè abbreviata, suturali basi extrorsum arcuata, humerali distincta, lateralibus duabus, inferiore vix conspicua. *Corpus* totum subtus punctatum, abdominis segmenta superiora punctata. *Pedes* picei, tibiis anticis 4-dentatis, intermediis 3-dentatis, posticis bi-dentatis.

Genus OMALODES. Dejean.

Mandibulæ exsertæ, æquales, subdentatæ, longitudine caput sub-æquantes.

Maxillæ intus barbatæ.

Palpi maxillares breves, crassi, subcompressi, articulo tertio secundo paulo breviore, quarto vero duplo longiore.

Palpi labiales breves, articulis duobus ultimis æqualibus.

Labrum parvum, triangulare, apice deflexum.

Labium semicirculare, emarginatum.

Antennæ, funiculo apice incrassato, articulis subrotundis, primo majore, capitulo globoso aut ovali.

Scrobiculi antennales angusti, profundi.

Thorax posticè sub-bi-emarginatus.

Prosternum sub-elevatum, posticè rotundatum, lobo anteriore quantum recurvo.

Mesosternum anticè sub-emarginatum.

Tibiæ compressæ, anteriores dentatæ, intus ciliatæ, posteriores unica serie dentato-spinosæ.

Tarsi graciles; anteriores articulis quatuor primis spina minima, inferiore, apicali instructis, primo sub-elongato; posteriores articulis quatuor primis brevibus, æqualibus, extus spinis duabus brevissimis, intus quatuor longis instructis. Unguiculi bini æquales.

Abdomen segmento superiore penultimo magno, sexangulari, declivi, ultimo perpendiculari, ovali, parvo, segmento inferiore penultimo lateribus dilatato.

Corpus crassum, convexum.

De moribus hujus generis insectorum nihil certum scimus.

* 1. O. borealis. Tab. I. Fig. 10.

Thorace lateribus punctatis, stria margini valdè approximata. *Elytris* striis dorsalibus quatuor, marginali valde abbreviata, suturali nulla. *Tibiis* omnibus 4-dentatis.

Habitat ad insulam longam Noveboraci.

Ater, nitidissimus. *Caput* impressione frontali rotundata, profundè et acutè emarginata, emarginatione profundè impressa, ita ut caput duabus protuberantiis instructum videtur; lateribus punctatis; magis vero posticè. *Thorax* lateribus punctatis, stria marginali integra, ambiente, angulo anteriore a margine satis remota, postea tamen valdè approximata, vix distincta. *Elytra* versus basin dilatata, striis dorsalibus tribus, prima integra, posticè leviter impressa, sparsè punctata, secunda subintegra, interdum anticè paulo abbreviata, posticè in foveam profundam, subrotundam desinente, tertia posticè ad medium abbreviata, suturali nulla, marginali post medium anticè abbreviata, humerali leviter impressa; inter striam primam dorsalem et humeralem striola parva; laterali unica. *Corpus* subtus punctatum, mesosternum vix a poststerno striâ separatum; abdominis segmentum superius ante-penultimum breve, carinatum, penultimum lateribus latè impressis, punctatis. *Pedes* punctati, tibiis omnibus 4-dentatis, dente anticarum anteriore emarginato, sive bifido, posteriore minimo.

Species hæc *Omalodem Omega*, Kirby, huc usque solum in Brasiliâ repertum valdè refert; sed mihi donata fuit utpote insulæ longæ hujus provinciæ indiges: vir tamen a quo insectum receptum fuit subdolus erat et insidiosus. Cum specie Kirbyanâ collata, satis distincta apparet.

* 2. O. Harrisii. Tab. I. Fig. 11.

Punctatus. *Thorace* bistriato, striis integris, approximatis. *Elytris* striis omnibus integris. *Tibiis* anticis 4-dentatis.

Habitat in Pennsylvaniâ, a Dom. Harris communicatus.

Ater, opacus, totus supra et subtus punctatissimus. *Caput* impressione frontali sub-incurva. *Thorax* posticè sub-bi-emarginatus, striis marginalibus duabus integris, approximatis, anticè vero remotioribus, exteriore margine propè confluente, interiore anticè ambiente. *Elytra*, striis omnibus dorsalibus integris, quatuor primis per paria approximatis, suturali integra; inter secundam et tertiam striam dorsalem altera est, brevis et obliqua; humerali nulla, marginali interrupto dislocata, parte anteriore curvata, satis profundè impressa, posteriore recta, vix distincta, e punctis majoribus solum constituta, laterali unica. *Mesosternum* et poststernum medio depressum, vix stria separatum. *Tibiæ* anticæ 4-dentatæ, dente anteriore emarginato, intermediæ et posticæ 8-spinoso-dentatæ.

GFNUS HISTER. LINNÆUS.

Mandibulæ exsertæ, vel porrectæ, ut plurimum æquales.

Maxillæ coriaceæ, intus ciliatæ, apice acuminatæ.

Palpi maxillares articulo primo brevi, secundo tertio duplo longiore, quarto elongato, tertio triplo longiore.

Palpi labiales breves, articulo primo minore, tertio secundo duplo longiore.

Labium sub-emarginatum.

Labrum latè et leviter emarginatum.

Antennæ sub frontis margine insertæ, funiculo versus apicem incrassato, articulo primo arcuato, majore, longiore, cumque secundo obconico, cæteris subrotundis, capitulo ovali.

Scrobiculi antennales ut plurimum rotundati, plani, profundiusculi aut nulli.

Thorax margine posteriore subrotundatus, et (duabus speciebus sectionis ultimæ exceptis) uni-vel bi-striatus.

Prosternum subelevatum, posticè aut rotundatum, aut truncatum.

Mesosternum ut plurimum emarginatum.

Tibiæ compressæ, anteriores ut plurimum extus dentatæ, posteriores extus serie spinularum gemina, omnium spinis terminalibus inæqualibus.

Tarsi compressi, articulis quatuor primis æqualibus, setula utrinque instructis, quarum exterior brevior et gracilior est.

Unguiculi bini, æquales.

Abdomen segmento superiore penultimo quinquangulari, declivi, ultimo perpendiculari.

Corpus crassum, convexum, rotundatum aut ovale.

Genus hæcce plurimas comprehendens species, ut labor investigationis et determinationis levior sit, in sectionibus quinque divideretur; in hac divisione norma Paykulliana quodammodo sequitur.

Insecta hæc omnia in cadaveribus, excrementis, et fungis putridis habitant.

§ I. *Thorax* bistriatus, *elytra* stria marginali.

§ II. *Thorax* bistriatus, *elytra* stria marginali nulla.

§ III. *Thorax* unistriatus, *elytra* stria marginali.

§ IV. *Thorax* unistriatus, *elytra* stria marginali nulla.

§ V. *Frons* concava; *Thorax* unistriatus aut estriatus, *prosternum* bistriatum, *elytra* stria marginali nulla. Species anomalæ, forsan postea genus distinctum efformaturæ.

§ 1. *Thorax bistriatus, elytra stria marginali.*

1. H. ARCUATUS. Tab. I. Fig. 12.

Thorace striis integris, margine remotis. *Elytris* maculis duabus magnis, aurantiacis. *Tibiis* anticis bi-dentatis.

Hister arcuatus, Say, Journ. Acad. Nat. Sc. Vol. V. part 1.

Habitat ad maris oras.

Ater, nitidus. *Caput* impressione frontali rotundata. *Thorax* margine ciliatus, striis integris, margine remotis, interstitio interdum punctato. *Elytra* ad basin dilatata, maculis duabus magnis, lunatis, aurantiacis, foveaque transversali utrinque ad apicem impressa; stria marginali, tribusque primis dorsalibus integris, quarta ut plurimum obsoleta, vel medio valdè interrupta, quinta anticè valdè abbreviata, suturali integra, vel medio abbreviata; lateralibus duabus. *Prosternum* compressum, medio incurvum, lateribus punctatum; *mesosternum* læve, anticè profundè emarginatum. *Abdominis* segmenta superiora grossè punctata, inferiora punctata, medio lævia: pleuræ hirsutæ et (sicut in omnibus) punctatæ. *Femora* magna, ferruginea, lævia; *tibiæ* anticæ valdè dilatatæ, exterius punctatæ, bi-dentatæ, dentibus magnis, obtusis, integerrimis.

Nota. Elytrorum striæ, exceptis tribus primis, valdè variant.

2. H. MERDARIUS. Tab. II. Fig. 1.

Thorace striis integris, posticè subcoeuntibus. *Elytris* striis quatuor dorsalibus integris: *tibiis* anticis 4-dentatis.

Hister merdarius, Paykull, Monog. Hister.

Habitat in excrementis bovinis.

Ater, nitidus. *Caput* subtilissimè punctatum, impressione frontali emarginata. *Thorax* parum convexus, striis lateralibus integris, posticè subcoeuntibus, exteriore margine approximata, interiore basi reflexa, interstitio plus minus punctato. *Elytra* paulo infra basin dilatata, striis punctatis, marginali tribusque primis dorsalibus integris, quarta interdum anticè paulo abbreviata, quinta medio, aut pone medium abbreviata, vel solum e duobus punctis constituta, suturali medio abbreviata, laterali unica. Prosternum lateribus parcè punctatis, mesosternum læve, subemarginatum. *Segmenta* abdominalia inferiora lateribus punctata, anticè medio lævia, linea postica punctorum; ultimo medio impunctata. *Pedes* nigri, femoribus punctatis, *tibiis* valdè dilatatis, anticis 4-dentatis, dente anteriore trilobo.

3. H. OBTUSATUS. Tab. II. Fig. 2.

Thorace striis integris, subparallelis, posticè subcoeuntibus, exteriore basi inflexa. *Elytris* striis quatuor dorsalibus integris. *Tibiis* anticis 6-dentatis.

Hister obtusatus, Harris, Trans. Nat. Hist. Soc. of Hartford, No. I. H. *morio*, Dej. Cat.

Habitat in excrementis bovinis.

Ater, nitidus; *Caput* subtilissimè punctatum, impressione frontali emarginata. *Thorax* convexus, subtilissimè punctulatus, striis punctatis integris subparallelis, posticè subcoeuntibus, interiore basi parum reflexa, exteriore vero basi inflexa, interstitio lævi. *Elytra* paulo infra basin dilatata, fovea utrinque ad basin et ad apicem impressa, lineaque transversali punctorum apicali, striis punctatis, marginali, tribusque primis dorsalibus integris, quarta anticè paulo abbreviata, quinta et suturali valdè ponè medium abbreviatis, suturali tamen paulo longiore, laterali unica. *Prosternum* punctatum, mesosternum læve, anticè emarginatum. *Segmenta* abdominalia inferiora punctata, ultimo medio lævissimo. *Pedes* nigri ; *tibiis* subtus punctatis, anticis valdè dilatatis, 6-dentatis, dente anteriore emarginato, cæteris acutiusculis, duobus inferioribus minutis.

Interdum adest linea punctorum inter striam marginalem, et primam dorsalem.

4. H. IMMUNIS. Tab. II. Fig. 3.

Thorace striis a margine remotis, sub-æqualibus, parallelis. *Elytris* striis quatuor dorsalibus integris. *Tibiis* anticis 4 seu 5-dentatis.

Hister immunis, Erichson, Klug's Jahrbücher, 1.

Habitat in excrementis bovinis.

Ater, nitidus. *Caput* impressione frontali rotundata, interdum emarginata. *Thorax* subtiliter punctatus, striis marginalibus a margine remotis, parallelis, subæqualibus. *Elytra* stria marginali, tribusque primis dorsalibus integris, quarta anticè parum abbreviata, quinta et suturali ponè medium valdè abbreviatis, interdum posticè ad apicem arcuatim convexis, laterali unica; linea punctorum inter striam marginalem et primam dorsalem. *Prosternum* punctatum. *Mesosternum* læve, anticè vix emarginatum. *Abdomen* segmentis omnibus grossè punctatis. *Pedes* picei, *tibiis* 4 seu 5-dentatis, dentibus parvis.

5. H. STYGICUS. Tab. II. Fig. 4.

Thorace striis subæqualibus, margine approximatis. *Elytris* striis quatuor dorsalibus integris. *Tibiis* anticis 5-dentatis.

Hister stygicus, Dej. Cat.

Habitat in provinciis australibus.

Ater, nitidus. *Caput*, fronte puncto impresso, impressione frontali rotundata vel sub-pentagona. *Thorax*, striis marginalibus margine approximatis, parallelis, subæqualibus, exteriore paulo breviore. *Elytra* foveola transversali utrinque ad basin, et ad apicem impressa, stria marginali quatuorque primis dorsalibus integris, quinta valdè ponè medium, et suturali ad medium abbreviatis, laterali unica. *Prosternum* lateribus punctatum; *mesosternum* læve, anticè vix emarginatum; *segmentum* abdominale primum inferius, exceptis lateribus, lævissimum, cæteris punctatis. *Pedes* picei, *tibiis* anticis 5-dentatis.

6. H. Harrisii. Tab. II. Fig. 5.

Punctatus, *thorace* striis æqualibus, interstitio angusto. *Elytris* striis quatuor dorsalibus integris, quinta et suturali abbreviatis. *Tibiis* anticis 5-dentatis.

Hister Harrisii, Kirby, Fauna boreali Americana, Vol. IV.
H. ambiguus, Dej. Cat.

Habitat in excrementis bovinis.

Ater vel brunneus, nitidus, supra et subtus punctatus. *Caput* impressione frontali emarginata. *Thorax* striis marginalibus margine approximatis, æqualibus, parallelis, interstitio angusto. *Elytra* impressione parva, transversali, sublunata, utrinque ad basin, stria marginali, quatuorque primis dorsalibus integris, quinta et suturali abbreviatis, illa medio, hac ante medium, lateralibus duabus. *Mesosternum* anticè subprofundè emarginatum. *Pedes* picei, *tibiis* anticis 5-dentatis, dente infimo minimo.

7. H. repletus. Tab. II. Fig. 6.

Punctatus. *Thorace* striis integris, æqualibus, interstitio angusto. *Elytris* striis omnibus dorsalibus integris, quinta anticè incurvata, marginali posticè abbreviata. *Tibiis* anticis 5-dentatis.

Hister repletus, Say, MSS.

Habitat in provinciis borealibus; e Mus. Dom. Harris.

Piceus, nitidus, subtus pallidior, supra et subtus punctatus. *Caput* impressione frontali obtusè emarginata. *Thorax* striis marginalibus margine approximatis, integris, interiore posticè incurvata, interstitio angusto. *Elytra* striis quatuor primis dorsalibus integris, æqualibus, quinta et suturali paulo brevioribus, illa anticè incurvata, et interdum posticè cum quarta arcuatim conjuncta; lateralibus duabus. *Mesosternum* anticè subprofundè emarginatum. *Pedes* picei, *tibiis* anticis 5-dentatis, dente anteriore majore obtuso.

8. H. LÆVIPES. Tab. II. Fig. 7.

Thorace striis subæqualibus. *Elytris* stria marginali abbreviata, tribus dorsalibus integris. *Tibiis* anticis inermibus.

Hister lævipes, Germar. *H. simplicimanus*, Dej. Cat.

Habitat ubique in stercore bovino.

Ater, nitidus. *Caput* impressione frontali rotundata. *Thorax* subciliatus, striis marginalibus subæqualibus, exteriore margini approximata, posticè parum abbreviata, interiore integra, basi incurvata, quasi rotundato-hamata. *Elytra* striis tribus primis dorsalibus integris, æqualibus, quarta medio valdè interrupta, interdum partibus serie punctorum connexis, interdum solum punctum ad apicem et basin, quorum basale majus et oblongum est, quinta omnino cessat, suturali integra ad basin recurva, marginali ante medium abbreviata, lateralibus duabus. *Prosternum* puncticulatum, lateribus punctatis; *mesosternum* læve, anticè emarginatum. *Segmenta* abdominalia inferiora impunctata, superiore ultimo vix punctato. *Pedes* picei, *tibiis* anticis inermibus.

9. H. FÆDATUS. Tab. II. Fig. 8.

Thorace punctato, striis marginalibus inæqualibus. *Elytris* striis tribus dorsalibus integris. *Tibiis* anticis 5-dentatis.

Hister melanarius, Dej. Cat.

Habitat ubique in excrementis bovinis.

Ater, nitidus. *Caput* punctatum, impressione frontali emarginata. *Thorax* punctatus, magis ad latera, striis marginalibus inæqualibus, interiore basi paulò abbreviata, exteriore margine approximata, valdè abbreviata. *Elytra* striis punctatis, marginali, tribusque primis dorsalibus integris, tertia interdum basi dilatata, quarta propè basin, quinta et suturali post medium, illa valdè, abbreviatis; laterali unica. *Prosternum* lateribus punctis paucis; *mesosternum* læve, anticè leviter emarginatum. *Segmenta* abdominis inferiora punctata, anticè lævia. *Pedes* nigri, *tibiis* anticis 5-dentatis, dentibus parvis, anteriore emarginato.

Nomen Dejeanii specie alteri jamdudum adscitum.

10. H. PUNCTIFER. Tab. II. Fig. 9.

Thorace punctulato, striis inæqualibus. *Elytris* striis vix punctatis, quatuor dorsalibus integris, marginali dislocato-interrupta: *tibiis* anticis 5-dentatis.

Hister punctifer, Paykull, Monog. Hist.

Habitat in Pennsylvania.

Ater, nitidus, punctulatus. *Caput* fronte profundè excavato, impressione frontali rotundata. *Thorax* striis marginalibus inæqualibus, exteriore margini approximata, medio abbreviata, interiore remota, subintegra. *Elytris* striis excavatis, vix punctatis, quatuor primis dorsalibus, integris, quinta pone medium, et suturali ante medium abbreviatis, marginali dislocato-interrupta, hoc est, stria ultra elytrorum medium versus humerum ascendit, ibique interrupta est, pars anterior vero extrorsum curvata, a humero descendit et alteri, aut paulo post extremitatem anteriorem jungitur, aut sine junctione appropinquans præteriit: lateralibus duabus. *Corpus* totum subtus puncticulatum; *mesosternum* emarginatum. *Segmentum* abdominis ultimum superius, utrinque impressum. *Tibiæ* anticæ 5-dentatæ, dentibus obtusiusculis, superiore emarginato, ultimo minutissima.

* 11. H. DECISUS. Tab. II. Fig. 10.

Thorace punctatissimo, striis inæqualibus. *Elytris* striis profundè punctatis, quatuor primis dorsalibus integris, marginali dislocato-interrupta. *Tibiis* anticis crenato-denticulatis.

Habitat in Georgia cadaveribus.

Ater, nitidus. *Caput* punctatum, impressione frontali emarginata. *Thorax* punctatissimus, striis marginalibus punctatis, inæqualibus, exteriore margini approximata, pone medium abbreviata, interiore integra. *Elytra* punctulata, striis profundè punctatis, quatuor primis dorsalibus integris, quarta tamen reliquis interdum paulo breviore, quinta post medium, suturali vero ante medium anticè abbreviatis: marginali dislocato-interrupta, parte dislocata brevissima, lateralibus duabus. *Sternum* punctatum; *mesosternum* anticè emarginatum. *Segmenta* abdominis inferiora punctata. *Pedes* nigri, *tibiis* anticis crenato-denticulatis.

12. H. ABBREVIATUS. Tab. II. Fig. 11.

Thorace puncticulato, striis inæqualibus. *Elytris* striis exaratis, profundè punctatis, quatuor dorsalibus integris, marginali interrupto-dislocato. *Tibiis* anticis 4-dentatis.

Hister abbreviatus, Fabr., Syst. Eleut. *H. striatopunctatus*, Dej. Cat.

Habitat ubique in stercore bovino.

Ater, nitidus. *Caput* punctatum, impressione frontali rotundata, aut emarginata, palpis ferrugineis. *Thorax* puncticulatus, striis inæqualibus, exteriore margini approximata, ad medium posticè abbreviata, interiore integra, basi paulo incurvata. *Elytra* striis exaratis, profundè punctatis, quatuor primis dorsalibus integris, quinta pone medium abbreviata, suturali autem anticè ante medium, et etiam posticè paulo abbreviata, marginali dislocato-interrupta, lateralibus duabus. *Prosternum* puncticulatum, apice et lateribus punctatum, *mesosternum* puncticulatum, anticè emarginatum. *Segmenta* abdominis inferiora punctata. *Pedes* picei, *tibiis* anticis 5-dentatis, dentibus subobtusis, superiore emarginato.

13. H. BIFIDUS. Tab. II. Fig. 12.

Thorace puncticulato, striis inæqualibus. *Elytris* striis exaratis, profundè punctatis, quatuor dorsalibus integris, quinta interrupta, marginali dislocato-interrupta. *Tibiis* anticis 4-dentatis.

Hister bifidus, Say, loc. cit.

Habitat in excrementis et fungis putridis.

Ater, nitidus. *Caput* impressione frontali emarginata. *Thorax* puncticulatus, striis inæqualibus, exteriore margini approximata, ante medium abbreviata, interiore integra, basi paulò incurvata. *Elytra* striis exaratis, profundè punctatis, quatuor primis dorsalibus integris, quinta medio valdè interrupta, parte anteriore breviore, suturali ante medium abbreviata, marginali dislocato-interrupta, lateralibus duabus, exteriore abbreviata. *Prosternum* apice punctatum, *mesosternum* anticè emarginatum, puncticulatum. *Segmenta* abdominis inferiora punctata, primo lævi. *Pedes* picei, *tibiis* anticis 4-denticulatis, dente inferiore trifido.

* 14. H. spretus. Tab. III. Fig. 1.

Thorace margine postico punctato, striis subæqualibus, interstitio lævi. *Elytris* striis tribus integris, quarta et suturali abbreviatis, quinta penè obsoleta, marginali dislocato-interrupta; *tibiis* anticis 2 seu 3-dentatis.

Habitat in Georgia, in excrementis.

Ater, nitidus. *Caput* punctatum, impressione frontali subintegerrima. *Thorax* margine postico præsertim ad latera punctato, striis marginalibus subæqualibus, subintegris, parallelis, interstitio lævi, exteriore posticè paulo breviore, margine approximata. *Elytra* fovea transversali utrinque ad apicem impressa, striis latis, punctatis, tribus primis dorsalibus integris, æqualibus, quarta pone medium, vel ad medium abbreviata, anticè e punctis constituta, quinta penè obsoleta, ut plurimum e punctis paucis, suturali anticè ad medium abbreviata, marginali dislocato-interrupta, parte superiore leviter impressa, anticè abbreviata, inferiore pene obsoleta ut plurimum e punctis constituta, lateralibus duabus. *Prosternum* puncticulatum, *mesosternum* emarginatum, læve. *Segmenta* abdominis posteriora inferiora lævia, lateribus punctatis. *Pedes* picei, *tibiis* anticis 3-dentatis, dentibus obtusis.

Pars dislocata striæ marginalis interdum cessat.

* 15. H. curtatus. Tab. III. Fig. 2.

Thorace striis inæqualibus. *Elytris* striis dorsalibus quatuor integris, marginali utrinque valdè abbreviata. *Tibiis* anticis 3-dentatis, dente anteriore emarginato.

Habitat in Pennsylvania. Dom. Melsheimer benevolè communicavit.

Ater, nitidus. *Caput* punctatum, impressione frontali subrotunda, anticè plana. *Thorax* striis inæqualibus, exteriore brevissima, posticè valdè abbreviata, interiore integra. *Elytra* striis quatuor primis dorsalibus integris, quinta et suturali anticè abbreviatis, illa ad medium, hac vero ante medium, marginali brevi, utrinque valdè abbreviata, lateralibus duabus. *Prosternum* punctatum; *mesosternum* emarginatum, læve. *Abdominis* segmenta inferiora lævia, lateribus punctatis. *Pedes* picei, *tibiis* anticis 3-dentatis, dente anteriore emarginato.

16. H. depurator. Tab. III. Fig. 3.

Thorace striis inæqualibus. *Elytris* striis tribus dorsalibus integris, quarta et quinta obsoletis, marginali obsoleta. *Tibiis* anticis 3-dentatis.

Hister depurator, Say, loc. cit.; *H. anthracinus*, Dej. Cat.

Habitat ubique in fungis putridis, et excremento bovino.

Ater, nitidus. *Caput* impressione frontali rotundata. *Thorax* striis inæqualibus, exteriore margini approximata, medio posticè abbreviata, interiore integra; *Elytra* striis punctatis, tribus primis integris, tertia interdum ante medium posticè abbreviata, quinta et suturali obsoletis, vel solum e punctis paucis constitutis, sæpe tamen adsunt quinta et suturalis plus minus abbreviatæ, marginali obsoleta, e punctis in lineam dispositis constituta, sæpe vero cessat; lateralibus tribus. *Prosternum* apice punctatum; *mesosternum* vix emarginatum. *Segmenta* abdominis inferiora, exceptis lateribus, lævia. *Pedes* picei, *tibiis* anticis 3-dentatis, dente inferiore sæpe obsoleto. Thoracis striæ interdum integræ,æquales, et etiam ambæ posticæ abbreviatæ. Species admodum varians.

§ II. *Thorace bistriatus, elytra stria marginali nulla.*

17. H. biplagiatus. Tab. III. Fig. 4.

Thorace striis æqualibus. *Elytris* duabus maculis magnis arcuatis rubris, striis tribus integris. *Tibiis* anticis bi-dentatis.

Hister bi-plagiatus, Dej. Cat. *H. binotatus*, Lat.

Habitat in provinciis australibus rarius.

Ater, nitidus. *Caput* impressione frontali rotundata. *Thorax* striis integris, exteriore margini approximata, interiore remota. *Elytra* maculis duabus magnis rubris, striis tribus primis dorsalibus integris, quarta pone medium anticè abbreviata, interdum obsoleta, quinta parva aut obsoleta, suturali ante medium anticè abbreviata, interdum vix conspicua, lateralibus duabus. *Mesosternum* anticè emarginatum. *Segmenta* abdominis inferiora, exceptis primo et ultimo, linea postica punctorum. *Pedes* nigri, *tibiis* anticis bi-dentatis, dentibus magnis.

18. H. civilis. Tab. III. Fig. 5.

Thorace striis inæqualibus. *Elytris* striis solum tribus, integris. *Tibiis* anticis edentatis.

Hister civilis, Erichson, in Mus. Berolinensi.

Habitat in Massachusetts et Pennsylvania a Dom. Melsheimer et Zimmerman receptus.

Ater, nitidus. *Caput* impressione frontali rotundata. *Thorax* striis inæqualibus, exteriore ante medium posticè abbreviata, interiore integra, posticè extrorsum tendente. *Elytris* striis solum tribus, integris, suturali nulla, humerali distincta, lateralibus duabus, superiore punctata. *Sternum* læve, *mesosternum* anticè emarginatum. *Segmenta* abdominis inferiora, exceptis lateribus, lævia. *Tibiæ* anticæ latæ, edentatæ, paucis serraturis parvis superius instructæ.

19. H. indistinctus. Tab. III. Fig. 6.

Thorace striis æqualibus. *Elytris* striis quatuor dorsalibus integris. *Tibiis* anticis 3-dentatis.

Hister indistinctus, Say, loc. cit.

Habitat in excrementis, a Dom. Zimmerman benevolè missus.

Ater, nitidus. *Caput* impressione frontali rotundata. *Thorax* striis æqualibus, punctatis, exteriore margini approximata. *Elytra* striis exaratis, profundè punctatis, quatuor primis dorsalibus integris, quinta et suturali valdè abbreviatis, interdum obsoletis, suturali vero semper evidentiore, lateralibus duabus, inferiore punctata. *Prosternum* punctatum, *mesosternum* granted anticè leviter emarginatum, læve. *Segmenta* abdominis inferiora posticè lineato-punctata, primo et ultimo lævibus. *Pedes* picei, *tibiis* anticis 3-dentatis, dentibus obtusis, anteriore emarginato.

20. H. Americanus. Tab. III. Fig. 7.

Thorace striis inæqualibus. *Elytris* striis omnibus dorsalibus integris, quinta basi introrsum versa. *Tibiis* anticis 3-dentatis.

Hister Americanus, Paykull.

Habitat in excrementis bovinis ubique.

Ater, nitidus. *Caput* impressione frontali anticè transverso-deplanata. *Thorax* striis marginalibus inæqualibus, exteriore margini approximata, ante medium posticè abbreviata, interdum obsoleta, interiore integra. *Elytra* apice rufo marginata, striis impunctatis, dorsalibus omnibus integris, quinta ut plurimum basi introrsum flexa, suturali ut plurimum anticè paulo abbreviata, interdum cum quinta dorsali conjuncta, lateralibus tribus. *Prosternum* apice punctatum; *mesosternum* non emarginatum. *Segmenta* abdominis inferiora lævia, lateribus punctatis. *Pedes* picei; *tibiis* anticis 3-dentatis, dente anteriore emarginato.

Stria quinta dorsalis interdum non arcuata, et stria exterior thoracis obsoleta.

* 21. H. dispar. Tab. III. Fig. 8.

Thorace striis inæqualibus, exteriore brevissima. *Elytris* striis dorsalibus tribus, cum suturali integris. *Tibiis* anticis 3-dentatis.

Habitat in Georgia rarius.

Niger, nitidus. *Caput* impressione frontali emarginata. *Thorax* striis inæqualibus, brevissimis exteriore margini approximata, interiore integra. *Elytra* apice rufo submarginata, striis primis dorsalibus tribus, suturalique integris, quarta medio valdè interrupta, partibus serie punctorum connexis, quinta parva, utrinque abbreviata, interdum obsoleta. *Prosternum* apice punctatum ; *mesosternum* non emarginatum. *Segmenta* abdominis inferiora lævia, lateribus parcè punctatis. *Pedes* picei, *tibiis* anticis 3-dentatis, dentibus magnis obtusis.

§ III. *Thorax unistriatus, elytra stria marginali.*

22. H. sedecemstriatus. Tab. III. Fig. 9.

Thorace stria subintegra. *Elytris* striis quatuor dorsalibus integris, quinta et suturali anticè connexis, stria marginali gemina. *Tibiis* anticis 3-dentatis.

Hister sedecem-striatus, Say, loc. cit.

Habitat ubique in excrementis.

Ater, nitidus. *Caput* impressione frontali rotundata. *Thorax* stria marginali subintegra. *Elytra* apice punctata, striis exaratis, profundè punctatis, quatuor primis dorsalibus integris, quarta tamen anticè paulo breviore, quinta et suturali æqualibus, anticè paulo abbreviatis et arcuatim connexis, stria marginali gemina, exteriore integra, interiore abbreviata et cum humerali juncta, lateralibus duabus, integris. *Prosternum* apice et lateribus punctatum ; *mesosternum* non emarginatum. *Segmenta* abdominis inferiora lævia, et exceptis primo et ultimo linea postica punctorum, lateribus punctatis. *Pedes* picei ; *tibiis* anticis 3-dentatis, dentibus obtusis, anteriore emarginato.

* 23. H. cognatus. Tab. III. Fig. 10.

Thorace lateribus punctatis, stria marginali posticè abbreviata. *Elytris* striis quatuor integris, quinta et suturali anticè abbreviatis. *Tibiis* anticis 5-dentatis.

Habitat Noveboraco.

Ater, nitidus. *Caput* impressione frontali emarginata. *Thorax* lateribus punctatis, stria marginali posticè paulo abbreviata. *Elytra* striis quatuor dorsalibus integris, quarta tamen ceteris paulo breviore, quinta post medium, et suturali medio vel ante medium anticè abbreviatis, marginali anticè paulò abbreviata, lateralibus duabus, interiore posticè abbreviata. *Prosternum* punctatum; *mesosternum* læve, emarginatum, lateribus punctatis. *Abdominis* segmenta inferiora, exceptis primo et ultimo (quæ lævia) punctata. *Tibiis* anticis 5-dentatis.

Stria dorsalis quarta interdum integra est, et cum suturali arcuatim conjuncta; hæc conjunctio tamen et arcuatio ut plurimum rudimentales aut obliteratæ sunt.

24. H. marginicollis. Tab. III. Fig. 11.

Thorace puncticulato, stria exarata, integra. *Elytris* striis dorsalibus tribus, marginalique integris. *Tibiis* anticis 5-dentatis.

Hister marginicollis, Dej. Cat.

Habitat Noveboraco, in stercore bovino.

Ater, nitidus. *Caput* impressione frontali rotundata, levissimè emarginata. *Thorax* puncticulatus, punctis lateralibus majoribus, stria marginali exarata, integra, margini approximata. *Elytra* stria marginali, tribusque primis dorsalibus integris, quarta et quinta ante medium, et suturali ad medium anticè abbreviatis; laterali unica. *Prosternum* apice punctatum; *mesosternum* non emarginatum. *Segmenta* abdominalia inferiora (exceptis primo et ultimo) punctata. *Tibiæ* anticæ 5-dentatæ, dentibus validis, acutis.

Stria quarta dorsalis, interdum integra.

25. H. EXARATUS. Tab. III. Fig. 12.

Thorace stria integra. *Elytris* striis tribus integris, reliquis anticè paulo abbreviatis, æqualibus, quinta et suturali anticè subconnexis. *Tibiis* anticis 3-dentatis.

Hister exaratus, Dej. Cat.

Habitat in Georgia et Carolina.

Niger, nitidus. *Caput* impressione frontali anticè transverso-deplanata. *Thorax* puncticulatus, stria marginali integra. *Elytris* striis tribus primis dorsalibus integris, reliquis cum suturali anticè paulò abbreviatis, æqualibus, quinta et suturali anticè arcuatim subconnexis, tertia et quarta interdum eodem modo posticè junctis; stria marginali anticè abbreviata, e serie punctorum constituta; humerali levissima, vix conspicua, lateralibus duabus, inferiore anticè abbreviata. *Prosternum* apice punctatum; *mesosternum* non emarginatum. *Segmenta* abdominis inferiora lateribus punctatis. *Pedes* picei; *tibiis* anticis 3-dentatis, dente anteriore magno.

Species hæcce optimè hanc familiam cum sequente conjungit.

§ IV. *Thorax unistriatus, elytra stria marginali nulla.*

26. H. BI-MACULATUS. Tab. IV. Fig. 1.

Thorace puncticulato, anticè bi-foveato, stria abbreviata. *Elytris* posticè, diagonaliter rubris, striis dorsalibus integris. *Tibiis* anticis 4-dentatis.

Hister bi-maculatus, Linné. *H. obliquus*, Say, loc. cit. *H. erythopterus*, Fabr.

Habitat in excrementis bovinis, in locis sabulosis.

Ater, nitidus. *Caput* punctatum, impressione frontali emarginata. *Thorax* puncticulatus, foveola subrotunda in angulo antico utrinque impressa; stria marginali a margine remota, pone medium abbreviata. *Elytra* ab angulo ferè exteriore anteriore, ad angulum interiorem posteriorem diagonaliter rubra; striis omnibus dorsalibus integris, subæqualibus, scilicet quarta et quinta reliquis paulo brevioribus, suturali ad medium anticè abbreviata, lateralibus duabus, anticè abbreviatis.

Prosternum apice punctatum; *mesosternum* non emarginatum. *Segmenta* abdominis inferiora, exceptis primo et ultimo, punctata. *Pedes* picei, *tibiis* anticis 4-dentatis, dentibus obtusis: *Coxis* anticis ferrugineis.

§ V. *Frons concavus. Thorax unistriatus aut estriatus. Prosternum bistriatum, elytra stria marginali nulla.*

27. H. SUBROTUNDUS. Tab. IV. Fig. 2.

Thorace punctato, stria marginali subintegra anticè non ambiente. *Elytris* striis dorsalibus integris, suturali abbreviata. *Tibiis* anticis crenato-6-dentatis.

Hister subrotundus, Knoch, Say, loc. cit. *Dendrophilus granarius*, Dej. Cat.

Habitat in stercore bovino.

Piceus, nitidissimus. *Caput* punctatum, fronte concavo, marginato, impressione nulla; antennæ rufæ, clava picea. *Thorax* punctatus, magis vero lateribus, stria margini approximata, ad angulum superius curvata et a margine recedente, anticè non ambiente. *Elytra* posticè angustata, utrinque ad apicem extrorsum rufa, striis dorsalibus integris, suturali ante medium anticè abbreviata, humerali distincta; lateralibus duabus, superiore post medium anticè abbreviata, inferiore punctata. *Mesosternum* non emarginatum, sed obtusè acuminatum, posticè pauci-punctatum. *Segmenta* abdominalia inferiora, exceptis lateribus, lævia. *Pedes* rufi, *tibiis* anticis serrato 6-dentatis.

Variat totus niger, et thorace nigro, elytris rufo-piceis.

28. H. VERNUS. Tab. IV. Fig. 3.

Thorace stria nulla. *Elytris* punctatis, striis quatuor dorsalibus integris, quinta cum suturali abbreviata. *Tibiis* anticis serrato 6-dentatis.

Hister vernus, Say, loc. cit.; *Dendrophilus pedicularius*, Dej. Cat.

Habitat in excrementis, præsertim in provinciis australibus.

Piceo-niger, nitidissimus. *Caput* punctatum, fronte marginato, concavo, impressione nulla ; antennis rufis, clava fusca. *Thorax* stria nulla, punctatus, magis vero lateribus. *Elytra* posticè plus minus rufescentia, striis punctatis, quatuor primis dorsalibus integris, quinta et suturali anticè medio, vel paulo ante medium abbreviatis, humerali distincta, lateralibus duabus, superiore anticè post medium abbreviata, inferiore integra, punctata. *Corpus* subtus piceum punctulatum. *Mesosternum* non emarginatum, sed obtusè-subacuminatum. *Abdominis* segmenta inferiora lateribus punctata. *Pedes* picei ; tibiis anticis serrato-6-dentatis.

29. H. nanus. Tab. IV. Fig. 4.

Thorace stria marginali subintegra, anticè non ambiente. *Elytris* striis dorsalibus integris, quinta introrsum arcuata. *Tibiis* anticis serrato-dentatis.

Dendrophilus nanus, Dej. Cat.

Habitat ——————

Piceus, nitidus. *Caput* punctatum, fronte concavo, impressione nulla ; antennis rufis. *Thorax* punctatus, magis vero lateribus, stria margini approximata, ad angulum superius curvata et a margine recedente, anticè non ambiente. *Elytra* utrinque ad apicem extrorsum rufa, striis dorsalibus integris, quinta basi introrsum arcuata cum suturali conjuncta, suturali ut plurimum integra, interdum vero basi paulo abbreviata : humerali distincta, lateralibus duabus, superiore post medium anticè abbreviata, inferiore integra. *Sternum* —————— *Pedes* rufi, *tibiis* anticis subtiliter serratis.

Specimen nostrum imperfectum et mutilatum. Epierus sit ; attamen partes quæ restant, ad hoc genus religant.

Genus EPIERUS. Erichson.

Mandibulæ retractæ, planæ.

Maxillæ mala interiore intus, exteriore ad apicem solum barbata.

Palpi maxillares validi, articulis primis tribus brevibus, quarto elongato-ovali, longo, acuminato.

Palpi labiales articulo ultimo ovali, crasso.

Labium apice sub-bi-emarginatum, dente obtuso subporrecto.

Labrum semicirculare.

Antennæ in frontis margine insertæ, funiculi articulo primo elongato, obconico, cæteris multo minoribus, æqualibus, capitulo ovali compresso.

Scrobiculi antennales profundi.

Thorax margine postico rotundato, elytris arctè junctis.

Prosternum subelevatum, bistriatum, apice truncatum.

Mesosternum apice subemarginatum.

Tibiæ breves, angustæ, anticæ compressæ, extus serratæ, spinulosæ, intermediæ serie exteriore spinarum, posticæ unica spinula apicali, spinulæ terminales omnes subinæquales.

Tarsi graciles, articulis quatuor primis seta utrinque subtus instructis, articulo primo secundo breviore.

Abdomen segmentis duobus superioribus ultimis breviusculis, penultimo subarcuato, obliquè declivi, ultimo semicirculari, penultimo æquali, pene perpendiculari; segmento inferiori primo latissimo, reliquis multo angustioribus.

Corpus parvum, ovale, convexum; capite et thorace estriatis. Elytra striis sex.

Species omnes hujus generis sub cortice arborum emortuarum vitam degunt.

1. E. NIGRELLUS. Tab. IV. Fig. 5.

Punctatus, striis omnibus integris, punctatis, lateralibus tribus: *tibiis* anticis serratis.

Hister nigrellus, Say, loc. cit.; *Dendrophilus pulicarius*, Dej. Cat.; *Epierus pulicarius*, Erichson.

Habitat ubique.

Ater, nitidus. *Caput* punctatum, fronte convexo, impressione nulla, antennæ rufæ. *Thorax* punctatus. *Elytra* puncticulata, striis omnibus integris, punctatis, humerali vix distincta, lateralibus tribus exaratis et profundè punctatis. *Sternum* et epipleuræ punctatæ, *prosternum* striis parallelis, *mesosternum* leviter emarginatum. *Segmenta* abdominis superiora puncticulata, nitidissima, segmenta inferiora lateribus punctatis. *Pedes* rufi; *tibiis* anticis subtiliter serratis.

* 2. E. minor. Tab. IV. Fig. 6.

Thorace punctato. *Elytris* punctulatissimis, striis omnibus integris punctatis, lateralibus duabus. *Tibiis* anticis ciliatis.

Habitat in provinciis australibus.

Ater, picéus, vel etiam rufus. *Caput* punctulatum, fronte convexo, impressione nulla, antennæ rufæ. *Thorax* punctatus. *Elytra* punctulatissima, striis omnibus integris, punctatis, humerali vix distincta, lateralibus duabus. *Sternum* parsque epipleurarum superior punctata, prosternum striis parallelis. *Segmentum* abdominis superius ultimum punctatum, segmenta inferiora lateribus punctata. *Pedes* rufi vel nigri, *tibiis* anticis crenato-ciliatis.

Præcedenti refert, sed duplo minor.

Genus TRIBALUS. Erichson.

Mandibulæ retractæ, margine interiore ciliato, dente parvo instructo.

Maxillæ ambæ intus barbatæ.

Palpi crassi, subcompressi, articulis primis tribus brevibus, ultimo elongato.

Labium semicirculare.

Labrum semicirculare, apice subtruncatum.

Antennæ propè mandibularum basin insertæ, articulis vix increscentibus, primo, vix reliquis majore, capitulo ovali, truncato.

Scrobiculi antennales profundi.

Thorax posticè rotundatus, angulis posterioribus acutis.

Prosternum subelevatum, latum, posticè truncatum, lobo anteriore trilobo.

Pedes longi, recti.

Tibiæ anticæ planæ, subgraciles, extùs serrato-spinosæ, spinæ terminales minutissimæ, posticæ sub-compressæ, serie exteriore spinarum parvarum sparsim instructæ.

Tarsi graciles, articulis quatuor primis subtus fasciculato-pilosis, posteriores articulo primo reliquis minore.

Abdomen segmento superiore penultimo angusto, plano, obliquè-declivi, ultimo majore, semicirculari, perpendiculari.

Corpus parvum, breve, subquadratum, punctatum. Elytra striis rudimentalibus.

Species unica in Georgiâ et Carolinâ invenitur, sub cortice arborum emortuarum latens.

* 1. T. Americanus. Tab. IV. Fig. 7.

Punctatissimus; *elytris* striis obliteratis; lateralibus duabus, tibiis inermibus.

Hemisphericus, niger, obscurus, punctatissimus, marginatus, margine reflexo. *Antennæ* piceæ. *Elytra* striis sex obliteratis, interioribus tribus rudimentalibus, reliquis exterioribus integrioribus, paulo evidentioribus, suturale et marginali nullis, lateralibus duabus. *Tibiis* omnibus inermibus.

Genus DENDROPHILUS. Leach.

Mandibulæ exsertæ, breves, latæ.

Maxillæ mala exteriore apice solum, interiore intus barbatæ.

Palpi maxillares articulo primo minuto, ultimo longo, cylindrico, subacuminato.

Palpi labiales breves, articulo primo minutissimo, vix distincto, secundo subobconico, tertio ovato.

Labrum brevissimum rotundatum.

Labium breve, rotundatum, subemarginatum.

Antennæ articulo secundo majore, longiore, cæterisque quinque sequentibus crassiore, hi parvi, breves et æquales sunt, octavo duplo latiore, capitulo arctè conjuncto, ita ut capitulum quadriarticulatum videtur. Capitulum compressum, ovale, truncatum.

Scrobiculi antennales profundi.

Thorax brevis, posticè rotundatus, angulis posterioribus acutis, scutellum elongatum.

Prosternum subelevatum, posticè subrotundatum, lobo anteriore breviusculo.

Mesosternum latè et profundè emarginatum.

Pedes breves.

Tibiæ latæ, extus obtusè angulatæ, apice rotundatæ, spina brevissima exteriore instructæ, spinæ terminales, præter unam quæ tibiis anticis inseritur, parvæ, breves.

Tarsi longiusculi, articulo primo longiore.

Abdomen segmento superiore penultimo angustissimo, ultimo majusculo perpendiculariter declivi, inferiore primo latissimo, reliquis angustis.

Corpus convexum, crassum, ovale.

Sub cortice arborum emortuarum habitant.

1. D. PUNCTULATUS. Tab. IV. Fig. 8.

Punctatus. *Elytris* striis dorsalibus duabus primis subintegris, subæqualibus, reliquis abbreviatis, suturali nulla. *Tibiis* anticis crenatis.

Hister punctulatus, Melsheimer, Say, loc. cit.

Habitat in Pennsylvania rarius.

Piceus, opacus, supra et subtus punctatissimus. *Elytra* basi rufo-marginata, striis dorsalibus duabus primis subintegris, subæqualibus, tertia et quarta inæqualibus, ante medium posticè abbreviatis, quinta valdè posticè abbreviata, suturali nulla, marginali utrinque abbreviata, humerali vix distincta, lateralibus duabus, superiore profunda. *Prosternum* striis parallelis; *mesosternum* profundè emarginatum. *Tibiis* anticis crenatis, apice obliquè truncatis.

GENUS PAROMALUS. ERICHSON.

Mandibulæ exsertæ.

Antennæ articulo secundo longiore, obconico, ceteris brevibus, æqualibus, capitulo ovali, compresso.

Scrobiculi antennales lati.

Thorax posticè rotundatus, angulis posterioribus subobtusis, elytris vero arctè aptatis.

Prosternum subelevatum, plus minus posticè rotundatum, lobo anteriore subdeclinato.

Tibiæ anteriores latæ, subarcuatæ, spina terminali unica, valida, curvata, posteriores angustæ, intermediæ margine exteriore spinosæ, posticæ spina solitaria apicali.

Tarsi articulis quatuor primis brevissimis, subcompressis, utrinque subtus seta instructis.

Abdomen segmento superiore penultimo angusto, ultimo parvo, semicirculari, subfornicato, perpendiculariter declivi, inferioribus, primo excepto, angustis.

Corpus parvum, plus minus depressum, vel planum.

1. P. ÆQUALIS. Tab. IV. Fig. 9.

Punctatus. *Striis* omnibus plus minus obsoletis. *Tibiis* anticis sub-4-dentatis.

Hister æqualis, Say, loc. cit. *Paromalus complanatus* var., Erichson, loc. cit.

Habitat ubique sub cortice arborum emortuarum.

Oblongus, niger, nitidus, punctatus. *Caput*, fronte plano. *Thorax* tenuiter marginatus, margine anticè non ambiente. *Elytra* striis dorsalibus ut plurimum duabus, prima utrinque abbreviata, interdum medio valdè interrupta, secunda basali, obliqua, marginali utrinque abbreviata aut nulla, humerali distincta, lateralibus duabus integris. *Sternum* levissimè puncticulatum, prosternum striis parallelis; *mesosternum* anticè tri-emarginatum. *Pedes* picei, *tibiis* anticis sub-4-dentatis, dentibus parvis, acutis.

* 2. P. affinis. Tab. IV. Fig. 10.

Punctatus. *Elytris* striis dorsalibus, excepta prima, obsoletis. *Tibiis* anticis sub-quadridentatis.

Habitat sub cortice arborum emortuarum. Noveboraci rarissimè.

Oblongus, niger, nitidus, punctatus. *Caput* fronte plano. *Thorax* leviter marginatus, margine anticè non ambiente. *Elytra* stria dorsali prima exarata, anticè abbreviata, reliquis rudimentalibus, basalibus, obliquis, humerali distincta, marginali exarata, utrinque abbreviata, lateralibus duabus integris, superiore profundiore. *Sternum* ut in precedente ; *prosternum* striis anticè abbreviatis. *Pedes* picei, *tibiis* anticis sub-4-dentatis, dentibus parvis, acutis.

3. P. bistriatus. Tab. IV. Fig. 11.

Punctatus. *Elytris* striis obliteratis, duabus primis abbreviatis, suturali evidentiore. *Tibiis* anticis dentato-crenatis.

Paromalus bistriatus, Erichson, loc. cit.

Habitat sub cortice arborum.

Niger, ovalis, convexus, punctatus. *Antennæ* rufæ. *Elytris* striis obliteratis, prima dorsali rudimentali, brevissima, secunda posticè abbreviata, medio interrupta, versus basin reclinata, suturali evidentiore, utrinque abbreviata, marginali et humerali nullis, lateralibus duabus, superiore punctata, inferiore leviter impressa, anticè abbreviata. *Sternum* ———. *Pedes* rufi, *tibiis* anticis arcuatis dentato-crenatis.

4. P. seminulum. Tab. IV. Fig. 12.

Punctatus. *Elytris* stria unica, abbreviata, striis lateralibus integris. *Abdominis* segmento superiore ultimo levissimè puncticulato.

P. seminulum, Erichson, loc. cit.

Habitat in Carolina, a Dom. Zimmerman benevolè missus.

Niger, nitidus, oblongo-ovalis, convexiusculus, punctatus. *Antennæ* rufæ, clava pallidiore. *Elytra* stria dorsali unica, ante medium posticè valdè abbreviata, satis profundè impressa, suturali levissima, vix conspicua, utrinque abbreviata, lateralibus duabus, integris. *Sternum* ————————. *Abdominis* segmentum superius ultimum levissimè puncticulatum. *Pedes* picei, *tibiis* dentatis, anticis dilatatis.

5 P. CONJUNCTUS. Tab. V. Fig. 1.

Punctatus. *Elytris* striis dorsalibus quatuor integris, quarta cum suturali arcuatim connexa. *Tibiis* anticis serratis.

Hister conjunctus, Say, loc. cit.; *Paromalus pumilio*, Erichson, loc. cit.; *Abræus erythrocerus*, Dej. Cat.

Habitat in excrementis, præsertim in provinciis australibus.

Piceus, nitidus, ovalis, convexiusculus, supra et subtus punctatus. *Caput* fronte subconcavo, anticè linea incurva impressa, antennis rufis, clava obscura, palpis rufis. *Thorax* anticè utrinque impressus, punctatus, punctis lateralibus majoribus. *Elytra* posticè rufo-sub-marginata; striis dorsalibus quatuor primis integris, quinta ante medium anticè abbreviata, interdum pene obsoleta, quarta cum suturali anticè arcuatim conjuncta (junctura sæpe series punctorum); marginali post medium anticè abbreviata, humerali leviter impressa, lateralibus duabus integris, profundiusculis. *Prosternum* striis parallelis, *mesosternum* anticè emarginatum. *Pedes* picei; *tibiis* pallidioribus, anticis serratis, apice paulo angustatis, intermediis subcrenatis, posticis arcuatis.

Facie et moribus à ceteris differt; an genus revera distinctum?

TURMA TERTIA.

Caput retractile, fronte anticè abruptè contracta.
Maxillæ prope labium insertæ.
Prosternum simplex, hoc est sine lobo anteriore.

GENUS SAPRINUS. ERICHSON.

Mandibulæ exsertæ, breves.
Maxillæ intus barbatæ.

Palpi maxillares validiusculi, articulo primo minimo, secundo obconico, tertio subcylindrico, ultimo cylindrico, duas præcedentes æquante.

Palpi labiales articulo secundo obconico, tertio longiore, oblongo-ovali, apice truncato.

Labrum breve, in quibusdam emarginatum, in aliis integerrimum.

Labium parvum, subquadratum, anticè emarginatum.

Antennæ sub frontis margine insertæ, articulo secundo majusculo, ceteris minutis, æqualibus, capitulo subgloboso.

Scrobiculi antennales in prosterni lateribus siti.

Thorax posticè bi-emarginatus, angulis posticis acutis.

Prosternum elevatum, extans, compressum, striatum.

Mesosternum anticè non emarginatum.

Pedes ut plurimum longi, validi.

Tibiæ anteriores latæ, compressæ, extus, aut dentatæ, dente singulo spina instructo, aut integræ margine exteriore spinoso; posteriores compressæ, extus serie densa, longa spinarum, aliaque ad medium superficiei externæ ciliatæ, instructæ, spinæ terminales tibiarum omnium parvæ.

Tarsi compressi, articulis quatuor primis subæqualibus, extus et subtus seta apicali, intus vero serie setarum instructis.

Abdomen segmento superiore penultimo angusto, declivi, ultimo magno, perpendiculari, segmentis inferioribus, excepto primo, angustis.

Corpus crassum, ovale aut rotundatum, plus minus punctatum.

Elytra striata, striis dorsalibus obliquis, suturali si modo integra, cum dorsali quarta semper arcuatim juncta, stria quinta semper deest.

Habitant ut plurimum in cadaveribus.

In sectiones tres hoc genus dividitur.

§ I. *Striis* lateralibus tribus.

§ II. *Striis* lateralibus duabus, frons lateraliter marginatus; *impressione* frontali nulla.

§ III. *Striis* lateralibus duabus, frons lateraliter marginatus, linea elevata transversa, *impressioneque* frontali rotundata, recurva.

§ 1. *Striis lateralibus tribus.*

1. S. ROTUNDATUS. Tab. V. Fig. 2.

Piceus, nitidus, punctatus. *Elytris* striis dorsalibus et suturali posticè abbreviatis. *Tibiis* anticis crenatis.

Hister rotundatus, Fabr., Syst. El.; *Dendrophilus rotundatus*, Dej. Cat.

Habitat in Pennsylvania, in museo Dom. Harris.

Niger, piceus, nitidus, totus supra et subtus punctatus. *Caput* impressione frontali nulla. *Thorax* anticè non impressus. *Elytra* margine apicali rufescenti, striis omnibus dorsalibus subæqualibus, ponè medium, suturali verò ante medium posticè abbreviatis, humerali distincta, cum prima dorsali parallela, marginali anticè abbreviata. *Pedes* rufo-picei, *tibiis* anticis crenatis.

* 2. S. IMPERFECTUS. Tab. V. Fig. 3.

Fronte impressa: *thorace* disco, elytrisque anticè impunctatis; stria suturali utrinque abbreviata. *Tibiis* anticis crenato-dentatis.

Habitat in Pennsylvania. Mus. Dom. Melsheimer.

Niger, nitidus. *Caput* punctatum, fronte marginato, palpis et antennis rufis, clava obscuriore. *Thorax* anticè impressus, disco lævi, lateribus latè, margine postico angustè punctatis. *Elytra* medio posticè punctatissima, striis punctatis dorsalibus omnibus posticè abbreviatis, tertia breviore, quarta anticè introrsum arcuato, cum suturali utrinque abbreviata, non conjuncta; spatio inter striam primam et secundam striolis parvis obliquis plus minus sculpto, humerali distincta, marginalibus duabus, ambabus cum humerali conjunctis, posticè abbreviatis, superiore vero brevissimo. *Epipleuræ* punctatæ, *striis* lateralibus tribus, superiore posticè abbreviata, intermedia integra, inferiore levissima. *Segmenta* abdominis inferiora lateribus et posticè punctata. *Pedes* rufo-picei, *tibiis* anticis crenato-dentatis.

§ II. *Striis lateralibus duabus, frons lateraliter marginatus, impressione frontali nulla.*

3. S. LUGENS. Tab. V. Fig. 4.

Ater: *thoracis* lateribus, margineque postico, et elytris, macula suturali magna, basali excepta, punctatis. *Striis* dorsalibus omnibus posticè, suturali verò anticè abbreviatis; *tibiis* anticis crenatis.

Saprinus lugens, Erichson, loc. cit.

Habitat in territorio Oregonensi. Mus. Dom. Harris.

Ater. *Caput* punctatum. *Thorax* anticè et posticè utrinque impressus, disco lævi, nitido, lateribus latè ac densè, margine anteriore et posteriore verò subtiliter, punctatis. *Elytra* punctatissima, punctis plus minus confluentibus, rugas simulantibus, præsertim versus apicem, humeris maculaque suturali magna, basali oblonga et rectangulari lævissimis, nitidis; striis omnibus dorsalibus posticè abbreviatis, sensim brevioribus, suturali anticè abbreviata, humerali distincta, cum prima dorsali parallela, marginali utrinque abbreviata, cum humerali conjuncta, lateraliûm interstitio punctato, stria brevi posticè abbreviata inter striam lateralem et marginalem. *Prosternum* punctatum, versus apicem foveatum, striis anticè et posticè divergentibus; *mesosternum* punctatum. *Abdomen* subtus punctatum, segmenta duo ultima linea obliqua, elevata utrinque. *Pedes* anteriores punctis paucis, sparsis; *tibiis* anticis crenatis.

4. S. PENNSYLVANICUS. Tab. V. Fig. 5.

Æneo-nigricans: *thorace* anticè, discoque, et *elytris* extrorsum anticeque impunctatis. *Tibiis* anticis crenato-dentatis.

Hister Pennsylvanicus, Payk.; loc. cit.

Habitat ubique in cadaveribus putridis, præsertim piscium.

Totus æneo-nigricans. *Caput* punctatum. *Thorax* anticè utrinque subimpressus, lateribus latè, posticè vero angustè punctatus, anticè, discoque lævissimus. *Elytra* anticè ad medium, limboque toto impunctata, posticè ab apice striæ dorsalis secundæ ad suturam punctatissima, striis punctatis, quatuor dorsalibus medio posticè abbreviatis, tertia verò paulò breviore, suturali integra, marginali valdè abbreviata, humerali satis distincta. *Sternum* læve, *prosternum* striis incurvis anticè et posticè divergentibus. *Segmenta* abdominis inferiora lateribus et posticè punctatis. *Tibiæ* anticæ crenato-dentatæ, dentibus quatuor anterioribus majoribus.

Variat viridior, et viridi-æneus: thorace ad colorem aureum tendente, interdum etiam cæruleo-æneus est.

5. S. ASSIMILIS. Tab. V. Fig. 6.

Ater: *thoracis* lateribus anticeque, *elytris* extrorsum, posticeque punctatis, stria prima dorsali sub-integra; *tibiis* anticis crenulatis.

Hister assimilis, Paykull, loc. cit.

Habitat cum priore.

Ater, nitidus. *Caput* punctatum. *Thorax* anticè utrinque sub-impressus, disco postico lævi, lateribus latè, et margine antico punctatissimis, margineque postico linea punctorum. *Elytra* posticè punctata, humeri et latera sæpius impunctata vel punctis paucis sparsis, stria prima dorsali versus apicem paulo, secunda pone medium, tertia et quarta æqualibus, medio posticè abbreviatis, suturali integra, marginali utrinque abbreviata, humerali cum prima dorsali parallela. *Sternum* læve, *prosternum* striis divergentibus. *Abdomen* læve, linea punctorum in singulum segmentum. *Pedes* picei, *tibiis* anticis crenulatis.

6. S. CONFORMIS. Tab. V. Fig. 7.

Thorace punctatissimo, macula ponè disci medium lævi. *Elytris* posticè medio punctatis. *Tibiis* anticis crenatis, anticè 4-dentatis.

Hister conformis, Dej. Cat.

Habitat cum priore.

Niger, nitidus. *Caput* punctatum. *Thorax* anticè ad latera non impressus, crebrè punctatus, macula basali oblonga, impunctata, margine postico angustè punctato. *Elytra* posticè medio, juxta suturam punctatissima, humeris punctatis, lateribus supra levibus, subtus punctatis, stria dorsali prima vix punctata, posticè paulo abbreviata, reliquis majus abbreviatis, sensim brevioribus, suturali integra, marginali anticè abbreviata, humerali distincta, cum prima dorsali subparallela. *Sternum* læve, *prosternum* striis divergentibus. *Pedes* rufo-picei, *tibiis* anticis crenatis, antice 4-dentatis.

* 7. S. PICEUS. Tab. V. Fig. 8.

Nigro-piceus. *Thorace* anticè, lateribusque punctato, medio posticè lævissimo. *Elytris* punctatis, macula magna basali propè suturam lævi. *Tibiis* anticis crenatis.

Habitat ad oras maris rarissimè.

Nigro-piceus, nitidus. *Caput* punctatum. *Thorax* anticè utrinque impressus, margine antico lato, lateribus, margineque postico angusto, punctatis, disco postico parvo, lævi. *Elytra* punctata, macula magna basali a stria tertia ad suturam impunctata, striis omnibus dorsalibus posticè abbreviatis, sensim, a prima brevioribus, suturali integra, marginali anticè abbreviata, humerali distincta. *Prosternum* striis parallelis. *Segmenta* abdominis inferiora, excepto ultimo, punctata. *Pedes* rufo-picei, *tibiis* anticis crenatis.

* 8. S. MINUTUS. Tab. V. Fig. 9.

Thorace disco lævi, lateribus latè, margineque postico angustè punctatis. *Tibiis* anticis 5-dentatis.

Habitat in excrementis bovinis.

Supra ater, nitidissimus, subtus piceus. *Caput* punctatum. *Thorax* anticè simplex, scilicet non impressus, disco lævi, lateribus latè, margineque postico angustè punctatis. *Elytra* posticè obliquè introrsum punctata, anticè et in limbum lateralem levissima; striis dorsalibus tribus primis subæqualibus, ponè medium abbreviatis, prima paulo longiore, quarta ante medium abbreviata, suturali posticè abbreviata, marginali brevi, utrinque abbreviata, humerali distincta. *Prosternum* striis divergentibus. *Segmenta* abdominis inferiora, excepto primo (quod anticè punctatum) lævia. *Tibiis* anticis 5-dentatis.

* 9. S. impressus. Tab. V. Fig. 10.

Thorace anticè utrinque grande et profundè impresso, disco lævi, marginibus punctatis. *Elytris* posticè et lateribus punctatis. *Tibiis* anticis dentato-spinosis.

Habitat in Georgia, rarius.

Ater, nitidus. *Caput* punctatum. *Thorax* anticè utrinque grandè et profundè impressus, disco lævi, margine antico et laterali latè, postico autem angustè punctatis. *Elytra* anticè ad medium latè impunctata, posticè et lateribus punctata, striis dorsalibus omnibus posticè abbreviatis, quarta verò paulo breviore, suturali integra, marginali anticè abbreviata, cum humerali conjuncta. *Prosternum* linea punctorum per medium, striis parallelis anticè divergentibus; *mesosternum* punctatum. *Segmenta* abdominis inferiora punctata. *Pedes* picei, *tibiis* anticis dentato-spinosis.

* 10. S. deletus. Tab. V. Fig. 11.

Totus punctatus. *Thorace* æquali. *Elytris* vix macula impunctata ad basin, stria suturali fere obliterata, brevissima; tibiis anticis 4-dentatis.

Habitat in Georgia.

Ater, nitidus, totus punctatus. *Thorax* æqualis, hoc est, non impressus, plus quam in cæteris arcuatus. *Elytra* vix macula impunctata ad basin, stria dorsali prima integra, reliquis posticè abbreviatis, subæqualibus, suturali ferè obliterata, brevissima, ad basin elytrorum, ubi cum quarta dorsali arcuatim sub-connectitur. Humerali cum prima dorsali parallela, marginali vix conspicua, utrinque abbreviata. *Prosternum* striis parallelis anticè convergentibus. *Pedes* picei, *tibiis* anticis 4-dentatis.

* 11. S. OREGONENSIS. Tab. V. Fig. 12.

Ater. *Fronte* marginato. *Thoracis* lateribus margineque antico et postico punctatis. *Elytris* posticè introrsum punctatis. *Tibiis* anticis crenatis.

Habitat in territorio Oregonensi, Mus. Dom. Harris.

Ater, nitidus. *Caput* punctatum, fronte marginato, impressione recti-transversa. *Thorax* anticè utrinque impressus, lateribus latè, margine vero antico et postico angustè punctatis, disco lævi. *Elytra* posticè introrsum areæque dimidium inferius inter striam primam et tertiam interjacens, punctata, dimidium superius limbusque totus suturalis impunctata, lævia, striis dorsalibus subæqualibus, ad medium posticè abbreviatis, suturali integra, marginali posticè abbreviata, cum humerali conjuncta; interstitio et spatio inter strias laterales et marginem elytrorum superiorem punctatis, stria brevis posticè valdè abbreviata inter lateralem et dorsalem primam, quæ ad basin cum illa juncta est. *Abdomen* et corpus totum subtus punctatum. *Prosternum* striis parallelis, anticè et posticè paulo divergentibus. *Tibiis* anticis crenato 6-dentatis.

§ III. ***Striis lateralibus duabus, frons lateraliter marginatus, linea elevata transversa, impressioneque frontali rotundata, recurva.***

12. S. DIMIDIATIPENNIS. Tab. VI. Fig. 1.

Elytris posticè diagonaliter rubris, striis dorsalibus omnibus posticè abbreviatis. *Tibiis* anticis 5-dentatis.

Hister dimidiatipennis, Dej. Cat.; and Le Conte, Annals of the Lyceum Nat. Hist. N. Y., Vol. I.

Habitat in cadaveribus piscium, præsertim ad oras maris.

Ater, nitidus. *Thorax* lævis, linea basali punctorum. *Elytra*, margine angusto extante, posticè punctata et diagonaliter rubra, striis dorsalibus æqualibus, paulo ponè medium abbreviatis, suturali integra, marginali anticè abbreviata, cum humerali juncta. *Prosternum* læve, compressum, acutè carinatum, medio incurvum, striis convergentibus confluentibus, basi solum distinctis. *Segmenta* abdominis inferiora, exceptis lateribus, lævia, omnia excepto ultimo linea postica punctorum. *Tibiæ* anticæ 5-dentatæ, dentibus tribus anterioribus magnis, obtusis.

13. S. palmatus. Tab. VI. Fig. 1.

Nigro-æneus. *Thorace* lævissimo. *Elytris* posticè medio punctatis. *Tibiis* anticis 5-dentatis.

H. palmatus, Say, loc. cit.

Habitat cum priore, cum quo in forma et sculptura exactè quadret.

Nigro-æneus, nitidissimus. *Thorax* lævissimus, omnino impunctatus, excepto margine postico angustissima. *Elytra* medio posticè, et introrsum juxta suturam punctata, lateribus impunctatis, striis dorsalibus subæqualibus, ad medium posticè abbreviatis, suturali integra, marginali utrinque valdè abbreviata, humerali anticè cum prima dorsali parallela. *Prosternum* striis basalibus abbreviatis convergentibus. *Abdomen* ut in præcedente. *Pedes* picei, *tibiis* anticis 5-dentatis, dentibus tribus magnis exstantibus.

14. S. patruelis. Tab. VI. Fig. 2.

Viridi-æneo-nigricans. *Thorace* lævissimo, area parva laterali, et margine postico punctatis. *Elytris* medio posticè punctatis. *Tibiis* anticis 5-dentatis.

H. patruelis, Dej. Cat.

Habitat cum priore.

Viridi-æneo-nigricans. *Thorax* lævissimus, anticè utrinque area parva subrotunda impressa, cum margine angusto postico punctata. *Elytris* medio et introrsum juxta suturam, punctatis, lateribus impunctatis, striis dorsalibus æqualibus, propè medium posticè abbreviatis, prima punctata; suturali integra, marginali anticè abbreviata, humerali cum prima dorsali parallela. *Prosternum* striis parallelis, approximatis, ad basin divergentibus. *Abdomen* ut in præcedentibus. *Pedes* picei; *tibiis* anticis 5-dentatis, dentibus duobus anterioribus magnis.

Unam vidimus stria prima dorsali impunctata.

* 15. S. BIGENER. Tab. VI. Fig. 3.

Thorace lateribus punctato-subrugosis, disco parvo, lævi. *Elytris* posticè punctatis. *Tibiis* anticis 4-dentato-crenatis.

Habitat in cadaveribus piscium ad oras maris.

Ater, nitidus. *Caput* impressione semicirculari, sæpè obsoleta. *Thorax* disco parvo, lævi, lateribus punctato-subrugosis, sive grossè apiculatis. *Elytra* posticè diagonaliter punctata, stria prima dorsali integra, versus apicem undulata, subflexuosa, cæteris æqualibus, ponè medium abbreviata, suturali integra, humerali cum marginali utrinque abbreviata, conjuncta. *Prosternum* striis parallelis, approximatis, basi divergentibus. *Abdomen* lævi. *Pedes* picei, *tibiis* anticis dentato-crenatis, dentibus quatuor, obtusis.

16. S. FRATERNUS. Tab. VI. Fig. 4.

Opacus, aciculatus; *thorace* macula ponè disci medium, elytrisque altera subscutellari lævissimis nitidis; stria dorsali prima integra. *Tibiis* anticis 5-dentatis.

Hister fraternus, Say, loc. cit.; *H. aciculatus,* Dej. Cat.

Habitat in cadaveribus piscium ad maris oras.

Supra nigro-cuprascens, opacus, aciculatus, subtus niger. *Caput* rugulosum. *Thorax* limbo antico et laterali latè, postico angustè punctato, macula ovali pone disci medium, lævissima, nitidissima. *Elytra* macula subscutellari, humerisque lævissimis nitidis: stria prima dorsali integra, posticè undulata, cæteris subæqualibus, ad medium abbreviatis, suturali integra, marginali anticè abbreviata, cum humerali conjuncta. *Prosternum* striis approximatis, basi divergentibus. *Segmenta* abdominis inferiora lateribus punctata. *Pedes* picei, *tibiis* anticis 5-dentatis, interdum obtusè crenatis. Saprini hujus species nigri, obscuri, mesosternum habent punctatum.

17. S. sphæroides. Tab. VI. Fig. 5.

Cuprascens, nitidus. *Thorace* aciculato, macula pone medium lævissima. *Elytris* lævissimis, posticè medio punctatis. *Tibiis* anticis 5-dentatis.

Hister sphæroides, Dej. Cat.

Habitat cum priore.

Cuprascens, nitidus. *Caput* læve. *Thorax* aciculatus, margine postico punctato, macula pone disci medium lævissima. *Elytra* lævissima, posticè medio punctata, stria dorsali prima integra, posticè subundulata ; reliquis posticè abbreviatis, sensim brevioribus, suturali integra, marginali anticè abbreviata, cum humerali conjuncta. *Prosternum* striis parallelis approximatis, basi divergentibus. *Pedes* picei, *tibiis* anticis 5-dentatis.

Genus TERETRIUS. Erichson.

Mandibulæ retractæ, latæ, breves, supra armatæ, intus ad basin ciliatæ, denticulo parvo apicali.

Maxillæ intus barbatæ.

Palpi maxillares, breves, crassi, articulo ultimo longiusculo, acuminato.

Palpi labiales articulo secundo longiusculo, obconico, ultimo brevi, ovali.

Labium bi-laciniatum, laciniis brevibus, rotundatis, emarginationem lævem formantibus.

Antennæ in frontis excavationem parvum lateralem insertæ, pedunculus extus obtusangulariter dilatatus, funiculus articulo primo, cæteris parvis, æqualibus, arctè adpressis, duplo majore ; capitulo ovali, subcompresso.

Scrobiculi antennales subrotundi, in medio thoracis siti.

Thorax latus, posticè vix bi-emarginatus.

Prosternum subelevatum, latum, subporrectum, rotundatum, posticè emarginatum.

Mesosternum anticè obtusè acuminatum.

Scutellum minimum.

Pedes validi, tibiæ late-compressæ, anteriores margine exteriore dentatæ, posticæ dentibus duabus apicalibus, spinæ terminales omnium inæquales.

Tarsi graciles, articulis duobus primis brevibus, ultimo longo.

Abdomen segmento superiore penultimo brevi, obliquè devexo, ultimo magno, semicirculari, perpendiculariter declivi, inferiore primo lato, reliquis, excepto ultimo, minimis.

1. T. picipes. Tab. VI. Fig. 6.

Punctatus ; *elytris* estriatis, stria laterali nulla : *tibiis* anticis 5-dentatis.

Hister picipes, Fabr. Sys. El. ; Paykull, loc. cit. *Teretrius picipes*, Erichson, loc. cit. ; *Platysoma picipes*, Dej. Cat.

Habitat in Pennsylvania sub cortice arborum rarissimè, a Dom. Melsheimer benevolè communicatus.

Niger, nitidus, cylindricus, punctatus. *Caput* magnum. *Thorax* anticè declivis, margine laterali subsinuato. *Elytris* estriatis, stria laterali nulla. *Pedes* rufo-picei ; *tibiis* anticis 5-dentatis, posticis edentatis.

Genus PLEGADERUS. Erichson.

Mandibulæ retractæ.

Antennæ in ipso frontis margine, propè oculi marginem interiorem insertæ, articulo primo subgloboso, ceteris brevissimis, æqualibus, arctè applicatis, paulo majore ; capitulo ovali, subcompresso.

Scrobiculi antennales subrotundi, propè prosternum siti.

Prosternum striatum, latissimum, subelevatum, anticè et posticè truncatum, sulco interrupto, transverso, profundo, mediali.

Pedes breviusculi, graciles.

Tarsi mediocres, graciles.

Abdomen segmento superiore penultimo angusto, obliquo, ultimo semicirculari, perpendiculariter declivi, segmento inferiore primo latiusculo, reliquis minoribus, angustioribus.

Corpus minutum, breve, depressum, subquadratum, thorax striatus, elytra estriata.

Sub cortice arborum emortuarum inveniuntur.

1. P. TRANSVERSUS. Tab. VI. Fig. 7.

Thorace posticè non marginato, sulco utrinque laterali, alteroque mediali transversali ; *tibiis* inermibus.

Hister transversus, Say ; *Plegaderum cæsum*.

Habitat ubique.

Europæ valdè refert, sed thorax posticè non marginatus, corpus paulò convexius, punctaque elytralia majus confluentia. *Niger*, punctatus, punctis acuductis, confluentibus. Mandibulæ et antennæ rufæ. *Thorax* posticè non marginatus, sulco utrinque laterali, disco convexo, in duas partes inæquales, sulco transverso per medium impresso, diviso. *Corpus* subtus sparsè punctatum, striis lateralibus duabus. *Prosternum* medio protuberans, utrinque sulco lato, profundo: *mesosternum* non emarginatum, sulco longitudinali per medium impresso. *Pedes* picei, *tibiis* inermibus.

Differt insuper a *P. cæso*, thorace minus convexo, posticè non depresso, linea transversa minus profundè impressa, punctis oblongis non rotundis. Elytrorum puncta confluentiora sunt præcipuè ad basin; cum in *P. cæso* hæc ad latera propè apicem confluunt.

2. P. PUSILLUS? Tab. VI. Fig. 8.

Thorace posticè non marginato, sulco utrinque laterali: *tibiis* inermibus.

Hister pusillus, Payk. loc. cit.

Habitat in Carolina, a Dom. Zimmerman benevolè datus.

Piceus, supra grossè punctatus, punctis non confluentibus. *Mandibulæ* et antennæ rufæ. *Thorax* posticè non marginatus, sulco utrinque laterali, disco convexo, æquali. *Corpus* subtus sparsè punctatum, striis lateralibus duabus. *Prosternum* medio protuberans, utrinque sulco lato. *Pedes* rufo-picei, *tibiis* inermibus.

GENUS ONTHOPHILUS. LEACH.

Mandibulæ retractæ, breves, margini interiore ciliato. ***Maxillæ*** intus barbatæ, mala exteriore solum ad apicem.

Palpi maxillares porrecti, articulo primo parvo, obconico, secundo longiusculo, apice subincrassato, tertio brevi, quarto fusiformi.

Palpi labiales parvi, articulo primo angusto, porrecto, secundo brevi, tertio angustiusculo, ovali.

Labium latissimum, breve, anticè vix emarginatum.

Frons subconcavus.

Antennæ ante oculos insertæ, pedunculo breviusculo, compresso, articulo secundo obconico, tertio gracili, præcedenti subæquali, ceteris brevioribus, minus solito arctè aptatis, capitulo ovali, subcompresso.

Scrobiculi antennales angusti, profundi, ad marginem thoracis anteriorem siti.

Thorax et *elytra*, lineis elevatis insculptis.

Prosternum latum, anticè truncatum, et paulo prolatum, posticè leviter emarginatum.

Pedes elongati, graciles; tibiis omnibus inermibus, spinis terminalibus parvis, brevibus.

Abdomen, segmento superiore penultimo lato, ferè perpendiculari, ultimo ovali, supra subtruncato, prope abdominis planitiem sito, quo segmenta inferiora, excepto primo, arctè comprimuntur, et angustissima evadunt.

Insecta parva in excrementis, sicut nomen indicat, habitantia, et facile ab omnibus aliis Histeroidis, thoracis et elytrorum lineis elevatis distinguenda.

* 1. O. PLURICOSTATUS.

Thorace lineis sex elevatis, prima anticè, tertia posticè paulo abbreviatis. *Elytris* costis 14 elevatis.

Long. 1 $\frac{3}{8}$. Larg. 1 $\frac{1}{16}$.

Habitat in Georgia, rarissimè, e Dom. Ludovico Le Conte receptus.

Niger, opacus. *Caput* punctatum, margine elevato, angulo prope oculos porrecto, *fronte* tuberculo oblongo, centrali, *antennis* piceis, clava fusca. *Thorax* punctatus, margine exstante, subrecurva, lineis elevatis sex, prima anticè abbreviata, secunda subsinuata, integra, tertia posticè abbreviata, omnibus anticè convergentibus. *Elytris* costis quatuordecem elevatis, integris, alternis paulo humilioribus, interstitiis striatis, punctis simplici serie, quæ striis interrumpunt, interjectis. *Segmenta* abdominis superiora grossè punctata, penultimum lineis tribus longitudinalibus elevatis; ultimum obovatum, linea elevata per medium; inferiora angusta, punctata, primo latiore, serie antica punctorum insignium, profundiorum.

Differentiæ inter hujus generis species iconibus, nisi immaniter ampliatis, exprimi non possunt: quare, unum solum delineare visum est. Icon O. *alternati,* formæ et aspectus omnium notitiam rectè præbet.

2. O. ALTERNATUS. Tab. VI. Fig. 9.

Thorace lineis sex elevatis, prima anticè abbreviata, cæteris integris. *Elytris* costis octo elevatis, costulisque intermediis.

Long. lin. 1 ¼. Larg. 1.

Hister alternatus, Say, loc. cit.

Habitat a Pennsylvania ad Carolinam rarius, e Dom. Zimmerman receptus.

Niger, opacus. *Caput* sicut in priore. *Thorax* punctatus, margine exstante, subincurvo, lateribus profundè excavatis, lineis elevatis sex, prima anticè abbreviata, secunda et tertia integris, anticè convergentibus. *Elytra* costis octo elevatis, integris, interstitiis striatis costulisque tribus intermediis, quæ utrinque linea elevata, nitida terminantur, quæ linea serie punctorum interrumpitur: costula prima basi eminentiore. *Sternum* et latera, sicut in priore, grossè punctata. *Segmenta* abdominis superiora grossè punctata, penultimum ut in priore, ultimum anticè utrinque profundè impressum, impressionibus rotundis, margine postico elevato, sinum formante, a cujus apice linea elevata per segmenti medium producitur. *Abdomen* ut in præcedente.

* 3. O. nodatus.

Thorace lineis sex elevatis, prima anticè abbreviata, secunda integra, tertia posticè paulo abbreviata. *Elytris* costis octo elevatis.

Long. lin. 1 $\frac{5}{8}$. Larg. 1 $\frac{3}{8}$.

Habitat in Georgia ad montes, a Dom. Ludovico Le Conte benevolè missus.

Niger, opacus. *Caput* omnino ut in prioribus. *Thorax* punctatus, margine exstante, subrecurvo, lateribus profundè excavatis, lineis elevatis sex, prima anticè abbreviata, secunda sinuata, tertia paulo posticè abbreviata. *Elytra* costis octo elevatis, alteraque brevi basali, inter secundam et tertiam, interstitia tribus lineis elevatis, quarum intermedia simplici, lateralibus serie nodorum interruptis. *Abdomen, corpus,* podexque ut in O. *alternato.*

Genus ABRÆUS. Leach.

Mandibulæ retractæ.

Antennæ in sulcis minutis, acutè marginatis, inter oculos insertæ, ad marginem horum sulcorum interiorem; frons in angulum parvum elevatur. Pedunculus breviusculus, validus: funiculus articulo secundo, pro ratione longiusculo, cæteris brevissimis arctè aptatis, vix versus apicem increscentibus, capitulo ovali-compresso.

Scrobiculi antennales magni, subrotundi, ante medium thoracis, haud procul a margine laterali siti.

Prosternum latum, paulo prolatum, anticè rectè truncatum.

Scutellum nullum.

Pedes breves et angusti.

Tibiæ anteriores latiusculæ, posticè leviter curvatæ.

Tarsi parvi.

Abdomen segmento superiore penultimo obliquè declivi, ultimo semielliptico, ad planitiem abdominis perpendiculariter devexo; segmentis inferioribus, excepto primo, angustissimis.

Corpus minutum, subrotundatum, supra punctatum.

Habitant hæc insecta sub cortice arborum emortuarum.

1. A. ACICULATUS. Tab. VI. Fig. 10.

* Aciculatus. *Thorace* anticè vix emarginato. *Elytris* stria basali obliqua.

Habitat in Georgia et Carolina.

Piceo-niger, nitidus, ovalis, convexus, aciculatus. *Antennæ* rufæ, clava flavescente. *Thorax* anticè vix emarginatus. *Elytra* distinctius articulata, stria basali obliqua, posticè abbreviata ; lateralibus duabus, inferiora indistincta. *Pedes* rufi. *Podex* punctatus, nitidus.

* 2. A. SIMPLEX. Tab. VI. Fig. 11.

Puncticulatus. *Elytris* stria rudimentali vix conspicua.

Habitat cum priore.

Piceus, nitidus, ovalis, convexus, minutissimè puncticulatus. *Antennæ* rufæ. *Thorax* anticè vix emarginatus, margine posticè linea punctorum. *Elytra* stria basali rudimentali, valdè abbreviata, obsoletissima, laterali obsoletè impressa. *Pedes* rufi. *Podex* fere lævis.

* 3. A. OBLIQUUS. Tab. VI. Fig. 12.

Punctatus. *Elytris* stria basali obliqua, abbreviata.

Habitat in Carolina, a Dom. Zimmerman benevolè missus.

Niger vel piceus, nitidus, ovalis, convexiusculus, punctatus. *Thorax* anticè vix emarginatus, posticè tenuiter marginatus. *Elytra* stria basali obliqua, posticè abbreviata, prope latera posita : lateralibus profundis duabus. *Pedes* rufo-picei. *Podex* punctatus.

* 4. A. FIMETARIUS.

Grossè punctatus. *Elytris* stria obliqua abbreviata, basali, obsoletissima.

Long. lin. $\frac{1}{4}$.

Habitat in Georgia in fimeto, a Dom. Ludov. Le Conte inventus.

Rotundato-ovatus, niger, nitidus, supra et subtus punctatus.

Thorax posticè linea punctorum majorum impressus. *Elytra* stria basali obliqua obsoletissima, abbreviata: lateralibus profundis. *Prosternum* breve, leviter bistriatum, *mesosternum* anticè arcuatum, cum poststerni parte antica medio depressum. *Podex* levissimè puncticulatus.

Præcedentem valdè refert, sed thorax posticè non marginatus, et podex ferè lævis.

Species obscuræ, aut nobis incognitæ.

1. *Hister memnonius*, Melsh., Say, Journ. Acad. Nat. Sc. Philadelphia, Vol. V. p. 32.

"Inner thoracic stria abbreviated a little behind the middle, elytra each with a basal puncture. Elytra with the marginal and four dorsal striæ entire, the fourth hardly reaching the base, fifth less than half the length of the elytron. Anterior tibiæ 4-dentate."

Hæc species thoracis stria interiore abbreviata insignis. Erichsonio eadem ac *merdarius* habebatur; nobis tamen, *H. obtusato* confinior videtur; striatione tamen thoracica ambabus abhorret. (Vide Obs. post *H. depuratoris* descriptionem.)

2. *Hister thoracicus*, Paykull, Monographia, Hist. p. 20. Tab. II. Fig. 6.

"Niger, parum nitidus. Frons stria integra. Thorax bistriatus, stria externa in medio abbreviata, interna integra, margine oculo armato subtilissimè, confertissimè punctulato. Elytra oculis nudis lævia, armatis, striola marginali in medio abbreviata, tribusque primis dorsalibus subintegris, introrsum arcuatis, omnibus obsoletis, lævissimis. Abdomen puncticulatum; tibiis anticis 4-dentatis."

3. *Hister incisus*, Knoch-Erichson, Klug's Jahrbücher der Insectenkunde, Erster Band, p. 134.

Orbicularis, ater, opacus. Frons stria profunda, medio subobliterata. Thorax lateribus ciliatis, bistriatus, striis anticè paulo abbreviatis, sulcis parvis propè marginem anteriorem, subprofundis. Elytra stria suturali et marginali nullis, quatuor primis dorsalibus integris, quinta post medium anticè abbreviata, laterali leviter punctata. Tibiis anticis 3-dentatis, dentibus acutis. Long. 4 lin.

4. *Saprinus placidus,* Erichson, Klug's Jahrbücher, &c. p. 189.

Niger, nitidus. Caput punctatum, fronte stria transversa, antennis piceis. Thorax æqualis, subtilissimè et distinctè punctatus, punctis lateralibus anterioribus crebrioribus et profundioribus. Elytra posticè fortiter punctata, striis profundis punctatis, stria dorsali prima integra, reliquis medio abbreviatis, suturali *integra* (sed in parte descriptionis priore, *abbreviata* dicitur) marginali nulla, lateralibus duabus, superiore profunda, inferiore levissima. Pedes picei, tibiis anticis dentatis. Long. 1 $\frac{1}{4}$ lin.

5. *Saprinus mancus.* Hister mancus, Say, Journ. Acad. Nat. Sciences, Philadelphia, Vol. V. p. 41.

"Black; *head* punctured, compressed before and destitute of rugæ. *Thorax* densely punctured, punctures smaller on the disk, and particularly behind the middle: *elytra* densely punctured, a transverse common space near the base and humerus impunctured, marginal stria entire; dorsal striæ abbreviated rather behind the middle, *feet* piceous-black: *anterior* tibiæ not dentated, but with remote, short, thick spines. Length $\frac{3}{20}$ of an inch.

Saprinum fraternum referre dicitur, sed stria prima dorsalis corripitur, tibiæque anticæ edentatæ sunt.

6. *Platysoma venustum,* Dej. Cat.

Cæruleus, nitidus, antennis pedibusque piceo-rufis. Elytrorum striis omnibus integris. Habitat in Carolina et Georgia.

Descriptio hæc ex icone speciei hujus facta est.

7. *Abræus? lævigatus.* Hister lævigatus, Paykull, Monog. p. 84, Tab. XI. Fig. 7.

"Ater, nitidus, supra impunctatus; caput marginatum. Thorax tenuiter marginatus, valdè convexus. Elytra valdè convexa, subglobosa, striis tantum terminali, laterali, et marginali abbreviatis. Pectus subtilissimè punctatum, abdomen lævissimum, elytra vix excedens. Pedes picei, tibiis omnibus inermibus."

ART. IV.—ON THE OCCURRENCE OF URANIUM IN THE BERYL LOCALITY AT ACWORTH, N. H. By J. E. TESCHEMACHER.

IN April, 1841, I read a paper before this Society, announcing the discovery of Uranium in the well known Tourmaline locality at Chesterfield, in this State; and that I had found it not only among the Tourmalines, but also in the quartz which accompanied them.

Several boxes of minerals, from Acworth, New Hampshire, the celebrated locality of the enormous beryls, having recently arrived here, they were submitted to me for examination.

Acworth is about one hundred miles, in a north-easterly direction, from Chesterfield.

In these boxes were several of the large blue beryls, many of a pure white, from translucent to opake, and a few of a beautiful bright yellow color, varying in the same specimen from clear transparent to perfect opacity.

These last were nearly all imbedded in a dark, smoky quartz, perfectly resembling that at Chesterfield, and like it splintery, from the immense pressure to which it had been subjected, and which has so much injured the beauty of the accompanying beryls.

On breaking several of these specimens of quartz I was much pleased to find the uranium mineral, precisely of the same appearance as that at Chesterfield, in small green-yellow cubical plates, and in one piece there was a considerable quantity of the yellow pulverulent oxide. I beg to present two specimens for the collection of the Society; the uranium on them is not very abundant, although sufficient to shew its existence.

This locality not being mentioned in either of the recent publications in this country on Mineralogy, by Alger and Dana, I presume this mineral has not hitherto been observed there, which surprises me, as the spot has no doubt been many times examined.

I think it not at all improbable that the fine deep yellow color of the beryl, imbedded in the quartz, may be owing to an admixture of uranium, but I have not yet had an opportunity of trying it.

One chief object, however, of this communication, is to point out this occurrence of uranium of the same appearance, and under the same circumstances, as a fact which with others connects these two localities geologically.

Professor Hitchcock, in his last able Report on the Geology of Massachusetts, states the Chesterfield locality of Tourmaline to be an enormous vein of granite in mica slate, which is the character of that region, nearly corresponding with the direction of the layers of the slate. This vein of granite is crossed obliquely by a vein from six to eighteen inches in width, containing the red and green Tourmaline, Albite, quartz, &c., or rather the quartz forms the central part of this vein, the Albite lying on each side of it, and the Tourmalines passing through both. The beryl locality at Acworth, is a vein of coarse granite, passing through the gneiss which prevails in that part of the country. These then, are clearly intrusions of matter from below, and the character and actual appearance of the intruded crystalline rocks show clearly an action under tremendous pressure; while the similarity of the rocks renders it highly probable that this action took place at the same time in both localities. Now, although one hundred miles is but a very short distance for such action, yet it may be considered as one link in a long chain, a portion of a line in a delineation of direction, to guide and to incite students to further and closer examination.

The whole of this region contains beryls, dispersed in various localities, but these beryls have clearly been formed and crystallized under different circumstances, and perhaps have undergone action, whatever it may be, at different epochs from the beryls of Siberia, or from those of various localities in South America.

The beryls I possess, from Limoges, in France, somewhat resemble those from Acworth and Royalston, while the common beryls from Bavaria bear a greater similarity to those from our locality at Bowdoinham. From the beryl locality at Grafton, N. H. I received, five years ago, quite large specimens of a brilliant color, transparent and clear, but much injured by pressure.

I cannot conclude this short paper without remarking that the mineralogy of this country offers a vast and almost untrodden field to the aspiring student, and one in which the harvest which presents itself may not prove merely unprofitable honor.

Art. V.—DESCRIPTION OF A NEW SPECIES OF SALAMANDER.

By Lewis R. Gibbes, Prof. Mathematics and Chemistry in College of Charleston, S. C. Read Aug. 21, 1844.

Salamandra melanosticta. Gibbes.

Character. *Toes four; inferior surface silvery white, dotted with jet black spots; snout yellow; tail twice the length of body.*

Description. *Head* large for size of animal, with a very obtuse snout; nostrils latero-anterior; iris narrow, golden; pupil black; neck contracted, with a cutaneous fold underneath. *Body* cylindrical, *tail* nearly so, a little more than twice the length of the body. *Limbs* slender, each terminating in four digits.

Color. Snout light brownish yellow. *Above,* body ashy brown; limbs and tail brownish orange; black spots scattered over the whole surface. *Beneath,* throat, body and tail, silvery white, beautifully marked with jet black spots $\frac{1}{30}$ of inch in diameter, like ink-dots on a white ground; hence the specific name.

Dimensions. The fixed points taken are the tip of the snout, the junction of anterior extremities with body, the junction of posterior extremities with body, and the tip of tail, dividing the whole length of the animal into an anterior, a middle, and a posterior portion.

	Inch.
Anterior portion . .	0.3
Middle do. . . .	0.7
Posterior do. . .	1.6
Total length	2.6

Habits, &c. Found in Abbeville district, South Carolina, early in April, 1844, under old logs in open woods. Very lively and active in its motions.

Remarks. Very near the S. *quadridigitata* Holbr., but differs from that in color and markings. *That* is pale straw color above; *this* yellow on snout, brown on body, brownish orange on tail and limbs. *That* bluish silvery white beneath; *this* silvery white with jet black spots $\frac{1}{30}$ inch in diameter. *That,* above, has few minute dark brown spots, approaching vertebral and lateral lines; *this,* above, has numerous distinct, black, scattered spots. These two species are, I believe, the only ones known with four toes, and might form a subgenus or even a separate genus.

Art. VI — FURTHER ACCOUNTS OF SOME OF THE BIRDS OF YUCATAN. By Samuel Cabot, Jr. M D. Read January 3, 1844.

PYRRHULA RAPTOR. Plate XII.

This bird is very numerous throughout Yucatan, and does great damage in the fields and gardens. It feeds principally on grain and seeds, and is very voracious and destructive. It is called in the Maya language, *Tsapin.*

Male. 10$\frac{3}{8}$ inches long. *Bill* 1 inch long. Diameter at base, from above down, $\frac{9}{16}$ of an inch; from side to side $\frac{3}{8}$ of an inch. *Nostrils* small, oval, partly covered by feathers. *Upper mandible* somewhat inflated, arched from base to point, overlaps under mandible slightly. *Tarsus* one inch long. Middle toe to end of claw $1\frac{1}{8}$ inch long. *Wing* to flexure $4\frac{5}{8}$ inches long. *Tail* rounded, consisting of twelve feathers; middle ones $4\frac{6}{8}$ inches long, lateral ones 4 inches; first primary shortest, fourth and fifth nearly equal and longest. *Color.* Head and chin, extending down the sides of neck, and in a crescent across the upper part of breast, black; cheeks dark steel-grey. A line over eye from the base of the bill almost to hind head, throat, part of breast and chin, white. Nape, back, tail and outer barbs of primaries and secondaries yellow-olive, shafts dark brown. Breast, belly and thighs cinereous. Vent and under tail-coverts light bay. Bill black, legs brownish.

Female, $9\frac{3}{8}$ inches long. Dark cinereous brown on head, cheeks, back, wings and tail. Line over eye, chin and throat, white. Upper part of breast and sides greyish, lower part of breast, flanks, abdomen and vent, light bay, darkest at vent.

PICUS DUBIUS. Cabot.

The specimen from which this description is taken was shot near Uxmal, November, 1841.

I have named it *dubius*, because I at first thought it to be *Picus Carolinus*, and mentioned it as such in the Appendix to the second volume of Stephens's "Travels in Yucatan," p. 475; but when I compared the two birds, after my return to this country, my mistake was very evident, the *Picus dubius* being nearly an inch the longest, and having twice the number of white bands, besides other differences.

This bird is not uncommon in Yucatan, but, owing to the above-mentioned mistake, I procured but one specimen.

Male, $9\frac{3}{8}$ inches long. *Bill* $1\frac{1}{8}$ inch along ridge; $1\frac{3}{8}$ inch along gape. *Tarsus* $\frac{6}{8}$ of an inch long. Tail $3\frac{1}{2}$ inches long, of ten feathers. First primary shortest, third and fourth longest. *Color.* Whole top of head and neck bright vermilion. A white band, one fourth of an inch wide, crosses the forehead. Spot of bright vermilion at the base of the bill, above the nostrils. Back, wing coverts and secondaries, black, crossed with about thirty transverse, white bands. Upper tail coverts white. Lower tail coverts black and white, in wavy lines. Tail feathers black, except the two outer ones, which are tipped and spotted on the outer edge with dull white. Cheeks, line over the eyes, chin, breast and flanks, light cinereous; almost white on the chin, darker on the breast and the sides of the neck. Abdomen light vermilion. Bill horn-black. Legs slate color. Iris reddish.

PICUS PARVUS. CABOT.

I saw only one specimen of this bird, from which this description is taken. It was procured early in December, 1841, in the neighborhood of Ticul, Yucatan.

Male. Length $6\frac{1}{8}$ inches. *Bill* $\frac{6}{8}$ of an inch. *Tarsus* $\frac{9}{10}$ of an inch. *Tail* $2\frac{1}{2}$ inches, consisting of ten feathers. *Color.* Crown, red, with a light spot near the quill of each red feather. Back, wing coverts, secondaries and primaries, black, barred with white. Cheeks black, with a white stripe from the base of the bill to the ear. White line over the eye. Chin, throat and breast, white; breast marked with black spots. Vent and under tail coverts white, banded with black. Upper tail coverts black. Two outer tail feathers barred with black and white. White marks on the outer edge of the third feather; rest of the tail black. Legs bluish black. *Bill* horn-colored. *Iris* hazel. First primary shortest, second, longest.

PICUS YUCATANENSIS. CABOT.

I saw only two of these birds, and procured this one specimen in March, 1842, on the road from Chemax to Yalahao.

Male. Length $8\frac{7}{8}$ inches. *Bill* one inch along gape, $\frac{7}{8}$ along ridge. *Tail* 3 inches, of ten feathers. *Tarsus* $\frac{6}{8}$ of an inch.

First primary shortest, third and fourth longest. *Color.* Top of head, cinereous black. Hind head, nape, along the superciliary ridges to the base of the bill, scarlet. A patch of the same from the base of the lower mandible along the ramus to the angle of the lower jaw. Space between the eye and bill, and extending under the eye to the side of the neck, greyish, with darker bars, growing more distinct towards the neck. Chin black, spotted with white. Neck, breast, abdomen, upper and under tail coverts and flanks, olive, transversely barred with yellowish white. Back, upper wing coverts, outer edge of secondaries, and outer edge of primaries, olive. Two outer tail feathers yellowish, others black with some yellow near the upper part. Iris hazel. Legs bluish. Bill horn-color.

This bird resembles *P. Brasiliensis* very closely, but differs from it in having the top of the head cinereous black instead of scarlet.

Art. VII.—A further enumeration of some Alpine and other Lichenes of New England. By Edward Tuckerman, A. M.

After some years study of the Lichens of our alpine districts, the writer has attempted to give a synopsis, with descriptions, of the lichenose vegetation generally, whether alpine or not, of the White Mountains. From this the following observations are drawn, as well as (with one exception) the subjoined list of new or rare lichens. It need hardly be said that scarcely any of the results to be noticed are more than approximate; and that time only can show how many of them are not in some degree or other erroneous. New facts occur continually, illustrating either genera or species; there is very much unsettled in all the scientific arrangements of the Order; and though I may attempt to state definitely the little we know, I must yet repeat that nothing here pretends to be more than the present amount of information of a single observer.

Our alpine and mountain lichens may properly be compared with those of the Scandinavian Peninsula and Scotland. Of the first tribe, *PARMELIACEÆ*, of Fries, ten genera occur in the European district, of which eight are at present known in and about the White Mountains. To take up in order, the genera of this tribe — the forms of I. USNEA, reduced now by Fries to varieties of a single species, occur also, though to some degree modified, with us; while we have also the luxuriant U. *longissima*, not as yet found in Northern Europe. II. EVERNIA[1] is represented in the European district by 8 species, one of them disputed and little known; while we have 4 species. III. RAMALINA has 5 species belonging to Scotland and Sweden, (but of these 2 are maritime;) in our mountain district I find only two. Of IV. CETRARIA, 10 species occur in the European region, and the same number in ours, though of these last 3 are peculiar to America. V. NEPHROMA is represented abroad by 4 species, all of which occur also with us. VI. PELTIGERA has 7 species of which we have six. VII. SOLORINA has 2 species, of which, though both are now known to be American, neither has as yet occurred at the White Mountains. Of VIII. STICTA, there are known in the European district 8 species, in ours five. IX. PARMELIA, of which large genus about 87 species occur in Scotland and Sweden, many of which are however maritime or otherwise limited, or rare, while we can reckon at present about 51. And X. GYALECTA has in Scotland and Sweden 2 species, neither of which is as yet known here.

Belonging to the second tribe *LECIDINEÆ*, of Fries, there are 5 Genera in the European district referred to, all of which are found in ours. Of the Genera of this tribe, STEREOCAULON

[1] Reference is made throughout this paper to the Lichenographia of Fries. Evernia as there constituted, contains not only the species upon which Acharius founded the genus, but species also of Dufourea, Alectoria and Cornicularia.

is represented abroad by 7 species; here by four. CLADONIA has about 25 species in the foreign district; it is however no little to say that we can reckon perhaps 18. BÆOMYCES, reduced by Fries to the single species *roseus*, though common in New England, has never occurred to me about the Mountains. BIATORA, a genus, which I hope to have more opportunities to study, and which is probably well represented with us, has in Sweden and Scotland about 24 species, while we can as yet perhaps hardly reckon 8. LECIDEA, like the last, requiring long observation, has been most thoroughly investigated in Sweden, where about 39 species are recognized: as yet I can reckon only about 13 here; but this includes probably nearly all the more remarkable ones.

Of the third tribe *GRAPHIDEÆ* of Fries, there are three genera in Sweden and Scotland, two only of which I have met with here. UMBILICARIA has 8 species in the European district, and we have 9, two of ours being however peculiar to America. OPEGRAPHA has 5 species abroad, while we can reckon 4 as yet known. LECANACTIS, scarcely represented in the foreign district, is as yet wholly deficient here.

Of the fourth tribe *CALICIEÆ*, there are 2 genera in Scotland and Sweden. Perhaps this may be called on many accounts the most puzzling group of Lichens. There is certainly none upon which so much labor has been bestowed by eminent Lichenists. In this country very few species have been ascertained, and these almost entirely the commonest and most obvious forms. It is not every eye that can see a Calicium; nor are they easily to be found, where the attention is distracted by numerous other objects. Of CONIOCYBE there are 3 species in the foreign district, of which we have probably one. Of CALICIUM there are about 22 species in Sweden and Scotland, while we have only 5 as yet known. This number is however larger than that given by any American writer.

The fifth tribe *SPHÆROPHOREÆ*, contains 2 genera, of which we have one. Of SPHÆROPHORON three species occur in Scotland and Sweden. Of these, two are abundant and fertile with us; and I have found a single specimen of a plant resembling the third species more than either of the other two; more specimens are however needed to determine it. SIPHULA, the other genus of this tribe, is represented in the European district by a single species, peculiar as yet to the extreme northern parts of the Scandinavian peninsula.

Belonging to the next tribe *ENDOCARPEÆ*, Scotland and Sweden possess four genera, three of which occur in our region. Of four species of ENDOCARPON found in the European district, although three of them are common New England plants, only one, and that the least conspicuous, has occurred to me at the Mountains. Of PERTUSARIA, represented abroad by five species, I can only reckon two. Of THELOTREMA there is but a single species in Sweden and Scotland: we have this, and another, peculiar to our own Flora.

Of the tribe *VERRUCARIEÆ*, there are 2 genera in the foreign region; we have one of them. SEGESTRIA has 2 species, both unknown here. VERRUCARIA has 15 species, of which we have 5, and also one peculiar to our Flora.

The last tribe is *LIMBORIEÆ*, containing 4 genera, which exhibit the lowest developments of lichenose vegetation, and a near approach to a fungoid character; so much so that one genus may be said to hang between Lichenes and Fungi—and several species have been referred to both Orders by botanists. Four species of these Genera belong to the European district referred to. I have as yet detected neither of them here.

Several genera remain to be noticed, belonging to the Order *BYSSACEÆ*. As constituted by Fries, this Order includes Nostoc, Cænogonium, Ephebe, Collema, &c., which differ from Lichenes in their homogeneous structure; and are analogous to the Ulvaceæ, just as true Lichenes may be said to be to the Fucaceæ. Of this Order three genera, formerly referred to the Lichenes, are found in Scotland and Sweden, and also occur in our region. These are COLLEMA, LEPTOGIUM, and EPHEBE. The whole number of species that I have been able to determine is about 165. As the Leprariæ, Spilomata, and Variolariæ are excluded; and as a large number of Acharius's species, heretofore universally received, are, in accordance with the Friesian Method, reduced to varieties, this number must be allowed to embrace probably much the largest part of the Lichenes of a region so limited as the White Mountains. The comparison above attempted with Scotland and Scandinavia, might more justly have been made with a particular district in one of those countries, as Dovre in Norway, but for this I have not the necessary authorities.

Usnea *longissima*, Ach. Lichenogr. p. 626., Ach. Syn. p. 307., Fries Lichenogr. p. 19., in Obs., Parmelia longissima, Spreng. Syst. IV. 277. On firs and other trees, where they begin to diminish in height, on the mountains, abundant, and occurring five feet long. Frequent also at the base of the mountains in cold swampy woods. Distinguished by its terete, almost simple thallus, clothed with short, very regular horizontal fibres. Our plant agrees perfectly with the original Saxon lichen; and I possess what seem to be forms of the same species from South America, New Holland, Africa, and Asia.

Evernia *ochroleuca*, (Ehrh.) Fries Lich. p. 23., *γ. sarmentosa*, Fr. l. c., Lichen sarmentosus, Ach., Parmelia, et demum Alectoria, Ach. On the trunks and branches of trees in the mountain forest; resembling a pendulous Usnea. The rigid, fruticulose variety *a*, which was referred by Acharius to a different genus, has not occurred, though I have one or two specimens belonging to the species, which resemble it sufficiently to encourage further search.

Cetraria nivalis, (L.) Ach.—In fruit; found for the first time the present season. Hooker says it has never occurred in this state in Britain.

Peltigera *malacea*, Ach. Syn. p. 240., Fries Lichenogr. p. 44.—On the ground, and rarely on shrub firs, above the limit of trees. It also occurs at a much less elevation, as in the

Notch. Remarkable for its very spongy fragile fronds, which are sometimes large. Both in habit and apothecia it resembles P. canina, to which Acharius compares it, but Fries considers it nearest to P. aphthosa.

Sticta *glomerulifera*, (Lightf.) Delis. Stict. p. 129., Fries Lich. p. 54., Lichen glomeruliferus, Lightf. Fl. Scot. p. 853., Lobaria, Hoffm., Parmelia glomulifera, Ach. Meth., Lich., et Syn. — On old trunks, where its very large coriaceous fronds, covered with scutellæ, are conspicuous. Common in New England, and occurring also on rocks. Fries follows Delise in referring this, and the allied Parm. herbacea, to Sticta, with which genus they agree not only in habit, but also in possessing cyphellæ. These were observed by Delise in S. herbacea, but not in S. glomerulifera; and he even thought it doubtful (Hist. Stict. p. 130.,) whether they occurred in the latter species, in which moreover, Fries does not seem himself to have detected them. Their existence was known however, to Mr. Borrer, in whose herbarium I had first the opportunity of seeing a specimen with this development well marked; and I have since found them on a Scottish specimen abundant. Our plant is remarkable for the entire absence of the green glomerules, which, though an irregular development, form a striking feature of the European lichen.

Parmelia (Imbricaria) *incurva*, (Pers.) Fries Lich. p. 70., Lichen, Pers., Lobaria, Hoffm., P. recurva, Ach. Meth., Lichenogr., & Syn. p. 206. — On rocks with P. centrifuga in the alpine and subalpine region; descending also to the Notch. Infertile.

P. (Imbricaria) *ambigua*, (Wulf.) Ach. Meth. p. 207., Fries Lich. p. 71., Lichen, Wulf., Psora, Hoffm., Lobaria, Hoffm., Imbricaria, Decand. — On decaying wood from which the bark has fallen; also on living trunks of firs, and more rarely on rocks, White Mountains. Fertile.

P. (Imbricaria) *aleurites*, Ach. — On decaying wood; trunks; and rarely on rocks. Fertile. I have never found the fruit except on my specimens from the White Mountains.

P. (Physcia) *detonsa*, Fries Syst. Orb. Veg. (fide ips.) P. Novæ Angliæ, Mihi olim, P. aquila, Muhl. Catal.? — Trunks of trees, but not very general, fertile: on the coast I have found the best specimens on rocks. Distributed by me under the name above cited, but not published. Professor Fries pronounced the lichen to be his P. detonsa. It resembles P. aquila considerably, and may therefore be the plant so named by Muhlenberg.

P. (Physcia) *hypoleuca*, Muhl. Catal., Eaton Man., P. speciosa β. hypoleuca, Ach.! Syn. p. 211., P. speciosa, Ach. herb.! Tuckerm. Enum. Lich. N. Eng. in Bost. Jour. III. 288. — Trunks of trees; near Boston, and southern parts of New Hampshire. Certainly a distinct species. No description was published by Muhlenberg, but this defect was supplied in the sixth edition of Eaton's Manual. The name is not very appropriate; and might well have been specios*issima*.

P. (Amphiloma) *rubiginosa*, (Thunb.) Ach., Fries Lich. p. 88., — β. *conoplea?* Fr., P. conoplea, Ach. Lichenogr. p. 467, Pannaria, Delis. — Rocks of the Notch. Two small infertile specimens are all I have seen. They perfectly resemble my specimens of the foreign lichen, but of themselves are insufficient to place the matter beyond doubt. This is a very curious section of the genus, and everything that may tend to illustrate it in our Flora is interesting.

P. (Amphiloma) *lanuginosa*, Ach. Meth., Lichenogr. p. 465, Fries Lich. p. 88. — β. Fr. Lichen lanuginosus, Ach. Lich. Suec., Imbricaria, Decand., et Lepraria incana, Auct. ex parte, Lecidea incana, Ach. Syn., Hook. Br. Fl., Tuckerm. Enum. Lich. l. c. — On rocks, *a*, fertile; and also β, which last, in dark moist places degenerates, and becomes leprous and byssoid, in which state it is Lepraria incana of many authors. In the enumeration above-cited, I expressed an opinion that these byssoid powdery plants, whether referred to Lepraria or Lecidea by authors, were perhaps only states of Parmelia lanuginosa; the Lichenography of Fries, where this view is taken, not having then been seen by me. Our plant is mostly white so far as I have seen in all states; the foreign plant is often of this color, but ochroleucous normally, says Fries.

P. (Placodium) *straminea*, Wahl. in Ach. Meth. Suppl., and Ach. Lich. p. 432., Fries. Lich. p. 109, Lichen, Wahl. Lapp. p. 417., t. 28. f. 1, Lecanora, Ach. Lich. p. 432., et Syn. p. 180. — Rocks of the Notch, not abundant, but fine and fertile. This lichen has hitherto been found only on the coasts of the Icy Sea, in Finland, Spitzbergen, and Greenland. Though I have seen no authentic specimens of the foreign plant, I do not hesitate to refer our Parmelia to it. The color of the scutellæ, at first reddish brown, becomes almost black. We have the species also on the coast, where I have several times observed it.

P. (Placodium) *murorum*, (Hoffm.) Ach. Meth. p. 195., Fries Lich. p. 115., Lichen, Hoffm., Lecanora, Ach. Lichenogr., Placodium, Decand., Squamaria, Hook. — Rocks and stones near the sea, at Nahant; often in company with P. elegans, and beautiful rock forms of P. parietina. P. saxicola, and what I almost think may turn out to be P. oreina, are other fine lichens at Nahant.

P. (Patellaria) *oculata*, (Dicks.) Fries Lich. p. 135., — *a*. Fr. Lichen epibryon, Wahl. Lapp. p. 408. — β. Fr. Lichen oculatus, Dicks., Engl. Bot. t. 1833., Isidium? Ach. Meth. p. 140., Turn. and Borr. Lichenogr. Brit, p. 103., Hook. Br. Fl., Lecanora, Ach. Syn. p. 148., Lichen dactyliferus, Wahl. Lapp. p. 414. — Trunks of trees, rare. The description by Borrer, and the figure in English Botany leave nothing to be added to the history of this Lichen. And the doubts of the English Lichenists respecting its scientific arrangement, are confirmed by Acharius's latest judgment, and by Fries. The variety β. is an excellent example of that peculiar anamorphosis of the thallus of Lichenes, which, under the name of Isidium, long passed for a distinct genus.

P. (Urceolaria) *verrucosa*, Fries Lich. p. 186., — *a*. *Urceolaria*, Fr. Lichen panyrgus, Wahl., Urceolaria, Ach. Meth.,

U. mutabilis, Ach. Lichenogr., U. verrucosa, Ibid., Schær. Spicil. — β. *Pertusaria*, Fr. Thelotrema mammosum, Pers., Lichen glomeratus, Schleich., Porina glomerata, Ach., Pertusaria, Schær., Endocarpon globulare, Sommerf. — Upon dead mosses and sticks; common throughout the alpine region of the White Mountains. "Species multis rationibus valde insignis," remarks Fries, to whom we owe the complete determination and history of the plant, which the synonymes show to have been understood very differently by different botanists.

Stereocaulon *corallinum*, Schreb., Laur. in Fries Lich. p. 201. S. dactylophyllum, Floerk.!, S. Rössleri, Hochstett. (auct. Fr.) — Stones; very fine in the Notch. "Podetia plurima in densum cæspitem basi conjuncta, et saxo innata." The species of this genus, continues Fries, differ very much as the Peltigeræ, but are limited with more difficulty on account of their protean habit. The scales of the present species are digitate, often much like the branches of Sphærophoron globiferus.

S. *paschale*, (L.) Ach., Laur. in Fries Lich. p. 202. — Rocks, stones, and on the ground, commonly in large sods or masses, from the alpine region to the Notch. "Plurima podetia vulgo densissime stipata, (nec cæspitoso-juncta ut in priori) sæpe latas plagas saxorum occupant." Fr.

S. *condensatum*, Hoffm., Laur. in Fries Lich. p. 203., S. condyloideum, S. pileatum, et S. Cereolus, Ach. (auct. Fr.) S. paschale, β. Wahl., S. Meissnerianum Floerk.! — Rocks, not uncommon, from near the subalpine region (on Cutler's river) to the Notch, rarely fertile. The lichen called S. Cereolus by Acharius, and figured in his Methodus, is what our plant most resembles. It occurs also on the coast.

S. *denudatum*, Floerk.! D. Lich. IV. p. 13., Laur. in Fries Lich. p. 204. Sommerf. Lapp. p. 126., S. glaucescens, Tuckerm. Enum. Lich. l. c. — Rocks; from the alpine regions to the Notch; not commonly fertile. It is not rare on other mountains and rocky hills of New England. The S. glaucescens of one of the writer's previous papers belongs to this species, no description or notice of which had been seen by him, when his description was made. The state is remarkable for its large peltate granules looking like apothecia, and occurred in the Notch.

Cladonia *cæspiticia,* (Pers.) Floerk.! Clad. p. 8., Bæomyces Pers., Ach. Meth., Lichen, Engl. Bot. t. 1796., Cenomyce, Ach. Syn. p. 249., Scyphophorus, Hook. Br. Fl. II. 237.— Decayed mossy trunks, and on the earth. Podetia very short; sometimes indeed hardly visible, when the apothecia (which are of a rather light reddish brown) appear sessile on the lobes of the thallus.

C. *delicata,* (Ehrh.) Floerk.! Clad. p. 7., Lichen., Ehrh., Bæomyces, Ach. Meth., Cenomyce, Ach. Lichenogr.—Decayed trunks; rather rare, White Mountains. The above name is appropriate to this lichen, both as respects its thallus and its podetia. These last occur from a line to an inch in length.

C. *fimbriata,* (L.) Fries Lich. p. 222.,—*a.* L. C. fimbriata, Hoffm.—*β. tubæformis,* L. C. fibula, Auct.—*γ. radiata,* L. Lichen, Schreb., Cladonia, Hoffm., Bæomyces, Ach. Meth., Cenomyce, Ach. Lich.—Rocks; and on the ground; particularly in districts that have some years since been burnt over, throughout the White Mountains. It will illustrate the difficulties of this genus to observe, that of the three species here set down, each a distinct natural production, and presenting with us the very same features it presents in Europe, so that neither could be mistaken by a botanist here or there,—two are hardly reckoned varieties by Fries, though adopted as species by Floerke, while the third is reduced by Floerke to a variety, and unhesitatingly recognized as a species by Fries. I have several other Cladoniæ, new to me, still under examination.[1]

Biatora *placophylla,* (Ach.) Fries Lich. p. 257., Bæomyces,

[1] Of these I may mention, as ascertained since this paper was prepared, Cl. Floerkeana, decorticata, cenotea, and amaurocræa, all new to our Flora, and found by me during the past season at the White Mountains.

Ach. Meth. p. 325., t. 7. f. 4., Ach. Lichenogr. p. 574., Wahl. Lapp. p. 449., Ach. Syn. p. 281. — On the ground, in a sandy soil; Great Willey Slide; also with B. byssoides on the sandy banks of the Ammonoosuck, near Mount Washington. Remarkable for possessing an orbicular lobed thallus, like that of some Parmeliæ, together with stipitate apothecia, like those of Bæomyces. It has hitherto been found only in Lapland by Wahlenberg, and in Norway by Professor Blytt.

B. *rivulosa*, (Ach.) Fries Lich. p. 271., Lecidea, Ach. Meth. p. 38., Syn. p. 28. — Rocks; alpine region, and in the Notch, oftener sterile. "Lineolis nigris limitata decussataque," Ach. This striking feature is owing to the black hypothallus. I have several interesting Biatoræ under examination.

Lecidea *somediata*, (Muhl.) thallo cartilagineo-membranaceo e viridi glaucescente cinerascente laciniis linearibus obtusis subcanaliculatis multifidis irregulariter complicatis (soredifeis;) hypothallo crasso, e cæruleo-nigro; apotheciis adpressis tenuiter marginatis demum convexis nigris. — Lecidea sorediata, Muhl.! Catal. p. 105., Ach. Syn. p. 54. Lichen alomatus, Willd.! herb. — Trunks, common and fertile, White Mountains. The description of Acharius is so brief, that I have attempted another. It is singular that no other description exists, and that no other American writer besides Muhlenberg has noticed this interesting and conspicuous lichen.

Umbilicaria *pustulata*, (L.) Hoffm. Fries Lich. p. 350., Lichen, L., Lecidea, Ach. Meth., Gyrophora, Ach. Lichenogr., Gyromium, Wahl. — et Gyrophora papulosa, Ach. Lichenogr. p. 226., Muhl. Catal., Torr. Catal., Hals. Syn. View., Tuckerm. Lich. N. E. l. c. Umbilicaria lævis, Pers. (fide Ach.) Gyr. bullata, Willd. herb.! — Rocks of the Notch; ascending to the alpine region, fertile. I have ventured to restore our plant to U. pustulata. From this it was separated by Acharius, on account mainly of the absence of the "flocculose-fruticulose" granules which occur commonly in the European lichen, as well as a slight difference in the color of the upper surface. But these granules, as now understood, are of little importance, whether we follow Meyer in considering them abortive apothecia, or Fries, as analogous rather to the glomerules of Sticta glomerulifera. They are said to occur on other species, and I have found them more than once on the American plant. There is a smaller, thicker, glaucous form of our lichen in the alpine region, very much resembling a state of the species which occurs at the Cape of Good Hope. Apothecia at first patelliform, then plicate, and finally lirelliferous. The U. pustulata of Michaux is not this species, with which his description very ill agrees, but U. Pennsylvanica; as I ascertained by examining the original specimen, in his herbarium.

OPEGRAPHA *atra*, Pers. Fries Lich. p. 367. — Smooth bark; not uncommon.

CALICIUM *subtile*, Pers. Fries Lich. p. 388. — Dead trunks from which the bark has fallen; common at the White Mountains.

C. *trachelinum*, Ach., Fries Lich. p. 390. — Decayed naked wood, with the last; White Mountains.

EPHEBE *pubescens*, Fries. Cornicularia, Ach. Meth. — Rocks now and then moistened by water. By some considered a true Alga, and by others a Lichen, Fries arranges this production as a distinct genus of his order Byssaceæ. I have not found the apothecia.

ART. VIII. — CHARACTERS OF SOME NEW GENERA AND SPECIES OF PLANTS OF THE NATURAL ORDER COMPOSITÆ, FROM THE ROCKY MOUNTAINS AND UPPER CALIFORNIA. By ASA GRAY, M. D.

THE plants here described are selected from a collection made by Lieutenant Fremont, of the United States Topographical Engineers, during his recent exploring tour to the Rocky Mountains, Oregon, and the region that lies between Upper California and the Rocky Mountains, a part of which had never been visited by any scientific person. I shall not attempt to delineate Mr. Fremont's particular route, as the whole account of his perilous journey will soon be given to the public in an official report, which, doubtless, will even exceed in interest the graphic narrative of his earlier journey to the Wind River Chain of the Rocky Mountains.[1] Suffice it to say, that having explored the country about the Great Salt Lake, and gathered a rich scientific harvest in that singular and hitherto unvisited region, he attempted to cross the Rocky Mountains in mid-winter, to the head-waters of the Arkansas River. Baffled in this attempt, his provisions exhausted, and, I add with deep regret, having lost by sad mishaps his most interesting botanical collections, he was obliged to fall back to the settlements on the Rio Sacramento for supplies. He then rapidly recrossed the Californian and the Rocky Mountains to the Arkansas, through a region of the highest scientific interest, and reached St. Louis, we believe, in June last. His botanical collections were doomed to further mishaps, by storm and flood, during the latter part of the journey; so that his friend and our distinguished associate, Dr. Torrey, received only the *débris* of a collection of dried plants, which, considering the circumstances of the undertaking and the fact that researches in natural history were merely incidental to the main design of Mr. Fremont's tour, was originally of wonderful extent as well as richness. The *Compositæ* of this collection have been kindly submitted to me for examination. But, as some months must elapse before a description of the new species will appear in the forthcoming part of the Flora of North America, by Dr. Torrey and myself, I have deemed it proper to notice, in the present form, a few novelties in this family, which, in the course of a hasty examination, have arrested my attention.

Among the plants of the Asteroid tribe, I notice a new species of a very marked and characteristic genus of the

[1] Report on an Exploration of the country lying between the Missouri River and the Rocky Mountains, on the line of the Kansas and Great Platte Rivers. 1843. Senate Document, No. 243.

Rocky Mountain region, viz. Townsendia; — a genus founded by Hooker upon a single species, but to which Nuttall has since added four more, and still others will doubtless reward the exertions of future explorers. The present addition (Townsendia Fremontii, *Torr. & Gray, ined.*) resembles T. incana, *Nutt.* but has longer and narrower leaves, and larger heads even than T. sericea, *Hook.* The bristles of the pappus are also somewhat scariously fringed towards the base, so as to become almost squamellate. Somewhere in the vicinity of this genus, we must place a dwarf, annual, daisy-like plant, of very remarkable characters, which I now proceed to describe.

MONOPTILON, *Torr. & Gray, ined.*

Compositæ-Asteroideæ: Subtr. Asterineæ: Div. Astereæ.

Capitulum multiflorum, heterogamum; floribus radii 1-serialibus ligulatis fœmineis, disci tubulosis hermaphroditis, omnibus fertilibus. Involucrum fere uniseriale Erigerontis. Receptaculum convexum, nudum. Corollæ tubus radii et disci sparse hirtus: ligulæ obovato-oblongæ. Styli Asteroidearum; rami fl. hermaph. appendiculo triangulari obtuso terminati. Achenia oblongi-obovata, leviter obcompressa, sparsim hirtella, binervia (ad margines) vel in radio trinervia. Pappus conformis, duplex; exterior e coronula brevissima crenulata persistente; interior, seta capillaris unica, caduca. discum adæquans, basi scabrida, apicem versus sensim clavatimque plumosa! — Herba annua, exigua, depressa, villoso-pubescens; foliis sparsis oblongo- vel lineari-spathulatis, integris; capitulis subsessilibus vel bracteatis. Flores disci flavi: ligulæ ut videtur albæ, cæruleo vel lilacino tinctæ.

M. bellidiformis, *Torr. & Gray.* (Tab. XIII. Fig. 1—6.)

We are unable to give the locality of this highly curious plant, the number attached to the specimen having been lost. It was probably gathered in the southern ranges of the Rocky

Mountains. The generic name is expressive of its most striking peculiarity, that of a pappus composed of a solitary plumose bristle!

Many specimens occur of that group of biennial Asters which form Mr. Nuttall's genus Dieteria, and which are characteristic productions of the wide arid tracts which occupy so large a space both on this side and beyond the Rocky Mountains. These specimens tend to confirm the opinion I had already expressed,[1] that three of Nuttall's proposed species must be reduced to one.

Mr. Fremont's collection also affords us a new genus in the yellow or homochromous series of Asteroid plants. It is a low shrubby plant, which furnishes a connecting link between several genera that accord in habit but differ in technical character; such as Gutierrezia (Brachyris, *Nutt.*), Amphiachyris, and the section Euthamia of Solidago. Its disk-flowers have nearly the *pappus pilosus* of the latter; while the *single* ray-flower exhibits the *pappus paleaceus* of the former: the paleæ, however, are narrow, squamellate, and variously and irregularly concreted. Like Amphiachyris, the ray-flowers only appear to be fertile; although the ovary in those of the disk is fully formed. The generic name which I have chosen alludes to the combination of these two kinds of pappus in the same plant.

AMPHIPAPPUS, *Torr. & Gray, ined.*

Compositæ-Asteroideæ: Subtr. Asterineæ: Div. Chrysocomeæ.

Capitulum plerumque 7-florum heterogamum; nempe, flore radii unico, ligulato, fœmineo, fertili, et floribus disci 4-6 tubulosis, hermaphroditis, sed sterilibus? Involucrum obovoideum; squamis 6-7 subæqualibus, chartaceis, ovalibus, concavis, subcarinatis, appresso-imbricatis. Receptaculum an-

[1] Flora of North America, ii. p. 100.

gustum, subalveolatum. Ligula brevis, obovata, discum vix excedens: corolla fl. disci e tubo gracili infundibuliformis, limbo profunde 5-fido; laciniis lineari-oblongis revolutis. Styli rami breves Linosyridis; appendiculo ovato-deltoideo superati. Achenium radii oblongo-obconicum vel obcompressum, villosum, pappo uniseriali paleaceo (e squamellis pluribus setaceis nunc basi, nunc fere ad apicem sæpius in phalanges vario modo concretis,) achenio dimidio breviore superatum. Achenia disci, ut videtur infertilia, turbinata, glabra, pappo piloso uniseriali elongato instructa; setis rigidulis, denticulatis, valde inæqualibus; majoribus imo sæpe subcomplanatis et ramosis, seu potius cum minoribus nonnullis pl. m. concretis. — Frutex ramosissimus 1-2-pedalis, glabriusculus. Folia alterna, brevia, spathulata, mucronata, vix puncticulata, integerrima, sessilia, vel in petiolum brevem attenuata. Capitula numerosissima, in corymbis fasciculisve aggregata more Solidaginis § Euthamiæ, vel Gutierreziæ, sed squamæ involucri nec ad apicem herbaceæ, nec forsan glutinosæ. Flores aurei.

A. Fremontii, *Torr. & Gray.*

Mr. Fremont collected this plant at several places along the Mohave River, &c., somewhere between California and the Rocky Mountains, in April.

We must here mention a fine addition to the Oregon genus Pyrrocoma, which, although perfectly distinct both from P. carthamoides and P. radiata, belongs to the typical section of that genus, which it therefore helps to strengthen. It may be thus characterized.

Pyrrocoma foliosa, (*Torr. & Gray, ined.*): humilis, e radice crassa perpendiculari multicaulis, glabrata; caulibus confertim foliosis; foliis oblongo-lanceolatis (1-2-uncialibus,) integerrimis, mucronato-cuspidatis; summis in squamas involucri lanceolatas acuminatas mucronato-setigeras sensim transeuntibus; ligulis numerosis exsertis; corolla fl. disci pappo æquilonga.

The involucre may be compared with that of Liatris squarrosa. The close alliance of this genus with Aplopappus proper, which it appeared to replace in the northern hemisphere, I have elsewhere alluded to. But in Mr. Fremont's collection we have at length a very striking species of true Aplopappus, perfectly congeneric with the typical Chilian forms. It was gathered among the Mountains of Upper California; and is remarkable for its very long and showy rays, as well as for its rigid, undulate and tortuose leaves, not unlike some Mutisiaceous plants. The latter peculiarity is indicated by the specific name.

Aplopappus tortifolius (*Torr. & Gray, ined.*): fructiculosus, lana decidua tectus et pube brevissima scabridus; ramis inferne foliosis, apice in pedunculum longum nudum monocephalum productis; foliis coriaceis, semiamplexicaulibus, elongato-lanceolatis, spinuloso-dentatis lobatisve, undulatis, vario modo tortis; squamis involucri hemisphærici subulato-lanceolatis, imbricatis, granuloso-scabridis, extimis tomentoso-canescentibus; ligulis (ut videtur flavis) 30-40 linearibus, prælongis; pappo rufescente; acheniis sericeo-villosis.

Of the tribe Senecionideæ there are several novel plants, which are not in sufficiently good state for satisfactory determination. I notice, however, a new Balsamorhiza, unless it should prove to be a form of B. deltoidea, *Nutt.*, and what appears to be a new Chænactis. There is also an Actinella, which is perhaps a variety of A. Torreyana, with the heads immersed among the leaves. The printing of the third part of the Flora of North America was arrested at a point which just excluded the account of the most showy known species of this genus; one which Mr. Fremont collected in his first journey, on the Wind River Chain of the Rocky Mountains, near the line of perpetual snow. I may be excused, therefore, for inserting its specific character in this place.

Actinella grandiflora (*Torr. & Gray, ined.*): depressa, villoso-tomentosa; caulibus numerosis e caudice crassa, simplicibus (4-5-uncialibus,) sparsim foliatis, monocephalis; foliis radicalibus pinnato-partitis demum glabratis, segmentis linearibus integerrimis vel 2-3-fidis, caulinis supremis linearibus fere integris; squamis involucri valde lanati biseriatis, linearibus, æqualibus; pappi paleis circ. 6, angusto-lanceolatis, acuminatis, corollam disci subæquantibus.—Capitulum ratione pl. magnum, eaque Gaillardiæ aristatæ æmulans.

Besides one or two genuine species of Layia, the collection contains a new plant of the same isomorphous group, which, with entirely the aspect and floral structure of Callichroa (Calliglossa) Douglasii, and with what may be deemed the rudimentary representative of the peculiar plumose hairs of the pappus of Layia, has a proper *pappus paleaceus*, that distinguishes it from both these genera. I propose, therefore, to describe it under a name indicative of its principal characteristic, and which may be taken as a subgeneric appellation, in case that future discoveries should require, as they not very impossibly may, the union of Layia, Callichroa, Calliglossa, and even Oxyura, into one genus.

CALLIACHYRIS. *Torr. & Gray, ined.*

Compositæ-Senecionideæ: Subtr Helenieæ: Div. Madieæ.

Omnia Callichroæ subgen. Calliglossæ, *Torr. & Gr.*; sed pappus paleaceus; paleis 10-12, subæqualibus, lanceolato-ovatis, subulato-aristatis, corolla paulo brevioribus, basi pilis 2-3 elongatis utrinque instructis. Corollæ tubus pilosus. Herba annua vel biennis, facie omnino Callichroæ (Calliglossæ) Douglasii.

C. Fremontii, *Torr. & Gray, ined.*

Mr. Fremont gathered the plant in the mountains of California, in March.

The Cichoraceous plants of this collection apparently belong to known genera, and mostly to described species, with the following very interesting exception.

ANISOCOMA. *Torr. & Gray, ined.*

Compositæ-Cichoraceæ : Subtribe Scorzonereæ.

Capitulum pluriflorum. Involucrum cylindraceum; squamis subscariosis adpressis obtusis; interioribus 5-7 lineari-oblongis subæqualibus; exterioribus 4-6 multo brevioribus, subrotundis, imbricatis et quasi calyculatis. Receptaculum planum, squamellis nonnullis piliformibus inter flores exteriores onustum. Achenia turbinato-fusiformia, sericeo-pilosa, erostria. Pappus duplex; exterior coroniformis, crenulatus, persistens; interior e setis denis rigidulis uniserialibus, basi nudis, supra medium plumosis constans, decidua, inæqualis; nempe setis 5 corollam subæquantibus, et 5 alternantibus iisdem dimidio brevioribus. — Herba annua (biennisve?) glabra, acaulis; foliis radicalibus linearibus pinnatifidis, lobis brevibus, hinc inde mucronato-denticulatis. Scapi simplices, nudi, spithamæi, monocephali, foliis multo longiores. Capitulum unciale. Flores lutei: pappus niveus.

A. ACAULIS, *Torr. & Gray.* (Tab. XIII. Fig. 7—11.)

The single specimen of this plant from which our figure is taken, was not accompanied by any ticket or number, by which its particular habitat may be ascertained.

In conclusion, I have to offer my thanks to Mr. Isaac Sprague for the drawings which illustrate this brief paper.

EXPLANATION OF TAB. XIII.

Fig. 1. *Monoptilon bellidiformis*, of the natural size. 2. The receptacle and deflexed involucre. 3. A ray-flower. 4. A disk-flower. 5. Style from a disk-flower. 6. An achenium, crowned with the exterior coroniform pappus, and with the singular inner pappus of a solitary plumose bristle. All but fig. 1, are variously magnified.

Fig. 7. *Anisocoma acaulis*, of the natural size. 8. Two of the setaceous paleæ of the receptacle. 9. A separate flower, with the pappus. 10. An achenium, with the exterior coroniform pappus. 11. One of the larger and one of the smaller plumose bristles of the inner pappus. All but fig. 7 are magnified.

Art. IX.—DESCRIPTIONS OF SIX NEW NORTH AMERICAN CARICES. By Francis Boott, M.D., F.R. and L.S., Corresponding Member of the Society. Communicated October, 1842.

C. Boottiana, Bentham MSS.

New Orleans, Drummond, No. 560. 1833.

Dioica! spicis cylindricis, nudis, basi attenuatis. Stig. 3. Perigyniis (floriferis) obovatis, erostratis, obtusis, hirsutis, ore subintegro, squamâ latâ, obovatâ, acuminato-cuspidatâ, rubro-purpureâ, apice albo-membranaceâ angustioribus brevioribusque.

Culmus gracilis, debilis, scaber, octopollicaris, supernè nudus. Folia culmi brevia, angusta, vaginantia; radicalia longissima, ½-2 lin. lata, carinata, scaberrima, culmum sæpe plus duplo superantia. Spica mascula 12-14 lin. longa, 2 lin. lata: fœminea 1½–2 poll. longa, 1½ lin. lata (uno exemplo spicâ minori, ad basin superioris arctè contigua, aucta.) Squamæ omnes latæ, obovatæ, abruptè acuminato-cuspidatæ, apice albo-membranaceæ, tenuissimè ciliatæ, sanguineo-purpureæ, nervo pallido. Stig. 3, longissima. Perigynium (floriferum) 1½ lin. longum, ½ lin. latum, oblongo-obovatum, basi attenuatum, hirsutum, apice serrulatum, viride, purpureo tinctum, ore integro vel bidentato.

2. C. hyalina, Boott.

Texas, Drummond.

Spica e spiculis 3–5 composita, basi masculis, alternis, approximatis; terminali pedunculatâ, inferiori bracteatâ. Stig. 2. Perigyniis ovatis, acuminato-rostratis, antice oblique fissis, margine latiusculâ albo-hyalinâ alatis, serrulatis, squamâ ovatâ acutâ, pallidè ferrugineâ longioribus.

Cæspitosa. Culmus sesquipedalis, debilis, sulcatus, superne scaber. Folia ½-1 lin. lata, culmo breviora, apice attenuato-scabra: ligula pallidè ferruginea, truncata. Spica glauca, colore pallidè ferrugineo tincta, subsesqui-pollicaris: in *maturis*, e spiculis 3-4, inferiori interdum longè setaceo-bracteatâ; in *junioribus*, ex eadem cæspite antè anthesin, e spiculis 5, duabus vel tribus inferioribus setaceo-bracteatis, composita. Squamæ scariosæ, pallidè ferrugineæ. Spiculæ 4-6 lin. longæ, 3 lin. latæ; terminalis basi attenuata, pedunculata, infima interdum bracteâ trinervi setaceâ hispidâ, spicam superante, suffulta. Perigynium $2\frac{1}{4}$ lin. longum, 1 lin. latum ovatum, acuminatum, rostratum, bidentatum, anticè obliquè fissum, leviter nervosum, divergens, apice viride, basi stramineo-pallidum, margine albo-hyalinâ, undulatâ, tenuissimè serrulatâ cinctum. Achenium $1\frac{1}{4}$ lin. longum, oblongo ellipticum, stramineo-pallidum, pellucidè puncticulatum, basi styli æquali terminatum.

3. C. sicæformis, Boott.

New Orleans, Drummond. No. 432.

Spicâ decompositâ, nudâ, subpedali; ramis superioribus abbreviatis, congestis; inferioribus elongatis, remotiusculis, setaceo-bracteatis. Spiculis parvis, apice (superioribus ovatis interdum omnino) masculis. Stig. 2. Perigyniis ovatis in rostrum lineare longissimum subalatum serrulatum bicuspidatum productis, nervosis, squamâ ovatâ mucronatâ scariosâ triplo longioribus.

Culmus tripedalis et altior, superne nudus, angulis acutissimis, scabris. Folia 6 lin. lata, culmum superantia, superne marginibus denticulato-scabra; vaginis membranaceis prælongis. Spica 7-12 poll. longa; 1-2 poll. lata: spiculæ bracteis brevibus setaceis suffultæ. Squamæ pallidæ scariosæ. Perigynium 3 lin. longum, $\frac{6}{9}$ lin. latum, plano-convexum, nervosum; rostro (2 lin. longo) angustè alato, anticè altissime fisso. Achenium 1 lin. longum, $\frac{5}{9}$ lin. latum, ovatum, acuminatum, stramineo-pallidum, basi styli incrassato terminatum.

4. C. Christyana. Boott.

Texas, Drummond.

Spicis masculis 3, cylindricis, mediâ sessili, reliquis pedunculatis: fœmineis, 6-7, remotis, interdum apice masculis, oblongis vel cylindricis, exsertè pedunculatis, erectis, mediis ternatis geminatisque; extremis solitariis. Stig. 3. Perigyniis triquetro-ovatis, acuminatis, brevè rostratis, ore scarioso oblique fisso, squamâ ovatâ acutâ longioribus.

Culmus bipedalis, superne gracillimus, basi foliosus, pars spicas gerens pedalis. Folia crebra, 1–1½ lin. lata (junioribus setaceis mixta), attenuata, culmum subæquantia, marginibus scabra. Bracteæ vaginantes, foliaceæ; superiores setaceæ. Vaginæ inferiores pollicares. Spicæ pallidæ, concolores, pollicares: masculæ 1–3 lineas latæ, approximatæ, infima vaginata, setaceo-bracteata: fœmineæ 3 lin. latæ, remotæ, exsertè pedunculatæ: mediæ ternatæ geminatæque: extremæ solitariæ: vel omnino fœmineæ, vel plus minus apice masculæ. Pedunculi setacei, hispidi. Squamæ masculæ obtusæ, margine scariosæ; fœmineæ acutæ, scariosæ, glabræ, vel apice dorso scabræ.—Perigynium 2½ lin. longum, ⅔ lin. latum, ovatum, triquetrum, obsoletè nervosum, glabrum vel superne margine scabriusculum, rostro cylindrico brevi acuminato-attenuatum, ore hyalino, obliquè fisso. Achenium perigynio plus quam dimidio minus, triquetrum, stramineo-pallidum, basi styli æquali terminatum. Stig. 3, longæ.

Amiciss. *W. Christy, F. L. S.*, eheu! nimium cito mortuus benevolè communicavit.

C. Cherokeënsis, Schw.? ex icone monog. N. Am. Carices t. 25, fig. 1, et e descrip. spicis ovato-cylindricis, solitariis, perigyniis bidentatis, foliis rigidiusculis gaudet. Forsan tamen planta Drummondiana hic referendæ.

5. C. microdonta. Torr.

Galveston Bay, Texas, Drummond, 3d Coll. No. 439.

Spicis masculis 2–4-superioribus contiguis, sessilibus; inferiori subremotâ incluse pedunculatâ; extremis majoribus: fœmineis 3–4 cylindricis, acutis, remotis, exserte-pedunculatis, apice masculis. Stig. 3. Perigyniis (floriferis) oblongis, obtusis, nervosis, ore aperto subemarginato, squamâ ovatâ cuspidatâ brevioribus.

Radix repens, rudimentis foliorum striatis lanceolatis acutis tectus, fibris lignosis instructus. Culmus 1–1 $\frac{1}{2}$ pedalis, gracilis, obtusangulus, sulcatus, glaber, vel apice scabriusculus, basi foliatus; pars spicas gerens pedalis, e basi ad apicem bracteis vaginantibus instructus. Folia 1 $\frac{1}{2}$–2 $\frac{1}{2}$ lin. lata, culmo breviora. Bracteæ vaginantes, largè foliaceæ, culmum superantes, serrato-scabræ; vaginæ 3 lin. ad 2 poll. longæ. Spicæ masculæ 2–4; extremæ majores; terminalis 1–1 $\frac{1}{2}$ poll. longa: superiores contiguæ, sessiles, inferiores bracteatæ; infima subremota, inclusè pedunculata; squamis pallidè ferrugineis, lanceolatis, cuspidatis. Spicæ femineæ 3–4, erectæ, 12–15 lin. longæ, 1 lin. latæ; e masculis et inter se intervallis sub 2–3 pollicaribus remotæ, exsertè pedunculatæ, acutæ, basi sublaxifloræ, superior vel binæ superiores apice masculæ; pedunculis strictis $\frac{1}{2}$–2 $\frac{1}{2}$ poll. longis. Squamæ uninerviæ, pallidæ, margine scariosæ, ovatæ, longè hispido-cuspidatæ. Perigynium (immaturum) 1 $\frac{8}{9}$ lin. longum, $\frac{5}{9}$ lin. latum, nervosum, obtusum, olivaceum; ore aperto subemarginato.

6. C. ALVEATA. Boott.

Texas, Drummond, 3d Coll. No. 440, 441.

Spicâ masculâ 1, cylindricâ: femineis 2–4; superiori vel binis superioribus masculæ contiguis sessilibus: inferioribus remotis, exsertè pedunculatis. Stig. 3. Perigyniis ellipticis obtusis, costato-nervosis, ore aperto integro, squamâ latiori ovatâ, acutâ vel cuspidatâ, trinervosâ, paululum brevioribus.

Radix repens. Culmus subpedalis acutangulus, scaber, pars spicas gerens 3–5–pollicaris. Folia 1–2 lin. lata, culmum superantia vel eo breviora, marginibus apiceque attenuata triquetra scabra. Bracteæ superiores squamæformæ, setaceocuspidatæ, deorsum crescentes, foliaceæ, vaginatæ, culmum subæquantes; vaginæ superiores obsoletæ, infima 4-7 lin. longa. Spica mascula pollicaris, 2 lin. lata, sessilis vel pedunculata. Squamæ masculæ ferrugineæ, margine pallidæ, late ovatæ, obtusæ; nervo viridi in squamis inferioribus infra apicem evanescente, in superioribus rarius in mucronem brevissimum producto. Spicæ fœmineæ 6-12 lin. longæ, 2-3 lin. latæ: vel 2 erecta, superior subsessilis, inferior exsertè pedunculata: vel 3-4; superior vel binæ superiores apice masculæ, una vel duæ spicæ masculæ approximata, sessilis vel brevi inclusè-pedunculatæ: inferiora remota, longè exsertè pedunculata, rarius basi composita. Squamæ fœmineæ latæ, ovatæ, acutæ, medio viridi, 3-4 nervosæ, ferrugineæ: inferiores cuspidatæ. Perigynium 1 $\frac{7}{10}$ lin. longum, $\frac{6}{9}$ lin. latum, olivaceum, costato-nervosum (nervis albis), glabrum; ore aperto integro. Achenium (vix maturam) 1 $\frac{2}{9}$ lin. longum, $\frac{5}{9}$ lin. latum, fuscum.

An. C. *microdonta* distincta? Differt numero spicarum; squamis omnibus plerumque obtusis, *trinervatis;* foliis angustioribus *apice attenuatis.*

Art. X. — AN ATTEMPT TO PROVE THAT *COTTUS COGNATUS* OF RICHARDSON, *COTTUS VISCOSUS* OF HALDEMAN, AND *URANIDEA QUIESCENS* OF DE KAY, ARE ONE SPECIES, AND ARE IDENTICAL WITH *COTTUS GOBIO* OF LINNÆUS. By W. O. Ayres, East Hartford, Ct.

In the Fauna Boreali-Americana, Dr. Richardson describes a fish, which he obtained from the Bear Lake, belonging to the genus Cottus. He says it is very much like the River Bullhead, so common in Europe, and that he can hardly point out any characteristics which may distinguish it. He transmitted some of his specimens to Cuvier, and they were returned with the note, "tres semblable au C. gobio." Still he thought it advisable to describe them as belonging to a distinct species; he did so, applying the specific name *cognatus*. His account is very full and complete, and leaves us in no doubt in attempting to determine his species.

In 1837? Mr. Haldeman published, in a small pamphlet, a brief notice of a Cottus, which he supposed to be new, and which he named *viscosus*. From his description, we could scarcely identify the fish, but fortunately we have other means of information.

In 1843, Dr. De Kay's Report on the Fishes of New York, appeared. In the northern part of the State he had found a fish, which he supposed to be undescribed, and for which he felt compelled to institute a new genus. He called the genus *Uranidea*, from the position of the eyes; the species he named *quiescens*. His description is by no means precise, and his figure is not accurately drawn; but, as in the case of the *viscosus*, we are able from other sources to decide with certainty, in regard to the species intended by him.

July 5, 1842, Mr. C. H. Olmsted brought to me two specimens of Cottus, which had been taken in a small stream, in Manchester, Ct. On examination, although I found that they agreed in all respects with Dr. Richardson's description, and were evidently his *C. cognatus*, I was unable to see in what they differed from the *Cottus gobio*. In this Mr. Olmsted coincided with me; indeed, the opinion was first suggested by him. We visited the place where they were obtained, and found the species very abundant. I have since taken these fish, at different seasons of the year, of different sizes, and of both sexes; I have examined them closely, with the help of all the descriptions to which I could obtain access; I have tried them by their internal anatomy, and by their external appearance, and I cannot come to any other conclusion, than that they are identical with the Miller's Thumb, or River Bullhead, which is found so abundantly in the streams throughout many parts of Europe.

We know, from unquestionable testimony, that the species of Mr. Haldeman and Dr. De Kay are identical with the one now under consideration. It seems to me, therefore, certain, that the three specific names, *cognatus*, *viscosus*, and *quiescens*, and the generic name *Uranidea*, should be suppressed, as referring to a species which had been before described as *Cottus gobio*. The correctness of this opinion I will endeavor to show in the following pages.

The best description of the *gobio* which I have been able to find, is that given by Artedi. My attempt will be to show the perfect resemblance which our fish bears to the one described by him. The descriptions by Bloch and Cuvier would also be introduced, but want of space forbids. The account of Artedi is in Latin, of which I give a translation as correct and faithful as I can make it. The title by which he distinguishes the species is, "Cottus alepidotus, glaber, capite diacantho." His description is as follows.

"1. Head transversely flattened, broader than the body itself, more convex and unequal above than below.

2. Body gradually tapering from the head to the tail, and almost conically-terete, or a little compressed toward the tail; three or four inches long.

3. Snout a little curved upward; jaws of almost the same length.

4. It cannot be distinguished whether the nostrils are double or single, but there is found on each side a little valve, or barbule, very short and scarcely observable, in the place where the nostrils are commonly seen.

5. The eyes are not in the sides, but above, in the middle part of the head, very near to each other: pupil green; iris dusky yellow.

6. One of the plates of the head on each side ends in a point, bent in and recurved.

7. Branchiostegous membrane convex, and, as it were, puffed out with air, containing six curved rays on each side.

8. Mouth quite large and toothed, and indeed

a. Many little teeth, situated in more rows than one, on each side, on the limbs of the maxillaries.

β. In the anterior part of the palate is a little bone, rough with small teeth.

γ. In the throat above are two little bones, rounded, rough with small teeth; and below, between the branchiæ, also two, smaller and more oblong, sprinkled with little teeth. The middle of the palate, and the tongue are smooth.

9. The lateral line is very conspicuous, almost straight, or in the anterior part bending a little toward the belly.

10. Skin scaleless, slippery, and somewhat mucous.

11. Color dusky, or tawny yellow, on the back and sides, but marked with spots or blotches, somewhat large and black, sometimes transverse and sometimes irregular, on the posterior part of the body. Head above blackish; belly whitish.

12. Pectoral, anal, dorsal, and caudal fins varied with black and yellowish.

13. Fins on the back two, almost contiguous to each other. The anterior one is small, of seven short rays, which are undivided at the apex, but still not simple. The membrane of this fin is red on the upper margin. The second dorsal fin is almost joined to the first, varied with black spots, of seventeen rays, sometimes sixteen, undivided on the apex; the middle ones longest.

14. The pectoral fins are varied with black spots, large, somewhat rounded at the end, of fourteen rays, of which the middle ones are longest, the extreme ones shortest. All undivided at the apex, except two or three in some specimens. The membrane does not extend to the summit of the rays, whence these fins are on the margin, as it were, serrated.

15. The ventral fins are whitish, small, situated beneath, like the pectorals, of four rays, of which the two middle ones are longest, the last one undivided at the apex; the rest are, at the apex, bifid.

16. The anal fin is also spotted, of thirteen rays, sometimes fourteen, undivided at the apex; the middle ones are longest, as in the other fins.

17. The caudal fin is varied with black and dusky spots, of

eight rays, long and much branched at the apex, except the extreme ones, which are smaller and undivided. At the end the fin is not entirely even, but a little rounded.

18. Branchiæ on each side four, of which the two middle ones are provided with a double row of somewhat rough tubercles on the concave side.

19. Liver large and undivided, of which the greater part is situated on the left side; of a clay color.

20. Stomach large, and round like a little bag, filled with small coleopterous insects. Four oblong appendages at the pylorus.

21. Intestine once reflexed, then running straight to the anus.

22. The seminal vessels of the males, or the ovaries of the females, seem indeed double, but in the lower part they unite, and are included in a very black membrane.

23. Kidneys and urinary vessels quite large, are seen in the lower part of the abdomen.

24. Peritoneum blackish.

25. Vertebræ generally thirty-one, much compressed on the sides. Ribs about ten on each side, slightly fixed to the vertebræ by cartilage.

	Inches.	Lines.
Entire length,	2	9
from the snout to the middle of the eye,	.	2
to the spines on the side of the head,	.	$5\frac{1}{2}$
" beginning of the pectoral fins,	.	6
" " ventral,	.	$6\frac{1}{2}$
" " first dorsal,	.	$7\frac{1}{2}$
" end of the same,	1	2
" beginning of the anal fin,	1	3f
" end of the same,	F' 2	0f
" " second dorsal,	2	2
" beginning of the caudal fin,	2	3
Greatest breadth of the head,	.	$7\frac{1}{2}$
" at the pectorals,	.	6f
" perpendicular to the anus,	.	4f
" " " to the caudal,	.	2f"

I have thus given, as I believe, a correct and literal translation of Artedi's description. The perfect and very remarkable agreement of this with our fish, I will presently endeavor to show; and I may here remark that this account, though written more than a hundred years since, is more exact and precise than any other which I have been able to find. Though one or two points might, apparently, be amended, yet taken as a whole, the description is most admirable, and reflects great credit on its author; it is, in fact, vastly better than the majority of the descriptions which are published in our day.

I will now attempt to prove that the specimens which we obtain in Connecticut present nothing by which they may be specifically separated from those of Europe, and that, of course, the name by which they should be known is

Cottus gobio.

In order to do this, I will, in the first place, give a description, drawn from specimens taken in Manchester, Ct. And though I have taken a single one as a basis, whose measurements, &c., I have given, the account is not drawn from a single fish. I have examined very numerous specimens, living and dead, of all their different sizes, of both sexes, and at almost all seasons of the year, and points in which I should have been in error from an inspection of one fish, have been corrected from an examination of many. The dimensions are not those of a specimen of the largest size.

Entire length, two inches and six-tenths; length to the middle of the eyes, two-tenths; to the end of the preopercular spine, nine-twentieths; to the beginning of the pectorals, five-tenths; to the origin of the ventrals, eleven-twentieths; to the beginning of the first dorsal, seven-tenths; to the end of the same, one inch and three-twentieths; to the end of the second dorsal, one inch and nineteen-twentieths; to the beginning of the anal fin, one inch and two-tenths; to the end of the same, one inch and eight tenths; to the beginning of the caudal fin, two inches and one-tenth.

Greatest breadth of the head, six-tenths; at the pectoral fins, nine-twentieths; at the anus, three-tenths; at the caudal fin, one-tenth.

Mouth, seven-twentieths of an inch in width, plentifully supplied with teeth. In the upper jaw we find the intermaxillaries, which are short, densely crowded with them; they are small, very sharp pointed, and sometimes curved. In the lower jaw they are also very numerous, the band of them becoming broader and more dense toward the front part of the jaw. The vomer is covered with them, as are also the upper pharyngeals (forming a rounded patch on each,) and the lower pharyngeals, which are longer and narrow. The palatine bones and the tongue are smooth.

The *eyes* are situated on the top of the head, three-twentieths of an inch in length, elliptical in form, one-tenth of an inch from each other.

The *lateral line* arises at the superior angle of the operculum, and bending very slightly downward, passes back nearly straight to the caudal fin. A row of large and distinct mucous pores begins at the front of the lower jaw, and passes back on each side, as far as to the end of the preoperculum. Besides these there are numerous pores, much smaller, scattered irregularly on the top and sides of the head.

The *nostrils* are very difficult to distinguish. When the skin is removed, the nasal cavity is found extending almost the whole distance from the orbit of the eye to the maxillary bone. When the skin, however, is in place, this is not discernible, and all that we can see is a small aperture, somewhat tubular, apparently single, opening directly into the centre of the cavity. Around it are several of the mucous pores, one or two appearing to communicate with the cavity, but the only proper opening of the nostrils is, I believe, the one already mentioned.

On each side of the head are two *spines*. One of them is at the inferior angle of the preoperculum; it is short and stout, somewhat flattened vertically, curved upward, ending in a point not very sharp. It is not prominent, but easily felt by passing the finger from behind forward, covered entirely with the skin, and only about one-twentieth of an inch in projecting extent. The other is smaller and not so strong; it is situated at the anterior inferior angle of the operculum. Until the integuments are removed it is by no means easily seen, though it can be distinguished. It is not prominent, and the finger may be passed over it in the opposite direction to that in which it points, that is from before backward, without detecting it unless close attention is given. When the skin, however, is taken off, it is apparent at once. It is only about half the length of the preopercular spine, and is less curved. These four (two on each side) are all the spines that I have been able to detect on the head. The operculum ends in a flattened point, but it is not worthy of being called a spine, being weak and flexible.

The *skin* is smooth, scaleless, covered with a thick mucous secretion. The body tapers from the head gradually; it is rounded at first, but toward the tail it becomes compressed.

The *branchial membrane* is thin, nearly transparent. The fish, like most others of the genus, often inflates it to the utmost when it is taken from the water, and the membrane sometimes remains in this condition even after the fish is dead.

The *colors* are various, scarcely any two specimens being alike in this respect. The younger ones almost always have the colors more strongly marked than the adult fish, the groundwork being lighter and the bands darker. The more general arrangement of the colors may, perhaps, be stated thus; the prevailing color of the side light yellowish brown, with numerous blotches of darker brown, sometimes but not always amounting to irregular vertical bands which occasionally cover the greater part of the side. The head is in general darker than the body. The under side of the body, from the lower jaw to the caudal fin, is yellowish white. The first dorsal fin is of a light brown, with dark spots, and occasionally with bands; the upper margin of the fin is red. The second dorsal, pectorals, and caudal are colored like the first dorsal, except that they are destitute of the red margin. The ventrals are nearly transparent. The anal is like the second dorsal, but not quite so dark.

The *first dorsal* arises seven-tenths of an inch from the tip of the upper jaw; it is nine-twentieths of an inch in length, four-twentieths in height, rounded, highest at about the fourth or fifth ray. The rays are feebly spinous.

The *second dorsal* arises at the termination of the first. It is sixteen-twentieths of an inch in length, six-twentieths in height, somewhat rounded, the rays articulated but not branched.

The *pectorals* originate at the termination of the branchial membrane; they are oblique in their insertion, so that the posterior point of their origin is about even with the tip of the operculum, and in advance of the first dorsal. They are five-twentieths of an inch in length, twelve-twentieths in height, rounded, highest at the fifth ray counting from the top. The tips of the rays extend beyond the membrane, so that the fin appears digitate. The rays are articulated, and all simple. (I have not found any in which the rays were not simple, though it may not be a constant character.)

The *ventrals* are situated on a line with the posterior extremity of the origin of the pectorals. They are one-tenth of an inch in length, nine-twentieths, in height.

The *anal* arises nineteen-twentieths of an inch from the tip of the upper jaw. It is thirteen-twentieths of an inch in length, seven-twentieths in height, somewhat rounded.

The *caudal* fin is five-twentieths in length, ten-twentieths in height, not quite even at the extremity, but a little rounded.

Branchial rays. 6. *Fin rays;* D. 8—16; A. 10; V. 1—4; P. 14; C. 10.

I will give now a description of the *abdominal organs* as I have found them to exist in the species under consideration. For I regard the internal structure as a matter of the greatest importance in settling a question of identity in species, since it presents characters much less likely to prove variable than those which are merely external.

The *liver* is large and rounded; it occupies the whole breadth of the abdomen, and in a fish of the size described (two inches and six-tenths) is three tenths of an inch in length. It is light yellowish red in color, entire, showing but one lobe; the greater part of it lies on the left side.

The *stomach* is large and rounded; the œsophagus enters it near its extremity on the left, the pylorus is situated at the opposite end. The *cæca* are four, oblong, blunt, and rounded, placed around the intestine close to the pylorus; the longest, in a fish of two inches and six-tenths, is two-tenths of an inch in length. The *intestinal canal*, which is narrow, runs back a little distance, turns forward and passes almost to the pylorus, and then turning again runs nearly straight to the anus.

The *ovaries* are two, elongated, rounded in front, tapering posteriorly. Before their termination they apparently unite and become one. Still I think the excretory duct is not single, but double. As to this, however, I have not been able to satisfy myself entirely; if the duct is double the two branches are very closely connected. The membrane surrounding the ovaries is dotted with black. The *organs of the male* are somewhat similar in form to the ovaries of the female, but are more angular in front. They are much lighter in color, being almost white, and do not unite into one but continue separate throughout their whole length. The seminiferous ducts are very apparent, and pass back perfectly distinct from each other, opening posterior to the anus.

The *kidneys* extend more than half the length of the abdomen. No traces of a urinary bladder can be discerned. A uriniferous duct passes back on each side; as it descends to its termination it is posterior to the one from the generative organs but opens, I think, at the same place with it. The *air bladder*, or a *spleen* I have been unable to find.

This completes my description. And now in what does our fish differ from the European. The general shape of the body, all its proportions, the jaws, the peculiar structure of the nostrils, the situation of the eyes, the branchial membrane and rays, the teeth in their various positions (except the maxillaries) the lateral line, the surface of the body, the colors, the position and colors of the fins, all agree in the most complete and perfect manner. The only points in which there is the slightest want of coincidence are, the spines on the side of the head, the teeth on the maxillaries, and the tubercles on the branchial arches.

In regard to the preopercular and opercular spines, it may be remarked that this is one of the items in which Artedi and Bloch do not agree in their description of the European fish. Of course one of them must be wrong, and from the nature of the case it seems probable that Artedi is the one who is in error. In our American fish the opercular spine is very small and will not be detected without close observation, and in the *gobio* it may very easily have escaped the notice of Artedi. Bloch mentions two spines, but his description and figure contradict each other. The figure agrees with our specimens but the description does not. The want of correspondence, therefore, between our fish and this part of Artedi's description seems a matter of very little value, and one on which no argument can be founded for the separation of the species. In regard to the teeth we have another point of discrepancy. Artedi says they are "on each side on the limbs of the maxillaries." There is here also, apparently, an error in Artedi's account, because it contradicts the common, and almost universal, arrangement of the teeth in fish. The teeth of the upper jaw are in general situated on the *intermaxillaries*. Indeed I know of no fish in which there are teeth on the maxillaries, with none on the intermaxillaries, as Artedi has stated in regard to the *gobio*.

I have written thus far in reference to these items of difference, in order to show that they present no argument against the specific identity of the American and European fish, even were we destitute of other means of proof. But very fortunately we are not thus destitute. Through the kindness of Mr. Yarrell, the distinguished English ichthyologist, I am in possession of specimens of the undoubted *Cottus gobio.* And to my esteemed friend James J. Bolton, Esq. of Cambridge, England, I am indebted for others, taken in the Avon near Bath, and received in very perfect condition, having been in spirits only the little time requisite for reaching this country. I have examined these specimens very closely, and have compared them with ours (from Connecticut) and by this examination I am only rendered (if possible) more firm in my belief that the European and American species are identical.

Two instances of discrepancy have presented themselves, containing specific characters which appeared of some importance; I refer to the spines on the head, and the teeth in the upper jaw. I have said of each of them, in the preceding pages, that the discrepancy originated in an error of Artedi, and have perhaps been thought presumptuous in thus asserting. I did it, however, on what seemed to me absolute authority, an examination of perfect specimens of the species to which his description refers. I find in particular that the two spines on the sides of the head, the opercular and preopercular, are precisely alike in the fish of both countries. The minute opercular spine, pointing downward and forward, exists in the English specimens exactly as in those from Connecticut. It is certainly singular, but it is nevertheless true, that this little spine has been overlooked by every describer except Bloch, and even he, as I have already mentioned, has described them erroneously, though the error is perhaps caused by a transposition in copying or in printing.

The teeth in the upper jaw, also, no longer present any difficulty. They conform, as we might suppose, to the ordinary arrangement of the teeth in fishes, that is, they are situated on the intermaxillaries. These bones are short, not half the length of the maxillaries, densely crowded with short teeth. The maxillaries are destitute of teeth.

One thing more remains, the structure of the branchial arches. It is at the most a matter of very small importance, for Artedi's account simply implies that the outer and inner arches may be without tubercles, though it makes no assertion at all in regard to them. But small as it is it cannot be allowed to stand, for where it would make a difference no difference exists. A double row of tubercles on the second and third arches, and a single row on the first and fourth are found in all my specimens.

The last point, therefore, of apparent discrepancy is gone; the resemblance is perfect. But I will not dwell upon this at present. We come now to consider the abdominal anatomy of the fish; and here if the two species are not identical we may expect to find a difference. But it is here that we have, as I think, our strongest reasons for believing that the *gobio* is the fish which we find in America. It was this which removed every doubt from my own mind and fully satisfied me that the three or four nominal species were actually but one. The liver, the stomach, the cæca, the intestine, the urinary organs correspond in the most minute particulars not merely in description, but on actual comparison by dissection. If we examine with the greatest care each item in the account of the anatomy which Artedi has given us, and then compare them with those which I have presented, in the description of our own fish, we shall find that the two accounts might have been drawn from the same specimens, in every respect except one; that is a part, of what relates to the generative organs. These, in the male, continue distinct throughout their whole length, instead of uniting posteriorly into one; and neither they nor the ovaries of the female are included in a membrane which is "very black."

That the organs of the male do not perfectly correspond in the two I cannot assert, for I have not had an opportunity of dissecting a male of the European fish, and it may be that a comparison would do what it has done in the previous cases of apparent difficulty, only serve to strengthen our argument. But in the female, the membrane surrounding the ovaries is certainly "very black," while in our fish it is only dotted with black. Here is a difference; and to it we can afford to allow its full weight, for it is the only one which we can find, either external or internal. Is it sufficient to separate the species? At the least, we may doubt.

Here then we may rest the argument, as to the identity of the European species with the one which we find in Connecticut. Three or four points of apparent difference presented themselves; but they were only apparent, and have disappeared, with the exception of one solitary item. What reason then have we for supposing that fish, which correspond so perfectly, are specifically distinct. If both occurred in the waters of this country, it would seem a matter beyond question that they should be arranged under one name. And though their specific identity is an exception to the rule which prevails in regard to the fresh water fishes of Europe and America, and consequently may be by some considered improbable, still the perfect coincidence between the two will not allow me to doubt, and I must conclude therefore that the *Cottus gobio* is a native of America and is found in at least one stream in Connecticut.

I have thus far attempted to prove but the first point which was proposed. It now remains to be shown that this species has been described, as an inhabitant of North America, by three authors; and that they have applied to it two generic, and three specific names. We will take the descriptions in their chronological order. The first is that of Dr. Richardson. If we examine his account we shall find that throughout the whole of it, his object is to show that his fish is distinct from *gobio*, apparently a very difficult matter, and one in regard to which he is not able fully to convince even himself. He says that on comparing his specimens very minutely with an English specimen of the *gobio*, the principal difference he could detect was, in the American fish, a "greater height of the dorsal and anal fins." He mentions two other points of discrepancy. One of these was in regard to the first dorsal fin which, in the American specimens, was about a twelfth of an inch longer than in the English, occasioning a corresponding decrease of length in the space between the first and second dorsals. If this character were constant it might be of some value; but it is not. The dorsals of the gobio vary much more than the small fractions of an inch here referred to. In one of those sent me by Mr. Yarrell the interval between the first and second dorsals is two and a half lines, the fish being four inches in length. (These are precisely the numbers stated by Dr. Richardson, and it is possible that the specimen now in my possession is the very one from which his measurements were taken; it certainly agrees with them in every respect.) In one of those received from Mr. Bolton there is no interval between the fins; they unite so perfectly that the membrane of the first dorsal is attached to the first ray of the second to the height of a twelfth of an inch. In another the two fins unite, but not so strongly, the membrane of the first dorsal reaching to the base of the first ray of the second. In another there is an interval between the two, but it is less than in the first instance. And the length of the first dorsal varies according to the union of the two fins or the space between them. The discrepancy noted in this case is, therefore, of no importance.

In regard to the height of the dorsal and anal fins it may be observed, that the comparison was made by means of specimens preserved in alcohol, from which the measurements could scarcely be taken with so much accuracy as from the recent fish. I do not mean to imply that Dr. Richardson is in error here, for I have no means of knowing that such is the fact; but certainly, a difference amounting to but little more than a twelfth of an inch, for that is the greatest one mentioned, may be under such circumstances, without hesitation pronounced to be —— slight.

But one thing remains — a little diversity of shape in the branchial rays. In the English specimen they were stronger and flatter.

Now from all this what must we infer? Of course we may take Dr. Richardson's testimony in his own favor; for his endeavor was to show that his species was distinct from *gobio*, and taking that testimony what does it prove? Does it prove a want of specific identity? If it does, that want of identity depends upon two things; the slight diversity in the branchial rays, and the discrepancy (if we may call it so) in the dorsal fins. That these are sufficient to establish a distinct species I cannot believe. It appears to me that variations no greater than these are only what we may find in a dozen different specimens of almost any species, particularly a species belonging to a genus so variable as Cottus. And I cannot but be persuaded, therefore, that Dr. Richardson would have acted more correctly if he had yielded to his own convictions, and given us a description of his Bear Lake specimens under the old name *gobio*.

And that the little fish which we find in Connecticut is identical with the one described under the name *cognatus* does not, I think, need further argument. The two descriptions already given (Dr. Richardson's and the one from the Connecticut specimens) fully show that this is the case. I cannot see in what respects these two accounts do not perfectly correspond, and why they may not apply to the same fish. To institute a detailed comparison between the descriptions, item by item, seems an unnecessary wearying of patience, though it might be done with the most perfect certainty of a satisfactory result. I have examined them and the living specimens with the most rigid scrutiny, and I believe that the fish which was the cause of my undertaking the present communication is identical with the species which is found in the Great Bear Lake.

We come now to speak of the *Cottus viscosus* of Mr. Haldeman and *Uranidea quiescens* of Dr. De Kay. Of these, however, our notice may be brief, for we are fortunately in possession of the means of determining at once to what they refer. I will copy the account given by Mr. Haldeman, and endeavor to show that the description contains nothing which may prevent its referring to the same species.

It was published in a pamphlet, containing other descriptions, and is as follows.

" Cottus viscosus. Body very slender, yellowish clouded with black, the first dorsal fin edged with a very narrow line of orange. The fin rays are, D. 7 — 17 ; P. 14 ; V. 3 ; A. 12 ; C. 13, of which 11 are long. Total length, 3 inches. Snout to first dorsal ray, 0.84, and from here to the last dorsal ray, 1.5. The anus is midway between the snout and base of the caudal rays. The lateral line is straight from the middle of the first dorsal fin backward. Hab. Eastern Pennsylvania.

Obs. Closely resembles C. *gobio*, but the proportions are very different."

This is the whole description. It is scarcely sufficient to enable us to determine to what it refers, but so far as it goes, it agrees with our fish, and, as I believe, with *gobio*. Mr. Haldeman says it differs from this latter species in its proportions, but if so, they must be proportions which he has not mentioned here, for these correspond most perfectly.

There is but one thing more to be considered, the species described by Dr. De Kay. He has attempted to establish a new genus, but I cannot see that it is needed.

In Cottus, taking the description which Dr. De Kay has himself given, we have the " Head large, depressed. Body without scales. Dorsals distinct, or slightly connected. Ventrals under the pectorals, and with three or four rays. Opercle, or preopercle, armed with spines, occasionally both. Teeth velvet like, on the jaws and anterior part of the vomer." Here we have every character of Uranidea, except two "Eyes nearly vertical," and "teeth on the tongue." That these two would be of themselves sufficient to separate a genus, we may doubt; but we need not allow even them to remain. In all the species of the genus Cottus with which I am acquainted, the eyes are situated very near the top of the head; and in *C. Grœnlandicus* and *C. æneus*, the character, "Eyes nearly vertical," may be applied with as much propriety as in *Uranidea.*

As to the other item, "Teeth on the tongue," I must believe that Dr. De Kay has made a mistake, even in the description of his own species; for I have examined numerous specimens of it, and in them the tongue is certainly smooth. It may be, however, that the one described by him presented an exception to the general rule in the species, for I find a somewhat analogous case in a specimen of my own, which shows three or four teeth on each of the palatine bones, similar to the teeth on the vomer, while in all my other specimens those bones are perfectly smooth.

There is not, therefore, a single point in which *Uranidea* differs from *Cottus*, and the species, *quiescens*, which Dr. De Kay has described, is not entitled to rank as the type of a new genus. And apparently its claim to be considered a new species is no better. In the description we find nothing which may prevent our believing that it relates to *Cottus gobio*. As to the proportions, we cannot judge, for they are not given. The only items in which the description fails to agree perfectly with the species to which the present communication refers, are — the teeth on the tongue — the rays of the ventrals — and the branchial rays. Of the first of these I have already spoken. The second is like the first; it is apparently caused by an error in the description. The delicate spine of the ventrals probably escaped the notice of Dr. De Kay, and the soft rays seem, in many instances, to be three, until the integuments are removed. All my specimens, however, show that they are four, and that, of course, the fin contains five rays. The last mentioned difference I count of very little value, for the branchial rays, like those of the fins, so often vary in their number, that very little dependence can be put upon them. Dr. Richardson even goes so far as to say, that there is commonly a difference of one ray in the right and left sides of the same specimen. I have not found them to vary so uniformly as this, still they do not furnish a character which is by any means constant. We may, doubt, therefore, whether a difference no greater than this, and entirely unsupported by any other, is worth regarding.

But it has been mentioned that we have other means of settling the identity of *C. viscosus* and *U. quiescens* with our species, than simply trusting to the descriptions, and to that we now come. Mr. C. H. Olmsted, of East Hartford, Ct., in May, 1843, while in Albany, was examining the collection of fishes, &c., belonging to the State, the results of the recent survey. Among them he found one, which Dr. Emmons informed him was the identical specimen from which Dr. De Kay drew up his description of *U. quiescens*. Mr. Haldeman was present at the same time, and said that that was also his *C. viscosus*. Here, then, we have testimony, which is all that we need. Mr. Olmsted is perfectly familiar with the species which we find in Connecticut, and which both he and myself believe to be the *Cottus gobio*. He could not possibly have mistaken any other for it ; and he assures me that it is identical with the fish in the New York collection, the Uranidea of Dr. De Kay. It was this which induced me to say, that I had examined large numbers of specimens of Dr. De Kay's species, and was satisfied that he was in an error, in regard to the teeth on the tongue, and the ventral rays. For knowing from Mr. Olmsted that the description referred to our Connecticut fish, I considered myself justified in so saying ; in them the tongue is certainly smooth, and the ventral rays are five. Dr. De Kay, therefore, has, as I believe, acted without warrant, in attempting to establish the genus Uranidea. It differs from Cottus in nothing, and of course is not required. And not only so, but the species which he has placed in it, and called *quiescens,* is identical with the one which had been described so many years before, the *Cottus gobio.*

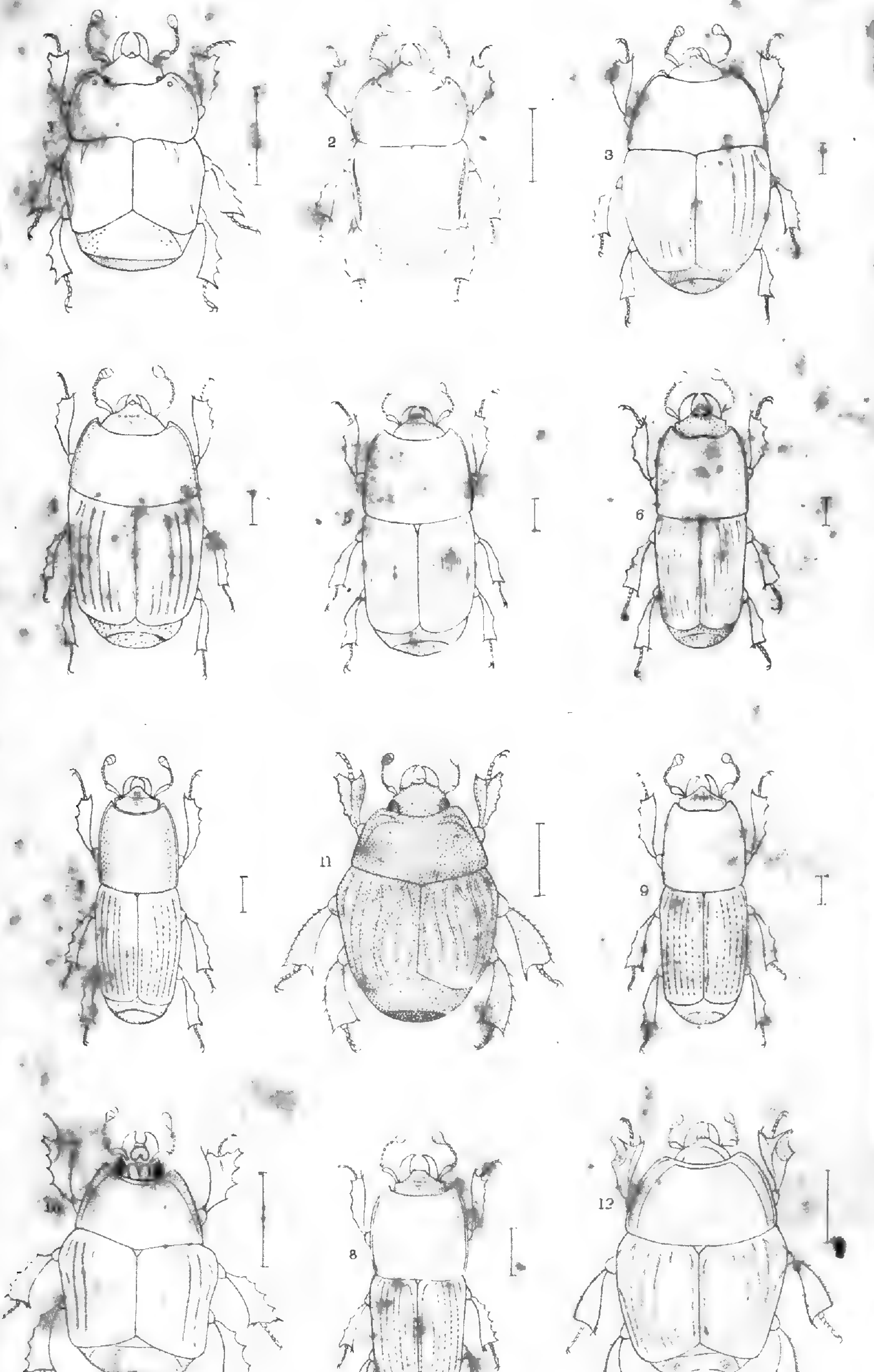
If now I have succeeded in establishing the point for which I have been laboring, I have brought in a principle which is of some importance. I have proved an exception to what was before regarded as a universal rule — that no fish of Europe, which is confined to the fresh water, is also a native of America. It is believed that this rule applies to all. It is true, that in the Fauna Boreali-Americana, Dr. Richardson describes the Pike of Europe (*Esox lucius*) as an inhabitant of the lakes and streams of the Fur Countries. But there is every reason to believe, that the species which he obtained was merely the one so common in the States, (*E. reticulatus* of Le Sueur,) and that the European Pike has never been found as a native on this side of the Atlantic. And I am not aware that any other fresh water species of Europe has been retained by the more recent writers as a fish of this country. The fact, therefore, of the apparent universality of this rule may seem to some a reason for refusing to believe that the species which we have had in view throughout this article, is specifically identical with the Miller's Thumb of England. Indeed it was so, at first, with myself; but when I examined more closely, and found the matter to stand as I have endeavored here to state it, I could not resist the accumulation of evidence.

The *gobio,* therefore, as a native of America, seems to be somewhat widely dispersed. Dr. Richardson's specimens were obtained in the Bear Lake, in lat. 67° ; Mr. Haldeman says it occurs in Eastern Pennsylvania ; Dr. De Kay obtained it in the Northern part of New York ; I have found it in Connecticut, and that it exists in various other parts of the United States is extremely probable.

It is only in Connecticut that I have had an opportunity to observe it, and I will mention what little I have learned as to it there. I have seen it in but one stream, in Manchester, about seven miles east of Hartford. The stream passes a very little distance north of the churches in that village, and in a mile or two below joins the Hockanum. The part of the stream in which I have found them most abundant, is in a deep ravine directly north of the west end of the village. The rocks which form the ravine are chiefly sandstone. From these issue numerous springs, whose waters unite with the stream, and render it extremely cold. I have found the fish in other parts of the stream, but only very small ones, and even they were of small numbers. In the ravine, however, where the water is so cold as to be actually very painful to the hand immersed in it, for a minute or two, even in a hot summer's day, they are abundant, and it was there that I obtained all my specimens at different times. They lie in the places where the water issues directly from the rocks, and are most commonly concealed under the stones, which cover the bottom of the stream. When the stones are removed, so as to expose them to the sight, they swim off with tolerable rapidity a foot or two, and drop on the bottom again, lying often with the body a little bent, as if ready for an instant start. They are not, however by any means quick in their motions, or particularly timid, and may be taken by means of a hand-net, with but little trouble. Their food appears to consist chiefly of minute insects; that they ever eat small fish is, I think, doubtful. The only other species found in that part of the stream, so far as I have observed, are *Salmo fontinalis*, Mitch.; *Catostomus Bostoniensis*, Le Sueur; and *Leuciscus atronasus*, Mitch.; the last being much more abundant than the others.

The spawning time of the Cottus is apparently in March and April, being earlier than it is in the Bear Lake, as mentioned by Dr. Richardson, which, however, is only what from the difference of latitude we might expect. I have never seen any specimens quite so large as the one described by him.

These few facts comprise all of any importance that I have observed, as to the species, and with them I close my remarks on the *Cottus gobio*, as included among the Fishes of America.



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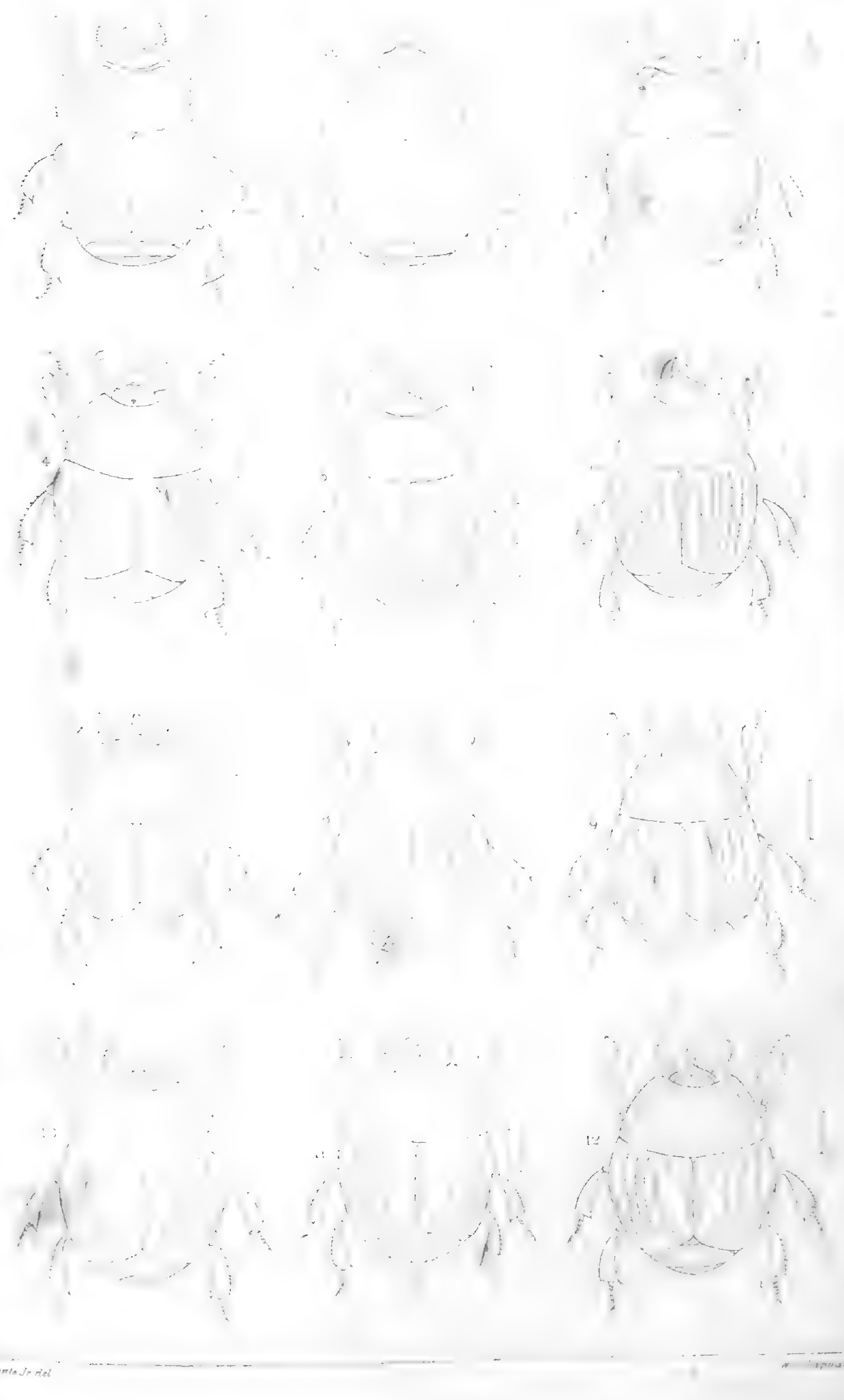

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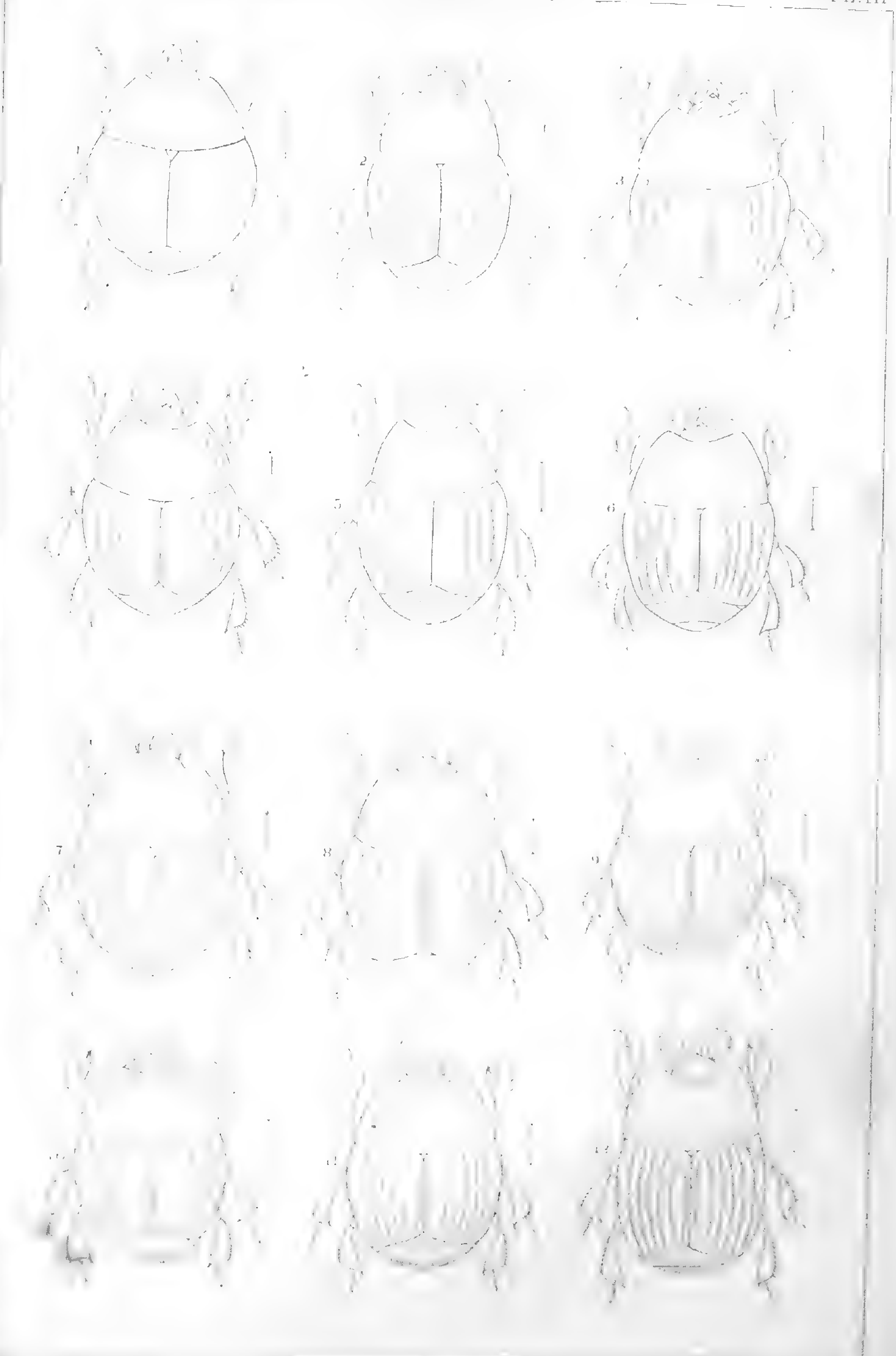

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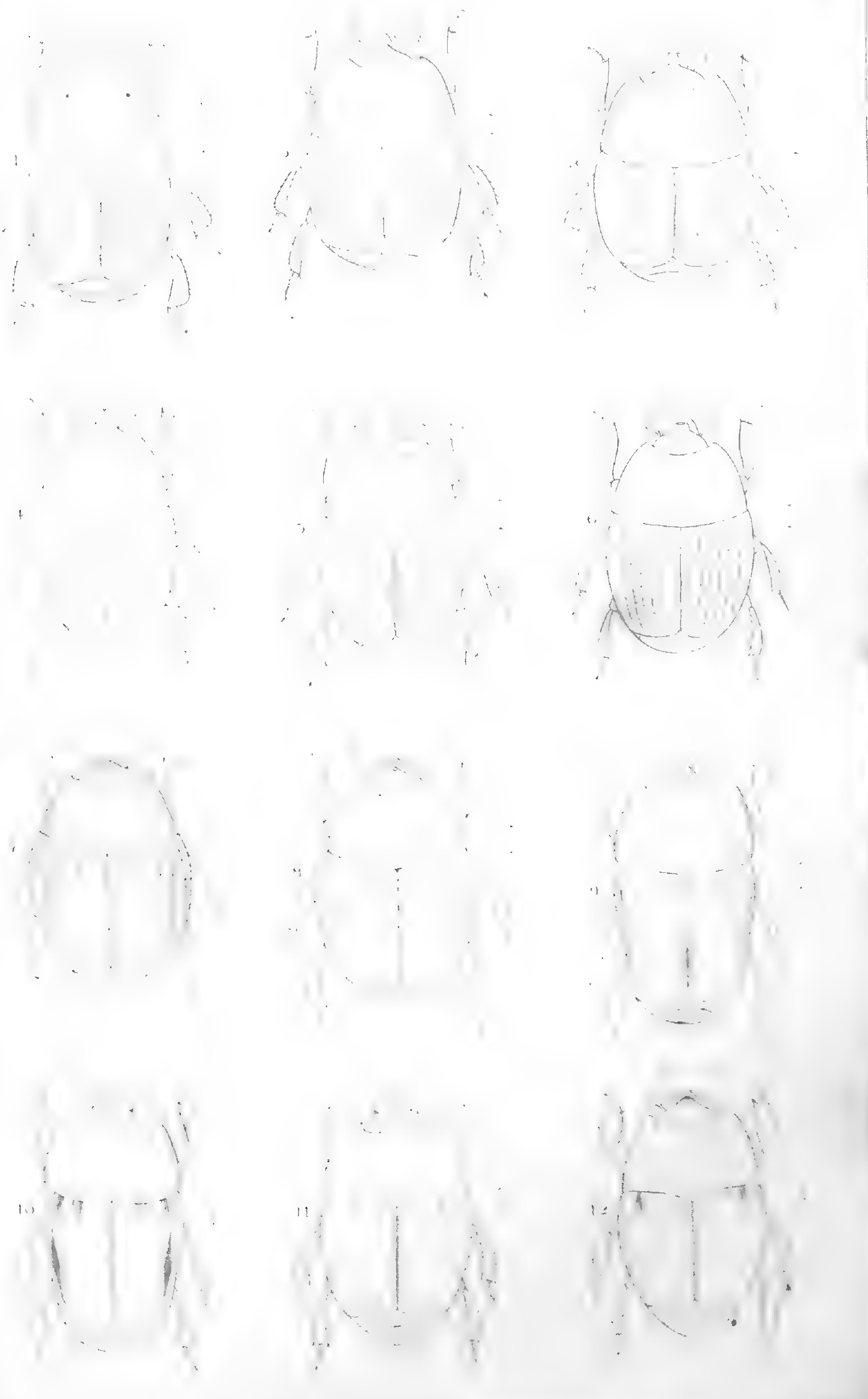
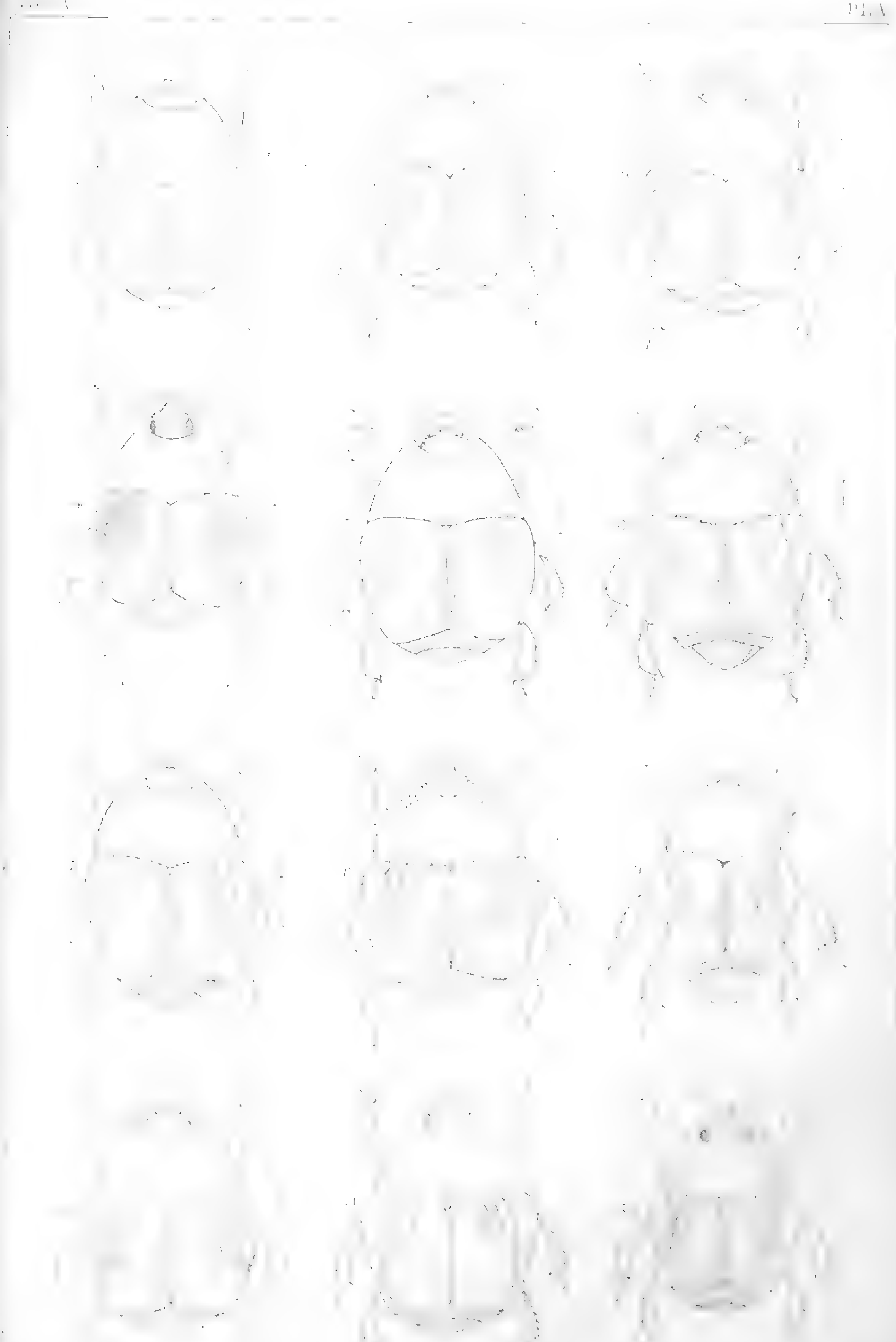




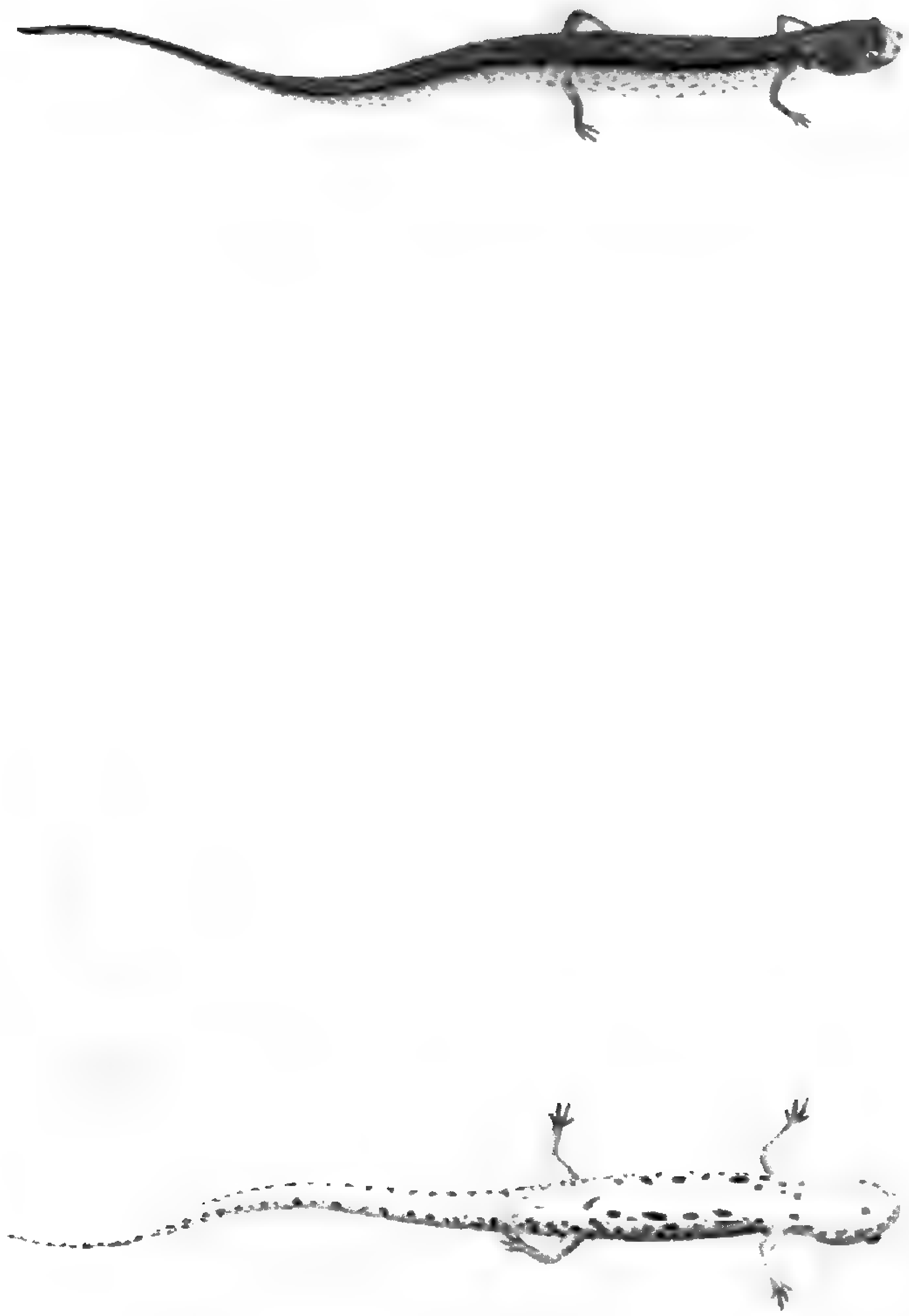
1 *Acipenser platorynchus*

2 *Lemasus plaurus*

3 *Luxilus kentuckiensis*

1 Centrarchus Fasciatus.

2 Leuciscus Storerianus.



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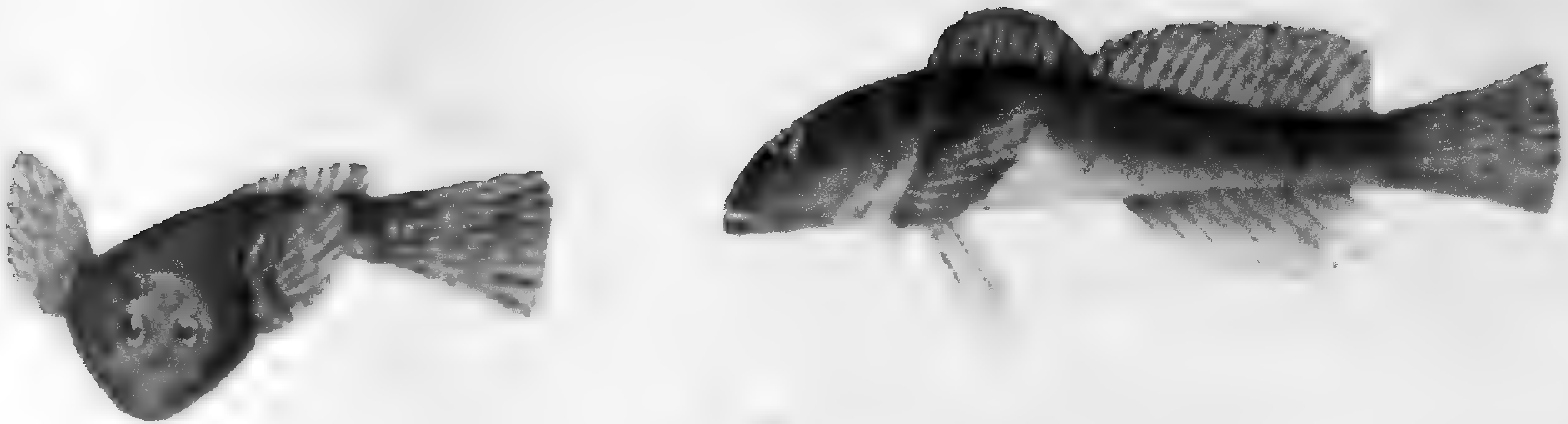
Salamandra melanosticta Gibbes.

PL. XI.



Cottus Gobio. L

W.O. Ayres. del.

PYRRHULA RAPTOR. 1 Male. 2 Female. 3 H

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1_6. Monoptilon bellidiformis.

[illegible] del. 7_11. Anisocoma acaulis. Warren Sc.

acknowledging receipt of Proceedings and presenting its own publications ; — Academia di Bologna, May 26, 1855, presenting its publications and other valuable books ; — George B. Blake, Esq., in reply to the vote of thanks passed at the meeting of the Society April 2.

June 4, 1856.

ADJOURNED ANNUAL MEETING.

Dr. Chas. T. Jackson, Vice-President, in the Chair.

The Committee appointed to audit the accounts of the Treasurer, reported that they had made their examination, and found the accounts correctly cast and properly vouched. The report was accepted.

The Committee appointed at the last meeting to nominate a candidate for the office of President, were further instructed to report the names of two or more persons as candidates for this office, at an adjourned meeting; and it was also voted that the meeting, when adjourned, should be adjourned to the time of the next regular meeting, to hear and act upon the report of said Committee.

A seventh letter was read from Mr. E. Samuels, giving a list of objects collected in California since his last account.

Dr. Brewer called the Society's attention to the fact that Mr. Samuels's letter mentions that he had obtained two specimens of California Red-tailed Hawks, shot on their nests, with their eggs.

This is an interesting and important acquisition, and may at last enable us to determine with certainty a disputed point in our ornithology, and to remove whatever confusion still remains. There are three varieties of North American hawks, each of which is probably a distinct species, in regard to which some confusion has prevailed. These are the common Red-tailed Hawk of the Atlantic States, (*Buteo borealis*,) *B. Swainsoni*, and the California Red-tail, described by Nuttall as *B. montanus*. The last has only recently been admitted to be a good species. In regard to all three there has been some difficulty in determining their specific distinctions, and they have been more or less confounded by writers. Mr. Audubon gives for the *B. Swainsoni* a figure of the Red-tail, and Mr. Cassin, in his Synopsis of the Birds of Prey accompanying his illustrated work, confounds the Western Red-tail with Swainson's Buzzard. Soon after its publication, having an opportunity to examine three genuine specimens of the latter, he is convinced of their distinctness, and that he had till then never seen a genuine *B. Swainsoni*. In the same paper, however, Mr. Cassin expresses the belief that there is no specific difference between the eastern and western Red-tailed Hawks. This opinion, however, he has since recalled. His attention having been called to differences in their eggs, in the cries of the bird, and finding also constant differences in their plumage, he has since admitted the Western bird to be a distinct species, to which Mr. Nuttall's name of *Buteo montanus* belongs. Mr. Samuels's specimens of the birds and eggs will, without doubt, afford satisfactory evidence of the correctness of these conclusions, and determine this interesting question beyond further doubt.

Dr. Kneeland presented, in the name of Dr. James C. Parkinson, of Bridgeboro', New Jersey, descriptions of two new Argonauts, *A. Conradi*, and *A. fragilis*.

A. Conradi. — Oblong ovate, surface minutely granulated, the granulations being chiefly in the grooves between the ribs, and on the tubercles: very few on the ribs. Sides convex toward the carinæ, plane toward the lip. Ribs rather distant, except on the umbo: broad, elevated, except anteriorly, where they become nearly obsolete; straight, entire, not furcate; long and short ribs alternating. Back broad, anterior and posterior third convex; middle third concave, anterior third, studded with small tubercles. Tubercles on anterior and posterior thirds of carinæ small, nearly obsolete: on the *middle third of each carina, seven very large tubercles*, broad at the base; compressed laterally near the apex; terminating in an acute edge, curving outwardly. Sinus furnished with a thick callus continued to the margin of the lip. Lips convex. Aperture subquadrate oblong; narrowing somewhat anteriorly. Angles acute; spineless; everted. Anterior half of the shell milk white, except near the sinus, where it is pale purple; posterior half pale fuscous. Subsinus, carinæ, and large tubercles, dark fuscous; a white, longitudinal, central line running through it, between carinæ. Anterior half of shell polished, remainder dull.

Length, $2\frac{3}{8}$ inches. Breadth, $1\frac{1}{4}$ inches. Aperture: length, $1\frac{1}{4}$ inches; width, 1 inch. Obtained at New Nantucket, Pacific Ocean.

I have named this shell after the distinguished T. A. Conrad, whose labors in the Testaceological field are well known and universally appreciated.

No. 2. *A. Fragilis.* — Oblong ovate, very thin, frail, sides smooth, without granulations, having numerous opaque, minute milk-white spots distributed over them; ribs numerous, interrupted, a few entire; subfurcate, somewhat waved. Back narrow, flat. Tubercles many; rather small; generally of a size. Sinus large, furnished with a callus, which is attenuated towards the edge of the lip, *and is carried across the base of the aperture, from one sinus to the opposite, in a flattened arch; upon this arch rests one side of the nucleus of the shell; which is* NOT INVOLUTED *like other species, but rises in a cylindrical form, a half inch above the arch from which the inner side springs;* it has much the appearance, in shape, of the end of the finger of a glove. Around this cylinder are a number of lines of growth; otherwise it is smooth, somewhat waved, and destitute of tubercles for the distance of $\frac{3}{4}$ inch from the apex; lips convex. Aperture, ovate oblong.

Color white, except the apex and posterior half of nucleus which is fuscous, posterior half of carinæ are also of the same color, with a white, central, longitudinal line running along the centre. Angles, which are rounded in the adult, acute in the young shell, somewhat everted, pale, purplish brown. Shell translucent.

Length, $2\frac{3}{4}$ inches. Breadth, $1\frac{3}{4}$ inches. Aperture: length, 2 inches; width, $1\frac{1}{2}$ inches.

Dr. Kneeland also presented, in the name of Dr. Parkinson, an uncommonly large and perfect shell of *Nautilus pompilius*, very much larger than any in the Society's cabinet.

Also, a very curious insect from the Sechelles Islands, called the "leaf-fly," or the "fly-leaf," "*la mouche feuille*." He read the following description of the insect from the "Mauritius Watchman," of the 8th of January, 1845:—

"Among the insects of this Archipelago, none is more remarkable than the *mouche-feuille*, as it is very appropriately named. The male and female insects differ considerably in appearance; and it is the latter only which deserves the foregoing title. The male is about an inch and a half long, and possesses some slight resemblance to a grasshopper in the form of the head and horns, nor is the body unlike that of that insect. The wings are of an exceedingly weak gauze-like texture, of a very pale green color, and are rather shorter than the body. Their powers of motion are extremely limited, being confined, as far as our observation has extended, to a slow and feeble walk. We have never seen them attempt to fly, nor do they appear to possess any instinct of danger.

"They delight principally in the Badamier, a tree which flourishes remarkably well at Sechelles. To the leaf of this, the female insect bears a most astonishing resemblance. The entire length is from an inch and a quarter to two inches, and the breadth in the widest part about an inch and a quarter. The head might easily be mistaken for the broken stalk of the leaf, to which the neck bears a perfect resemblance. The wings present the exact form and color of the young leaf, and the veins which traverse them have precisely the appearance of the ribs of the leaf. A kind of suture which seems to unite the wings in the centre, though they are really detached, presents a ridge perfectly analogous to that of the leaf stalk. The legs are flat, and of such a form as closely to resemble those little abortions of leaves which are frequently found on the Badamier. Another remarkable circumstance is the change of color which these insects undergo. As the leaves on which they feed wither, they lose their bright green color, and become yellow; whether they resume their green color with the leaves or not, is not known. No insect is more harmless and defenceless than this; their sole safety consists in their escaping observation by the close resemblance to the plant on which they feed. Their greatest enemies are ants, which prey upon them with great avidity, cutting out pieces of their wings and carrying them off, until the poor insect is completely dismembered. They seem sensible of no pain during this attack, for we have repeatedly seen ants eating the wings, while the fly continued its own repast on the badamier leaf without interruption; nevertheless, death ensues. They eat in the same way as caterpillars, cutting in a circular direction, but they are far from being so voracious as these insects. They drink frequently, plunging their mouths into the dew-drops, and drinking by suction.

"The *mouche-feuille* attains its full growth in about four months, and then begins to lay, and deposits an egg daily for about three months, when it dies. The eggs are of a dark brown color, and much resemble in shape the *Carambole*, but with a little knob at each end. They are about three lines in length, and one and a half in diameter at the largest part. In from eighty to ninety days the young are hatched, and are then of a reddish brown color, nearly an inch long, and perfectly flat, without any appearance of wings. It seems incredible that an insect of such a size could have been contained in such an egg. As they grow, the color gradually changes, and the wings appear, but we are unable to detail minutely the stages of their growth; but we believe it to differ from that of almost every other insect in that they do not change their skin. They were formerly found in all parts of the islands, but are now rarely met with except in Silhouette."

This genus has been called *Phyllium* by Illiger and Westwood; and *Mantis* by Fabricius and Donovan.

Dr. Durkee exhibited three living specimens of *Elater noctilucus*, or Lightning Spring-beetle, brought from the Island of Cuba, eight weeks since.

Dr. Zabdiel B. Adams was elected a Resident Member.

June 18, 1856.

ADJOURNED ANNUAL MEETING.

Prof. Jeffries Wyman in the Chair.

The Committee on nomination of a candidate for the office of President, presented a report, in accordance with their instructions at the last meeting. The report was read and accepted.

It was voted to defer the balloting for a President until the hour of 9 o'clock.

Mr. T. T. Bouvé read a letter from Dr. James Deane, of Greenfield, requesting the loan of specimens of fossils, to aid him in the preparation of his work on the fossils of the Connecticut Sandstone.

It was voted that the Curator of Geology be empowered to loan Dr. Deane such specimens as he might desire.

An eighth letter was read from Mr. E. Samuels, accompanied by a list of specimens sent from California.

Dr. Brewer read a letter from Mr. Robert Kennicott, of West Northfield, Cook Co., Illinois. Mr. K. proposes to exchange fossils, reptiles, birds, and fishes for a copy of the Journal of the Society.

It was voted that a copy of the Proceedings, and of such numbers of the Journal as are not scarce, be forwarded to Mr. Kennicott in consideration of his proposed exchange.

Dr. Brewer called attention to an interesting fact noticed by Mr. Kennicott, viz: that *Plotus anhinga* (Snake Bird) is found in Illinois; also that the Wood Ibis (*Tantalus loculator*) is common in Southern Illinois, where it probably lays its eggs. Mr. Kennicott saw the latter bird frequently near Cairo, in August and September of last year.

At the meeting of May 21, Mr. N. H. Bishop presented samples of a peculiar crystalline salt which he had brought with him from South America. Mr. Bishop's account of this peculiar mineral is as follows:—

It is found mixed with the soil in greater or less abundance, from San Luis de la punta, (a town on the western side of the pampas of the Argentine Republic, where the grass plains properly end, and the *travesia* or desert commences,) to the foot of the Andes.

San Luis lies in Lat. 33° 16′ S., Long. 66° 27′ W., and is the capital of the province of the same name. From this town, westward, the soil is almost worthless, until the River Mendoza is reached, where irrigation commences.

The soil is very light and dry, not compact in the least. This is probably caused by the dryness of the atmosphere and absence of water; for when Mr. Bishop crossed that part of the country, they were obliged to purchase water that had been caught in holes for the use of cattle. Stones are rarely met with; where they do exist, at the base of the Andes, he did not observe the existence of this salt. There are several spots on the *travesia*, between San Luis and Mendoza, furnishing a poor quality of grass, which is fed upon by the cattle which are driven across the continent to the coast. With the exception of these spots, the country between the above-named towns, and extending many leagues to the north and south, is a dreary desert, covered with a low growth of thorn bushes and a few species of gnarled trees, some of which bear pods.

This substance penetrates the earth from a few inches to a couple of feet. It is particularly abundant at certain places east of the town of San Juan, where the ground is covered with a thin incrustation. It is here exceedingly painful to the eyes from the reflection of the sun's rays, and the inhabitants are constantly affected with inflammation of the eyes.

The method of treating the soil by the natives is very simple. The water is conducted from the rivers Mendoza and San Juan (which take their rise in the Cordillera) through a sequia or canal, around squares of level land, at irregular intervals of time, and, to use their own expression, they *wash off the salitre.* Then a plough, constructed of two pieces of wood, is brought into service, and turns up from six to eight inches of the soil, which goes through the same washing process as the first. After two or three repetitions of this operation, a shallow soil is obtained, partially free from *salitre,* in which wheat, clover, pumpkins, melons, etc., are raised. The remaining *salitre,* according to the belief of the natives, is exhausted by successive crops, and after several years of tillage, the soil is suitable for the vine. Oranges, peaches, quinces, olives, figs, etc., flourish. Within a few years, large tracts of land have been made exceedingly fertile by the process above described, and could the New England plough be introduced there, the process would be far more valuable.

Dr. A. A. Hayes, communicated the following as the results of his analysis of the saline mineral, presented by Mr. Bishop: —

The specimen was a white, crystalline solid, formed by the union of two layers of salt, as often results from the evaporation of a saline solution, when the pellicle formed on the surface falls to the bottom. Along the line of junction, crystal facets are seen, but the forms are indistinct. These crystals readily scratch calc spar, and dissolve without residue in water, affording a solution, which, by evaporation at 150° F., leaves the salt with some of the original physical characters. It readily parts with a portion of water by heat, and when the temperature is raised to redness, it fuses quietly into a transparent, colorless, anhydrous fluid; on cooling, an opaque, white, crystalline solid remains. In this climate the specimen attracts moisture, and therefore has not a fixed amount of water constituent.

It consists of water, sulphuric acid, soda, magnesia, chlorine. Mixed with it are traces of crenate of iron and lime, with sandy grains of earth.

One sample afforded —

Water	16.420
Sulphuric acid	49.658
Soda	23.758
Magnesia	9.904
Chlorine	.260
	100.000

Three fragments from different masses were taken, and the following substances found: —

Water	16.42	18.84	19.60
Sulphate of Soda	48.00	45.82	45.74
" Magnesia	34.20	33.19	33.31
Chloride Sodium	1.21	1.79	1.16
Crenates Lime and Iron with Silicic Acid	0.17	0.30	0.13
Sand	——	0.06	0.06
	100.00	100.00	100.00

The varying amounts of water given, are illustrative of the absorptive power of the salts in the atmosphere of this place. Dried at 90° F., the amount of water was 15.20 in 100 parts, which exceeds by four parts, the proportion necessary to form proto-hydrates of the two salts present.

Analysis does not show the two sulphates to be in definite proportions in the masses, but the crystals may be a double salt, composed of one equivalent of sulphate of soda, and one equivalent of sulphate of magnesia; each retaining an equivalent of water. In the masses, the closest approximation is 42 parts of sulphate of magnesia found, instead of 46 parts required.

The communication of Mr. Bishop embraces interesting facts. These saline deserts cover extended areas, in different parts of South America, and, so far as he has been able to learn, the saline matter differs in kind at the different points. The tendency of saline matter contained in any soil is to rise through the aid of moisture to the surface, where, the water escaping, the salt is deposited. This effect, contrary to the gravitating influence, is the most common cause of deserts, and may be exerted everywhere, when the evaporation of water from a given surface becomes much greater in amount than that surface receives in the form of rain and dew. The cultivation of saline deserts by washing down the saline matter, exhibits the opposite action of water in restoring fertility, and it is by no means essential that the water should contain organic matter to insure the full effect, as the soil of deserts generally contains all the organic matter of many years' accumulation.

Dr. Wyman made a few remarks on some of the habits of the painted tortoise (*Emys picta*) during the breeding season, which he had recently observed.

Dr. Wyman also gave some account of the development of the dorsal cord in the Alewive, (*Alosa vernalis.*)

The dorsal cord has been generally described as terminating anteriorly between the auditory capsules, and, in consequence, it has been inferred that the true vertebral column does not extend beyond the basilar portion of the occiput; and that the occiput is the only part of the cranium which has a vertebral structure. In the Alewive, he had seen the dorsal cord, in the earlier specimens, uniformly extending as far forwards as the space between the eyes, and consequently into the region of the anterior sphenoid; subsequently, as the face is enlarged, the anterior part of the cranium seems to be carried forwards, and then the dorsal cord is seen between the auditory capsules only. If the dorsal cord is to be regarded as an index of the extent of the parts considered serially homologous with vertebræ, then it may be inferred that the vertebral column extends originally through the base of the cranium, and consequently that the cranium conforms to the vertebral type.

Dr. Wyman also gave some account of the habits of the Alewive in depositing its eggs, as observed in Fresh Pond, in Cambridge.

The eggs are about $\frac{1}{30}$ of an inch in diameter, and are laid in April and June in the greatest abundance; the localities selected being usually gravel or sandy bottoms, but sometimes they are laid among small stones, and in five or six inches of water. The alewives move ordinarily in small shoals along the borders of the pond, but varying from two or three to very numerous pairs. The males follow the females very closely, and when entering a small shallow cove, often some of the number are pressed entirely out of the water on the shore.

The Corresponding Secretary announced the receipt of the following letters, viz: —

From the Royal Society of London, March 8, 1856, acknowledging the receipt of the Society's publications; das Bibliothekariat der K. Bayerischen Akademie der Wissenschaften, January 12, 1856, acknowledging the same, and presenting various works; from the same, January 20, 1856, asking for duplicate copies of all works presented by the Society, and offering to reciprocate with its own publications; die K. Akademie der Wissenschaften, Wien, November 1, and December 30, 1855, presenting its publications; der Zoölogisch-botanischer Verein, Wien, December 12, 1855, presenting Vols. 3 and 4, and parts 1, 2, and 3 of Vol. 5 of its Transactions, and inquiring as to the reception of Vols. 1 and 2; George Frauenfeld, Wien, December 12, 1855, presenting publications of his own and asking an exchange on the part of the Society.

Dr. Brewer announced the second arrival of specimens, principally of Birds, Plants, and Eggs, from California, collected by Mr. Samuels, and forwarded by the Smithsonian Institution, accompanied by a catalogue by Prof. Baird.

After some remarks by the chairman upon the advantages and feasibility of summer excursions into the country and to the seashore, for the study and collection of objects of natural history, it was voted that a committee be appointed to take into consideration the subject of such excursions; and Messrs. Bouvé, Binney, and Brewer were chosen this committee.

The hour appointed for the choice of a President having arrived, Messrs. Ellis and Binney were appointed a committee to collect and count the votes, and after the first ballot, Professor Jeffries Wyman was declared unanimously elected.

Prof. Wyman hesitated in accepting the office thus tendered to him, expressing great diffidence in his ability to serve the Society acceptably in the capacity of President, at the same time signifying his willingness to promote its welfare in any way that lay in his power. He thought he could do this better in his private capacity than as its presiding officer.

Several gentlemen having urged in the most emphatic manner the acceptance of the office so cordially offered him, Prof. Wyman begged the Society would allow him time for consideration on the subject.

Mr. Benjamin J. Jeffries was elected a Resident Member.

DONATIONS TO THE MUSEUM.

April 16, 1856. A very valuable donation of Australian Birds, Mammals, and Fossils, made by the Government Museum of Natural History, at Melbourne, upon the suggestion of Oliver H. Holden, Esq., of that city, formerly a resident of Boston, as follows : *Cincloramphus rufescens*, Rufous-tinted Cincloramphus, male and female; *Larus Pacificus*, Great Pacific Gull; *Trichoglossus Swainsonii*, Blue Mountain Parrot, male and female; *Porphyrio melanotus*, Black-backed Porphyrio, male and female; *Casarka tadornöides*, Chestnut Shieldrake, or Mountain-duck, male ; *Spheniscus minor*, Little Penguin; *Lestris catarractes*, Skua Gull; *Ardea Novæ Hollandiæ*, White-fronted Heron; *Recurvirostris rubricollis*, Avocet, male and female ; *Eöpsaltria Australis*, Yellow-breasted Robin, male and female; *Xema Jamesonii*, Jameson's Gull; *Lobivanellus lobatus*, Spur-winged Plover, or Alarm-bird; *Hematopus longirostris*, White-breasted Oyster-catcher; *Spatula rhynchotis*, Australian Shoveller, male; ——— ———, Little Teal; *Malacorhynchus membranaceus*, Pink-eyed Shoveller; *Spatula rhynchotis*, Shoveller, female; *Schœniclus magnus*, Great Sandpiper; *Anas punctata*, Chestnut-breasted Duck; *Petroica multicolor*, Scarlet-breasted Robin, male and female ; *Himantopus leucocephalus*, White-headed Stilt ; *Jeracidea berigora*, Brown or Eastern Coast Hawk; *Bernicla jubata*, Wood Duck, male and female; *Nycticorax Caledonicus*, Nankeen Bird; *Biziura lobata*, Musk Duck, male and female; *Anas superciliosa*, Australian Wild Duck; *Athene* (?) *connivens*, Winking Owl; *Cuculus inornatus*, Unadorned Cuckoo ; *Rallus pectoralis*, Cuv., Pectoral Land Rail; ——— ———, Little Scrub Pigeon; *Peristera chalcoptera*, Bronze-winged Pigeon ; *Cacatua galerita*, White Cockatoo ; *Dacelo gigantea*, Laughing Jackass; *Gymnorhina leuconota*, White-backed Magpie; *Strix delicatulus*, Delicate Owl; *Hemipodius varius*, Painted Quail, male and female; *Cygnus atratus*, Black Swan, 2; *Schœniclus Australis*, Australian Tringa; *Entomyza cyanotis*; Blue-faced Entomyza; *Colluricincla harmonica*, Harmonious Colluricincla, female; *Phalacrocorax carboïdes*, Common Cormorant; *Cthonicola minima*, Little Cthonicola; *Myzantha garrula*, Miner; *Euphema aurantia*, Orange-bellied Grass-Parrakeet; *Acanthogenys rufogularis*, Spiny-cheeked Honey-Eater; *Tropidorhynchus corniculatus*, Friar Bird; *Rallus Lewinii*, Lewin's Water-Rail; *Platycercus Pennantii*, Lory ; *Anthochœra carunculata*, Common Wattle-bird; *Amadina Lathamii*, Spotted-sided Finch; *Cthonicola minima*, Little Cthonicola, 2; *Trichoglossus concinnus*, Red-eared Lorikeet (?) ; *Ptilonorhynchus holosericus*, Satin Bower-Bird, female; *Platycercus eximius*, Rosella Parrot ; *Pachycephala pectoralis*, Banded Thickhead, female; *Graucalus mentalis*, Summer Bird, male; *Alcyone azurea*, Azure Kingfisher; *Euphema pulchella*, Chestnut-shouldered Grass-Parrakeet, female; *Pomatorhinus temporalis*, Temporal Pomatorhinus; *Pachycephala glaucura*, Grey-tailed Pachycephala; *Petroica phœnicea*, Flame-breasted Robin, female; *Gymnorhina organica*, Grey-backed Magpie; *Seisura inquieta*, Razor-Grinder; *Cysticola isura*, Square-tailed Warbler; *Cinclosoma punctatum*, Spotted Ground-Thrush, female ; *Artamus sordidus*, Common Wood-Swallow; *Cinclosoma punctatum*, Spotted Ground-Thrush; *Sericornis citreogularis*, Yellow-throated Sericornis; *Pachycephala glaucura*, Grey-tailed Pachycephala, male; *Ptilotis fuscus*, Fuscous Honey-Eater; *Cuculus insperatus*, Brush Cuckoo; *Cracticus destructor*, Butcher Bird; *Colluricincla harmonica*, Harmonious Colluricincla; *Collocalia arborea*, Tree Martin ; *Petroica phœnicea*, Flame-breasted Robin ;

Stipiturus malachurus, Emu Wren; *Glyciphila fulvifrons*, Fulvous-fronted Honey-Eater; *Aprosmictus scapulatus*, King Lory, young male; *Halcyon sanctus*, Sacred Halcyon; *Rhipidura mosacillöides*, Black Fantailed Flycatcher; *Sericornis osculans*, Allied Sericornis; *Trichoglossus pusillus*, Little Stringy Bark Parrakeet; *Anthus Australis*, Australian Pipit; *Anthochæra lunulata*, Little Wattle-Bird; *Micrœca macroptera*, Great-winged Micrœca; *Chrysococcyx lucidus*, Bronze-winged Cuckoo; *Pachycephala pectoralis*, Banded Thickhead, male; *Rhipidura mosacillöides*, Black Fantailed Flycatcher; *Lathamus discolor*, Swift Lorikeet, male; ditto, female; *Ptilotis leucotis*, White-eared Honey-Eater; *Anthochæra lunulata*, Little Wattle-Bird; *Ptilotis leucotis*, White-eared Honey-Eater; *Oriolus viridis*, New South Wales Oriole, male; ditto, female; *Micrœca macroptera*, Great-winged Micrœca; *Chrysococcyx lucidus*, Bronze-winged Cuckoo; *Anthus Australis*, Australian Pipit; *Ptilotis auricomis*, Yellow-tufted Honey-Eater; ditto; *Melithreptus* ———— ———— Honey-Eater; *Pardalotus punctatus*, Spotted Pardalote, male and female; *Estrelda temporalis*, Red eyebrowed Finch, male and female; *Pardalotus striatus*, Striated Pardalote; *Rhipidura albiscapa*, White-shafted Fantail, male and female; *Sitella chrysoptera*, Orange-winged Sitella; *Malurus cyaneus*, Blue Wren; *Acanthiza uropygialis*, Chestnut-rumped Acanthiza; *Zosterops dorsalis*, Grey-backed Zosterops; *Falcucunlus frontatus*, Fronted Shrike Tit, male and female; *Acanthiza nana*, Chestnut-throated Acanthiza; *Climacteris erythrops*, Red-eyebrowed Tree-Creeper; *Acanthorhynchus tenuirostris*, Slender billed Spine-Bill; *Melithreptus lunulatus*, Lunulated Honey-Eater; *Dicæum hirundinaceum*, Swallow Dicæum; *Ptilotis penicillatus*, White-plumed Honey-Eater; *Acanthiza chrysorrhœa*, Yellow-tailed Acanthiza; *Ptilotis chrysops*, Yellow-faced Honey-Eater; *Meliphaga Australasiana*, Tasmanian Honey-Eater; *M. Novæ Hollandiæ*, New Holland Honey-Eater; *Acanthiza lineata*, Striated Acanthiza; *Pelecanus conspiccillatus*, Australian Pelican.—*Mammals:* Brush-tailed Opossum, White Native Cat, Kangaroo Rat, Wallabee, Kangaroo, Common Bat, and Young Bandicoot, and a parcel of Fossils from Flemington.

A collection of fifty-four species of Land Shells; by Dr. John Gundlach, of Havana. A Crustacean from St. Simon's Island, Georgia; by Dr. James C. Parkinson, of Bridgeboro', New Jersey.

May 21st. A specimen of *Scaphiopus solitarius*, from Cambridge; by Dr. J. N. Borland. Two specimens of Emydes and two young Alabama Turtles; by G. W. Binney. A specimen of Sulphuret of Iron; Crystals of a compound salt of sulphate of soda and magnesia taken from the surface of the soil; and two eggs of *Athene cunicularia*, Burrowing Owl, all from South America; by Nathaniel H. Bishop. The body of a young Lion a few days old, and a Human Embryo; by Dr. S. Durkee. An Embryonic Buffalo; by Dr. S. Kneeland, Jr. Bequest of the late President, Dr. John C. Warren, as follows: A skeleton of a Chimpanzee, together with a set more or less complete of unarticulated bones of the Dromedary, and the casts respectively marked as follows: Femur and Metatarsus of the Dinornis gigas, New Zealand; Humerus of the Hylæosaurus; Toe bone (phalangeal) of the Hylæosaurus Mantelli; Toe bone (proximal phalangeal) of an Iguanodon; Toe bone of the hind foot of the Iguanodon; Coracoid bone of the Iguanodon; Horn of the Iguanodon; Four casts marked "Tooth of the Iguanodon;" Unguical or nail bone (distal phalangeal) of a foreclaw of the Iguanodon; Unguical or nail bone (distal phalangeal) of hind claw of the Maidstone Iguanodon; small bone of the toe of the hind foot of the Iguanodon; Cast of a claw bone (ungueal bone) of a Gavial; Lower Jaw of a Mastodon, and Casts of parts of a Zeuglodon.

June 4th. An uncommonly large and perfect shell of *Nautilus pompilius*, and a specimen of the Leaf-fly or Fly-leaf, from the Sechelles Islands; by Dr. James C. Parkinson, of New Jersey. A specimen of Agalmatolite; by Dr. C. T. Jackson. Two shells of *Bulimus undatus*, variety B. zebra; two eggs of *Sturnella militaris*, South American Meadow Lark, both from South America; by N. H. Bishop. The skull of an English Terrier Dog; by E. A. Samuels.

June 18th. Four specimens of *Salmo erythrogaster*, Lake Trout, from Moosehead Lake; by Dr. Augustus C. Hamlin, of Bangor. The skin of an animal, probably of the Jerboa kind, from Africa; by Rev. Louis B. Schwarz.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 31, 1856.

Memoir of Hon. Abbott Lawrence. By Hon. Nathan Appleton. 8vo. Pamph. Boston, 1856. *From the Author.*

Quæstionum Ionicarum Liber. Auctore J. F. Lobeck, Fasc. I. 8vo. 1850. Regimontii Pruss. *From the Author.*

Contributions to the Anatomy of the Invertebrata. No. 3. Terebratula flavescens. By Prof. Owen. 4to. Pamph. London, 1853. *From the Author.*

Army Meteorological Register for 12 years, from 1843 to 1854. 4to. Washington, 1855. *From T. Lawson.*

Description of a Skeleton of the Mastodon giganteus of North America. By John C. Warren. 4to. Boston, 1855. *From the Author.*

Jahresbericht der Naturforschenden Gesellschaft in Emden, fur 1854. 8vo. Pamph. Emden, 1855. *From the Smithsonian Institution.*

On the Sandstone Fossils of the Connecticut River. By James Deane, M. D. 4to. Pamph. 1856. Philadelphia. *From the Author.*

Personal Observations in Victoria. By W. Von Blandowski. 8vo. Pamph. Melbourne, 1855. *From the Author.*

Acadian Geology. By H. W. Dawson. 8vo. Edinburgh, 1855. *From the Author.*

Transactions of the Illinois State Agricultural Society. 8vo. Vol. I. 1853–4. Springfield, Illinois. *From R. Kennicott.*

Description du Terrain Houiller de la France. Par MM. Dufrénoy et E. de Beaumont. 4to. Paris, 1842. *From A. Vattemare.*

Proceedings of the American Association for the Advancement of Science. 7th meeting at Cleveland, and 9th meeting at Providence. 2 Vols. 8vo. Cambridge, 1856. *From the Association.*

Sur l'Arragonite. Par M. Hauy. 4to. Pamph.

Sur la Réunion de la Pycnite avec la Topaze. Par M. Hauy. 4to. Pamph.

Précis des Expériences Galvaniques. Par J. Aldini. 8vo. Pamph. Paris, 1803. *From A. A. Hayes.*

Histoire des Progres de la Géologie de 1834 à 1845. Par le Vicomte d'Archiac. 5 Vols. 8vo. Paris, 1847.

Transactions of the Philosophical Society of Victoria. Vol. I. 8vo. Melbourne, 1855. *From Dr. Charles T. Jackson.*

Resumé Explicatif d'une Carte Géologique des États Unis et des Provinces Anglaises de l'Amerique du Nord. Par Jules Marcou. 8vo. Pamph. Paris, 1855.

Esquisse d'une Classification des Chaines de Montagnes d'une partie de l'Amerique du Nord. Par J. Marcou. 8vo. Pamph. Paris, 1855.

Institut Impérial de France. Rapport sur un Memoire de M. J. Marcou, relatif à la Classification des Chaines de Montagnes d'une partie de l'Amerique du Nord. Par MM. Elie de Beaumont, Dufrénoy, et E. de Verneuil, Rapporteur. 4to. Pamph. Paris, 1855. *From J. Marcou.*

Duplicate copies of the above works of M. Jules Marcou. *From Charles T. Jackson.*

New York Medical Times. Vol. V. Nos. 7, 8, 9. 1856.

New York Journal of Medicine. Vol. XVI. No. 3.

Silliman's American Journal of Science and Arts. No. 63, for May, 1856.

Proceedings of the California Academy of Natural Sciences. Vol. I. Part 2d, pp. 79–86. San Francisco. 8vo. 1856.

Proceedings of the Elliott Society of Natural History of Charleston, S. C. No. 1. 8vo. pp. 1–24.

Verhandlungen des Zoölogisch-Botanischen Vereins in Wien. Band III., IV. und Band V. 1, 2, 3. 8to. Wien, 1853–5.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Band XVII. Heft 1, 2, 3. October, 1855. 8vo. Wien. Band XVI. Heft 2.

Wurttembergische Naturwissenschaftliche Jahreshefte. *Received in Exchange.*

Annals and Magazine of Natural History. No. 99 for March, 1856, No. 100 for April, No. 101 for May.

Genera of Recent Mollusca. By H. and A. Adams. Part 2d. 8vo. London, March, 1856.

Proceedings of the Zoölogical Society of London, with Illustrations. Parts 248–59. 8vo. London, 1853. *From the Courtis Fund.*

Lives of American Merchants. By Freeman Hunt. Vol. I. 8vo. New York, 1856.

Works of Edmund Burke. Vol. III. Bohn's Edition. 12mo. London, 1855.

Life of Schamyl, and Narrative of the Circassian War of Independence against Russia. By J. M. Mackie. 12mo. Boston, 1856.

Encyclopædia Britannica. Vol. X. 4to. Boston, 1856.

The Roman Exile. By G. Gajani. 12mo. Boston, 1856.

The Attaché in Madrid, or Sketches of the Court of Isabella II. 12mo. New York, 1856.

Rise of the Dutch Republic. By J. L. Motley. 3 Vols. 8vo. New York, 1856.

History of the Plymouth Plantation. By Wm. Bradford. 8vo. Boston, 1856.

Recollections of the Table-Talk of Samuel Rogers. 12mo. New York, 1856.

Life in Brazil. By Thomas Ewbank. 8vo. New York, 1856. *Deposited by the Republican Institution.*

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VOLUME V.—No. II.

OCTOBER, 1845.

ART. I.—DISSECTION OF A SPERMACETI WHALE AND THREE OTHER CETACEANS. By J. B. S. Jackson, M. D. Read April 6 and September 7, 1842.

These dissections were made in the spring of 1842, and, following each other in quick succession, afforded a very favorable opportunity for comparison. The first specimen examined was that of the spermaceti whale, the internal structure of which, so far as I can ascertain, has never yet been fully described. Mr. Hunter,[1] whose paper contains about all that is known on the subject at the present day, states that his

[1] The following authorities have been carefully examined with reference to these dissections.

Hunter on the Structure and Œconomy of Whales, with Notes by Mr. Owen.
Fred. Cuvier, (Hist. Nat. des Cétacés, 1836.)
Lesson, (Histoire Naturelle des Cétacés.)
G. Cuvier, (Anat. Comp., and Oss. Fossiles.)
Beale, (Natural History of the Sperm Whale, 2d ed. 1839.)
Dr. Alderson's description of a Sperm Whale, (Cambridge Philos. Trans. vol. ii. p. 250.)
Sir Wm. Jardine, (Naturalist's Library, vol. vi. on Whales.)
Todd's Cyclopedia of Anatomy, (Art. Cetacea.)

observations were founded upon the dissection of seven different species, and that one of the number was a spermaceti whale, though he says that some of them were only superficially examined; it does not appear whether this was the case with regard to the whale, but it may be suspected, as he mentions only two of the internal organs, the heart and the tongue. Dr. Alderson describes the heart particularly, and notices the form of the thyroid cartilage, and G. Cuvier figures the body of the hyoid bone. The osteology, and some of the external organs, as they may be called, have been fully described; but, as I have found nothing more concerning the internal structure than what is above mentioned, I shall give my notes of this dissection in detail. The second specimen examined was probably the *Delphinus delphis*, and the third the *Phocæna globiceps*. The fourth consisted of the organs merely of the common porpoise. These three last dissections, of which full notes were taken, will not be given in detail, but chiefly those points in the description of particular parts which I have not found noticed by authors, or which differed from their descriptions; entire organs will also be described, which are not mentioned by the authors above quoted, or whose existence has been denied.

OF THE SPERMACETI WHALE.

This was a very young specimen, and was taken in Vineyard Sound, about fifteen miles from New Bedford, on the 29th of March, 1842. On the 31st it was brought on the Providence Railroad to this city for exhibition, and on the night of April 1st, with the assistance of Dr. William Henry Thayer, I removed the organs; these were carried to the Medical College on the following day, and were there examined.

On its arrival at the railroad depot, it was found to weigh 3,053 pounds. After the removal of the organs, the body having been stuffed to about its natural size, and carefully sewed up, the measurements were as follows: — From a line with the anterior extremity of the head to the tip of the tail 16 feet, to the rudimentary dorsal fin 9 feet, to the anterior fin about 4 feet, to the vent 10 feet 2 inches, to the eye 3 feet 2 inches, to the external orifice of the ear 3 feet 8 inches, to the angle of the mouth 2 feet 10 inches. According to Mr. Owen, "When brought forth, the young cachalot is usually twenty feet in length;" but the present individual could not have been recently born, as the foramen ovale was completely closed. Vertical diameter of the head just in front of the opening of the mouth 34 inches, and of the largest part of the body 3 feet, the abdomen having, perhaps, fallen in somewhat since the removal of the organs; anterior fin 18 inches long and 9 inches wide. The dorsal fin, or hump, forms a very obtuse angle, and is ill defined, being about 10 inches in length, and 2 or 3 inches in height, there being also between it and the caudal two or three quite small finlets. Span of tail 19 inches, and 4 inches wide midway. Lower jaw to the angle of the mouth 20 inches; right eye $1\frac{1}{2}$ inches long; the left not examined, as the animal laid upon that side, and I was not aware, at the time, of the difference that had been observed, the left being, according to F. Cuvier, always imperfect, and almost useless. Orifice of the external ear about the size of a goose quill. The circumference of the body before the removal of the organs was, according to the owners, 9 feet.

As to the general outline, it resembled the figure in the Naturalist's Library, (vol. vi. pl. 8,) about as nearly as one individual would be likely to resemble another of a different age and sex. The small finlets, however, are not shown in the figure, and the under part of the body near the caudal fin is much less prominent than it was in the present specimen; the external surface also was everywhere quite black, remarkably smooth, and elastic like India rubber.

Epidermis as in the other cetaceans. The skin, known generally as the blubber, was about 3 inches thick where cut through, and the muscles resembled those of other large mammalia as to color and texture.

The *teeth* in the lower jaw had not yet come through. Some have described teeth as having been found concealed beneath the gum in the upper jaw of adults; this fact, however, is questioned by some of the highest authorities. I will, therefore, give the testimony of a very intelligent observer, Capt. Benjamin Chase, of Nantucket, who, having been for many years engaged in the sperm whale fishery, is well acquainted with the subject, and has allowed me to use his name, and to give the result of some of his observations. He states that he has more than once seen teeth of a considerable size in the upper jaw of the adult females, though always covered by the gum; the males, he says, being much larger, are cut up differently, and in such a way as not to expose the teeth. The roof of the mouth was smooth, light colored, and hollowed as if to receive the lower jaw, which is quite narrow in front.

The *tongue* was 33 inches in length, the free extremity being 7 inches long, and 6 inches wide. Mr. Hunter describes it in the sperm whale as "almost like a feather-bed;" but in the present specimen, which was quite fresh, it was not remarkably soft. The surface was not so flat as it often is in the cetaceans; towards the edges anteriorly were numerous small fissures and granulations, and, posteriorly, there were several quite prominent glands, but generally it was sufficiently smooth. In structure it seemed wholly muscular, whereas in the Greenland whale, it furnishes a large quantity of oil.

The body of the os hyoides resembled the figure in Cuvier's Oss. Fossiles, and was 12 inches transversely across the base, and 6 inches on the median line; this was connected by two intermediate cartilages, 3 inches in length, with the styloid bones, which were 9 inches long and $1\frac{1}{2}$ inch in diameter. Dr. Todd remarks, with regard to this bone in the cetaceans, (p. 572,) on its "slight degree, or total absence of connection with the larynx," but nothing of the kind was observed in any one of these dissections.

The *œsophagus* was 20 inches in length from the cricoid cartilage, and not remarkably capacious; muscular coat thick, and lined by a smooth cutis and cuticle.

The *stomach* in this order of animals, as in the ruminants, is composed of several cavities, the number being generally four or five. In the present case there were but three, and the appearances have been most perfectly represented in a figure drawn by Dr. J. Wyman, Plate XIV.

The first cavity (marked *b* in the figure,) is commonly described as a mere ovoid dilatation of the œsophagus, but here it is nearly of a globular form, projects so far towards the left side as to form a *cul de sac,* as in the human stomach, and is altogether about the size of a man's head; the size and form of it, however, probably depend somewhat upon the age of the animal, as in case of the ruminants. The cutis and cuticle are continued throughout from the œsophagus (*a*), and, where they abruptly terminate, the second cavity is supposed to commence. The inner surface was sufficiently smooth, but the cuticle being partially detached, there were seen upon its under surface, numerous rounded papillæ, corresponding undoubtedly with follicles in the cutis. The muscular coat in this, as in all of the other cavities, was tolerably thick. Mr. Hunter supposed the first cavity of the stomach in the cetaceans to be a mere reservoir, as in the ruminants; but this idea is now fully disproved, and the object of the cuticular structure remains unexplained. In the case of the sperm whale this structure is particularly remarkable, considering the nature of its food, which, according to Mr. Beale, is the soft squid, this being, as he remarks, the only animal which it ejects when wounded; the same observation has been repeatedly made by Captain Chase, and the confirmation is important, as being so directly opposed to the statement of F. Cuvier. (p. 298.) In the present case nothing was found in any one of the cavities but a little water, and some fine greenish sand, the animal not having taken any food, probably, since it was separated from its mother.

The second cavity of the stomach (c) differed entirely from that of the cetaceans generally. In the first place, the œsophagus opened about as freely into it as into the first cavity. Secondly, the communication between it and the second was very large, measuring 15 inches across when cut open, and it was not surrounded by projections of any sort. Thirdly, instead of being spherical, it was much elongated, and terminated at the further extremity in a blunt point, measuring 20 inches in length. Fourthly, the characteristic rugæ on the inner surface were nowhere strongly marked, and towards the first cavity were even wanting. The mucous coat was about half a line in thickness, quite dense, and showed upon the cut edge a slight appearance of fine, whitish, perpendicular and parallel lines, this structure being often described as highly glandular in the cetaceans.

The third cavity (e) which evidently corresponds to the fourth, as generally described in the cetaceans, arose from the second about midway (d), was of an elongated form, quite narrow at its commencement, but becoming dilated and curved upon itself towards its further extremity. Externally it measured 30 inches in length, $3\frac{1}{2}$ inches in diameter for the first four inches, and 18 inches at the largest part. The mucous coat, as compared with the second cavity, was less rugous, thinner, less dense, and without any of the linear appearance. There is generally a very small, intermediate cavity between this and the second, of a spherical form and marked by distinct orifices, but nothing of the kind was found in the present case.

Beyond these three is still a fourth cavity (g), about which, in the cetaceans generally, there has been much question whether it should be regarded as an additional cavity of the stomach, or as a dilatation of the intestine. In this case it appeared rather larger than the first cavity, the largest diameter being about 13 inches, and the transverse about 6 inches. It was extensively and intimately connected with the third cavity, but the opening between them was exceedingly small (f), measuring only $\frac{1}{4}$ inch in diameter, the two appearing not unlike one cavity divided by a septum, through the centre of which a small circular hole had been punched. This cavity, which was largest at its commencement, rapidly diminished in size, and soon made an abrupt turn upon itself, almost immediately after which the intestine (h) was well marked. The mucous membrane was thinner and softer than in the other cavities, and quite free from rugæ, the whole thickness of the parietes in these two last cavities being less than in that of the first. On the most careful examination nothing like pylorus was found, neither was there any sudden change in the thickness or structure of the mucous coat, as described by G. Cuvier, so that if the question had not existed, I should not have thought of this cavity as otherwise than a dilatation of the intestine; a similar dilatation I have twice seen in the dromedary. (Journal B. S. N. H., IV. 7.)

The *intestine*, being cut away from the mesentery, was found to measure 260 feet, or just $16\frac{1}{4}$ times the length of the animal. Before being opened, it measured, on an average, about one inch in diameter, near the upper extremity $1\frac{3}{4}$ inches, midway or rather below, less than an inch, and for the last 12 feet, it dilated from about $2\frac{1}{4}$ to $8\frac{1}{2}$ inches; cœcum wanting, as it was in all of the other specimens. The contents were for the most part pasty, and colored by bile; throughout the last 30 or 40 feet, they were of an intensely deep brown color, thin at first, but towards the last having a thick, glutinous consistence. Mucous coat thin, but very firm; muscular rather thick. The valvulæ conniventes were most remarkably developed from near the commencement of the intestine to within about 40 feet of its termination; instead of being transverse and interrupted, as in man, they were more or less oblique, and apparently continuous; this being quite obvious in some parts before the intestine was opened, so that it appeared as if there were a spiral valve within; the effect of this would be to add to the already great length of the intestine, and balance in some measure its small size. The valves were $1\frac{1}{2}$ or 2 lines in width, very regular, and so close together as nearly to overlap, the intervening mucous membrane being traversed longitudinally by very numerous fine lines. Along the first few feet of the intestine the surface was generally smooth, but there were a number of folds of mucous membrane which might properly be called valvulæ conniventes, not being continued entirely across the intestine; these were about one inch apart, and ½ inch in width midway. About 40 feet from the termination of the intestine, the valves became smaller and more irregular, and soon the mucous surface assumed a very peculiar appearance, the change, however, being gradual; the portion opposite the mesentery continued thin and nearly or quite smooth, whilst the remainder, consisting of one half or two-thirds of the whole intestine, was extremely thick and rugous, the rugæ being very broad and mostly transverse, though many were longitudinal; no mucous follicles were seen here, nor indeed in any part of the intestine, except a few very small ones in the rectum, and yet it was impossible not to regard this as a glandular structure, analogous, perhaps, to the Peyerian; the mucous membrane throughout the last 20 or 25 feet was smooth. Finally the rectum opened in the sulcus which gave outlet to the vagina.

The *liver* was a broad, flat, very regular organ, divided into two lobes, of which the left was decidedly the largest, differing therein from each of the other specimens, and from what has been generally observed in the cetaceans; the right measured 24 inches in length, the left 25, and the whole organ transversely 34 inches; thickness 2 inches; no trace of a third lobe. Color and structure not remarkable. Gall-bladder wanting, as usual, in the cetaceans; duct, near the liver, reticulated upon the inner surface, and measured 1½ inches transversely.

The *spleen* was a soft, dark red organ, somewhat lobulated, of a flattened, oval form, and about 10 inches in length; also a second, about an inch in diameter, and connected with the first by cellular membrane; several of these are sometimes found in the cetacea, and I am not sure that there were not others in the present case.

The *kidneys,* of a flattened, lozenge-like shape, were formed, as usual, of an aggregation of small glands about the size of a filbert. One of them measured 19 inches in length, 14 inches at the broadest part, and 2 inches thick. There was no marked pelvis at the commencement of the ureter. The bladder was small and flaccid, containing scarcely any fluid; before being opened it measured 10 inches in length and 4½ inches across the fundus. Mucous and muscular coats not remarkable. The urethra, which opened close to the clitoris was 11 inches in length, and one inch transversely when cut open; muscular coat quite thick.

Of the *genital organs.* The external fissure, 8 inches in length and 2½ inches deep, received the opening of the vagina about midway, and posteriorly the rectum; anteriorly was the clitoris, a dense, greyish organ, having somewhat the form of a parrot's beak, and measuring 1½ inches in its two principal diameters. Outlet of vagina transverse and contracted, the posterior lip being a very thick, rounded mass; outlet of rectum also surrounded by numerous, rounded masses of the size of filberts. The whole canal, from the outlet to the division into the cornua uteri, which was quite abrupt, measured 32 inches; the first 12 inches were smooth, and measured 7½ inches transversely when cut open, gradually diminishing afterwards to 3 inches at the bifurcation. Where it began to contract, transverse rugæ were seen, and soon became as strongly developed as in the ruminants, or even more so, being ½ inch in width and almost overlapping; these are also crossed by an infinity of longitudinal rugæ. The muscular coat was 2 or 2½ lines thick, and extended up into the rugæ, becoming thinner in the upper part of the uterus and in the cornua. Superiorly, the transverse rugæ became less marked, and just below the bifurcation they nearly or quite disappeared. As in the ruminants, the limit between the vagina and the uterus was not marked. One of the cornua only was examined; this was 12 inches in length, and 3 inches transversely when cut open; longitudinal rugæ on the inner surface very close and well marked. The Fallopian tube, cut open, was extremely thin and delicate, its mucous coat being thrown into fine longitudinal folds; $2\frac{1}{2}$ lines transversely where it leaves the uterus, and about 8 lines at the further extremity, though at this last part it cannot be said exactly where it terminates, since it finally expands into a delicate membrane, as it does in some other animals. The ovaries were of a flattened, oval form, and $3\frac{1}{2}$ by $1\frac{3}{4}$ inches; surface somewhat fissured; a single incision being made through one of them, no vesicles were seen. On each side of the genital fissure, and very near to it, was another, about 5 inches in length, at the bottom of which was felt the nipple.

F. Cuvier says, (Op. cit. p. xxiv.) "On ignore le mode d'accouplement des cétacés souffleurs. Personne jusq'u à présent n'en a été témoin. L'opinion la plus probable, c'est qu'ils s'unissent couchés tous deux sur le côté. Steller dit que son *manatus* (le Stellère) s'accouple avec la femelle couchée sur le dos." Hunter's opinion appears to be very absurd, though Mr. Beale quotes it without remark. Now, on this point, Capt. Chase's observations were exceedingly interesting, and were stated by him with full confidence. He informed me that he had more than once had the most favorable opportunity of witnessing the act in the spermaceti whale, in the right whale, and in the "porpoise;" in the two first, it continues for a few minutes, but, in the last, it is almost momentary; the position is horizontal, and not upon the side, nor does the female remain supine, but, being close to the surface of the water, they occasionally turn so as alternately to bring the top of the head above the water, evidently for the purpose of respiration. The right whale, he thinks, breeds at particular seasons, but the spermaceti at any season of the year; and he agrees with most observers in never having seen more than a single young one at a time about an old female; in cutting up one of these last, he has seen "a bucket-full of thick, rich milk" discharged from the mammary gland; the act of suckling he has never witnessed.

Of the *heart,* the ventricular portion was formed very much as in the tortoises, measuring 16½ inches transversely, whilst, from above downwards, the right side measured but 7, and the left 8 inches. In the place of an apex, there was a broad surface, and rather a depression on the median line, as if it were the first step towards a separation of the ventricles, as seen in the dugong. Vrolik (Ann. des Sc. 1838) speaks of the semilunar form of the heart in some of the cetaceans, but this was the only instance in which it was found, in the four specimens here described. The right auricle was about twice as large as the double fist; form not remarkable, neither was its thickness; appendix well marked, and its cavity traversed by a mesh of strong, muscular fibres. Foramen ovale quite closed, and the fossa very little marked. No Eustachian valve, neither was there in either of the three other specimens. Coronary vein one inch in diameter, and opened at the usual place; no valve found in any one of the specimens. One superior cava, which soon divided; one inferior cava, measuring, transversely, 8 inches, when cut open in its passage behind the liver, and entering the heart as soon as it had passed through the diaphragm.

Right ventricle from about ½ to ¾ of an inch thick; the inner surface being very irregular from strong, muscular bands. Tricuspid valve 14½ inches along its adherent edge. Pulmonary artery 3½ inches from upper edge of valves to bifurcation, 9 inches in circumference on inner surface, and about 2 lines thick.

Left auricle rather smaller than the right. Parietes generally thin, but having numerous very strong and prominent muscular columns on the inner surface. Appendix well marked. Fossa ovalis less distinct than on the right side. In the left ventricle the muscular columns were so numerous, large, and prominent, that it was difficult to measure the parietes, but the average thickness was not far from 1⅓ inches, that of the apex being 5 lines. Circumference of mitral valve at adherent edge 11 inches; cordæ tendiniæ very numerous.

The ascending aorta measured 4 inches to the first branch at the arch; no marked dilatation, the circumference on the inner surface being $8\frac{1}{4}$ inches; parietes 3 lines thick. The ductus arteriosus formed a cord $2\frac{1}{3}$ inches long, and $\frac{3}{4}$ of an inch in diameter, externally, but the canal remained open so as to allow the passage of an instrument about $\frac{1}{4}$ of an inch in diameter. The persistence of this opening is quite remarkable, even in a cetacean, not having been found in either of the three other specimens, except in the dolphin, which was fœtal. The arch of the aorta gave off three vessels. The first, 6 inches in circumference externally, divided at once into two branches, one of which was traced in sitû, and was found to be the right carotid, the other taking the direction of the subclavian; these vessels were of about equal size, and it is remarkable that they were so, considering the great bulk of the head as compared with the anterior extremities. The second vessel arose only half an inch from the first, was 5 inches in circumference, and consisted almost wholly of carotid. The third vessel arose from the aorta 5 inches beyond the second, was $3\frac{1}{4}$ inches in circumference, and may have been a superior intercostal, such as was afterwards found in the dolphin.

I regret exceedingly not to have seen the intercostal plexuses, one of the most interesting structures in the cetaceans, and one of the discoveries of Mr. Hunter which the French have endeavored to appropriate; they were not overlooked, but the first examination was made under too unfavorable circumstances for observation.

The vena porta, the vena cava where it passes behind the liver, and the hepatic veins, are said to be dilated into reservoirs in some of the cetaceans, to be used, like the plexuses, during the time of submersion; but nothing of the kind was found in the present case. One singular fact, however, which I have not seen noticed, was observed in all of the four specimens; and that was, a persistence of the umbilical vein, or, at least, a vessel of considerable size in the suspensory ligament, and which opened into the vena porta; of course, it would be found in the dolphin, which was fœtal; in the whale, it was nearly or quite as large as the thumb.

The *lungs* consisted, each, of a single lobe, as in the three other specimens, and were of a regular, flattened, oval form, the left measuring 25 by 14 inches. The air-cells were not visible to the naked eye, being much smaller than in man; moreover, they did not communicate through the lung, but through one bronchus a definite portion of the lung only could be inflated, as in the other mammalia, the surrounding structure remaining quite collapsed. Neither did they so communicate in any one of the other subjects, except in the dolphin, the experiment being fairly tried in each of them. The fact of this communication was first noticed by Mr. Hunter; but he seems to apply the observation to the cetacea in general. G. Cuvier, (An. Comp. vol. vii. p. 108,) or rather Duvernoy, makes the same general statement with regard to the carnivorous cetacea, and mentions particularly the dolphin and the porpoise.

The *trachea* was 8 inches in length, 4 inches wide, and much flattened antero-posteriorly. Rings about seven in number, but very irregular, as in all of the other specimens; some quite broad, some narrow and running into each other. No membranous portion, neither was there in either of the other subjects. The left primary bronchus was 6 inches long, the right 5 inches; and, from this last, just at its origin rather than from the trachea, as generally observed in the cetacea, arose a third smaller bronchus, which went to the upper part of the right lung. In the division of the bronchi there was nothing very remarkable; some very small glands were seen in the mucous membrane, and beneath it were well-developed transverse fibres.

The *larynx* is one of the most interesting organs in the cetacea, being elongated upwards so as to project into the posterior nares, or internal orifice of the blow-hole, thus establishing, for the purpose of respiration, a direct communication between the external air and the interior of the lungs; the soft palate extends very far backwards, and the strong muscles in that region, contracting about the larynx, cut off all communication between it and the cavity of the mouth. In the collapsed state in which the organs were after their removal from the body, the glottis stood erect three inches above the posterior edge of the soft palate, and it was $2\frac{3}{4}$ inches in width, the anterior lip being the largest. It appeared to consist of an anterior and a posterior cartilage, covered by a thin membrane and by cuticle, the whole bearing some gross resemblance in form to a turtle's back; down the back of the anterior cartilage there extended a ridge, and along the opposite one a corresponding groove, allowing the two to close very perfectly together, and superseding the necessity of a proper epiglottis, which organ seemed to be wanting, though it really existed in the form of the anterior cartilage. The thyroid cartilage is 3 inches in length anteriorly, 6 inches posteriorly, and the same for the width on one side; form very regular. Cricoid not remarkable.

The blow-hole, situated on the top of the head, at the very extremity, and rather towards the left side, was $6\frac{1}{2}$ inches long, and in the form of an *ʃ*, as observed by Alderson and also by Beale. F. Cuvier says, in one part of his work, (p. 288) that the form is semicircular, though in a supplement, (p. 384) he quotes largely from Beale's work, which was then recent, and so far corrects himself as to say that it has the form of an s. The direction was longitudinal, though Hunter makes it transverse. Captain Chase states, that when the whale blows out, the orifice becomes circular, and that in an old one he has seen it as large as a bucket; as to the formation of the spout, about which there has been and is still so much question amongst authors, he regards it unequivocally as the vapor of the expired air with the addition of a very small quantity of water that gets into the blow-hole from without, the water that is taken in with the food being discharged, he thinks, as it was received, and not through the blow-hole; his observations, then, agree with those of Mr. Beale, who, on this point, is the best of all authorities. Captain Chase has seen the blow-hole cut open, and describes it as a single, continuous tube, about as large as a man's arm, and without any lateral cavities such as are found in the dolphin; inner surface smooth, and black; it extends backwards near the top of the head as far as the eye, and then turns down to the throat; this last descending portion he has never examined.

The following parts have been preserved for the Society's Collection: — 1st, the stomach, with the œsophagus, and commencement of the intestine; 2d, portions of intestine, showing the structure at different parts; 3d, the heart, and large vessels; 4th, the tongue, palate, pharynx, larynx, trachea and large bronchi; 5th, the genital organs; 6th, a cast has been made of one of the kidneys.

Since this dissection was made, I have had an opportunity to examine the entire lower jaw from six different subjects, and I would here give the result of these observations, as there seem to be some erroneous views with regard to the teeth; also, recently, Dr. Henry Wheatland, of Salem, has examined three others, and sent me his observations, which will be added to the above.

The first specimen was from a sperm whale that was said to have made 110 barrels of oil, and that was taken only a week before, by a vessel bound into New Bedford. The length on the median line was $16\frac{1}{4}$ feet, and from the back tooth to the articulating surface $5\frac{1}{2}$ feet. The teeth were generally more or less movable, the gum being still quite fresh; posteriorly they were small, and appeared but little above the gum; on the right side there were 25, regularly arranged, but on the left only 24, the number often varying, not merely in different individuals of the same species, as a general rule in the cetaceans, but in the same individual on the two sides; the ninth and tenth from the front, on the left side, though of full size, were so close together as fairly to touch, several of the teeth about them not being opposite to those upon the other side, as they generally were.

The second specimen was from a whale taken the year before between Cape Hatteras and the Bermudas, and said to have made 100 bbls. of oil. Length on the median line 15 feet 7 inches; between the articulating surfaces 5¾ feet, and to the back tooth 5½ feet; on the right side there were 25 teeth, and on the left 27, opposite to each other towards the front, but soon became irregular, and were more so than in the other specimens; towards the front also they were quite pointed, but further back rounded or ovoid; the back teeth were much the smallest, the surface being worn so as to show the structure. F. Cuvier says, that fifty-four is the greatest number of teeth that has been met with, and that the number increases with the size of the animal; but, if this last is in proportion to the length of the lower jaw, the rule does not apply to the present specimens. He says, moreover, that they are conical in the young and ovoid in the old; they were conical in the small and undoubtedly young specimens presently to be mentioned, but so were the anterior teeth in this second specimen, which belonged to a full grown adult. The same author thinks that the sperm whale sheds its teeth, and that, too, more than once; and T. R. Jones (Comp. Anat. p. 666,) has an idea, with regard to the cetaceans, that, as they advance in age, new teeth are formed in the back of the jaw, whilst those in front drop out, the alveoli becoming absorbed; but, in the present specimens, I found nothing to favor either of these suppositions; the front teeth in the largest individuals were perfectly preserved, there were nowhere any deficiencies, and there were in one of the smallest specimens about as many teeth as are generally found in the adult.

The third specimen was 8 feet 5 inches in length, 3 feet 9 inches between the articulating surfaces, and the same to the back tooth. There were 20 teeth on each side, arranged regularly opposite to each other, and very little if at all worn; anteriorly they were comparatively large and strong, midway more slender, and posteriorly small.

The fourth specimen was 7 feet 10 inches in length; 4 feet between the articulating surfaces, and 3 feet 2 inches to the back tooth; on the right side 26 teeth, and on the left 23.

The fourth specimen was from a young animal, said to have been 18 feet long, and to have made 14 bbls. of oil; taken within three days' sail of Nantucket. It was about 5 feet 8 inches in length, and had 23 teeth on each side, but, as these were cemented in, the number cannot be so fully depended upon; all of them were pointed.

The sixth specimen, which is in the Society's Cabinet, is $5\frac{1}{4}$ feet in length, 2 feet 9 inches between the articulating surfaces, and the same to the back tooth. The teeth, which are connected by a strip of dried gum, and are perfectly loose in the sockets, are 25 in number on the right side, and 24 on the left, besides an anterior one on the left side, which has evidently been lost; all of them pointed, and some hardly piercing the gum. With the jaw, is the entire cranium, $6\frac{1}{4}$ feet long, and corresponding generally with G. Cuvier's description and figures (Oss. Foss. vol. v. pl. xxiv.); the petrous portion of the temporal bone, however, remains on one side, and, instead of being free, as usual in the cetaceans, is as closely connected with the base of the skull as any other bone.

The seventh specimen (these three last were examined by Dr. Wyman) was $15\frac{1}{3}$ feet in length on the median line, 5 feet 1 inch between the articulating surfaces, and 4 feet 9 inches to the back tooth. On the right side 26 teeth; on the left 25, besides a back one, which seems to have been removed.

The eighth specimen is $7\frac{1}{3}$ feet in length, between the articulating surfaces 3 feet 8 inches, and to the back tooth 3 feet 2 inches; 24 teeth on each side.

The ninth specimen is 8 feet 2 inches in length, between the articulating surfaces 4 feet 2 inches, and to the back tooth 3 feet 8 inches; 23 teeth on each side.

DISSECTION OF A FŒTAL DOLPHIN.

About a fortnight after the dissection of the whale, I received from Dr. Storer a specimen of the above, which was sent to him by Dr. William Prescott, of Lynn, with the following description of the mother, from whom it had just been removed.

The length was $7\frac{1}{4}$ feet; color dusky black on the back, white on the belly, and lead-colored on the sides; a dusky line, from one to two inches in width, commenced a little above the eyes, and, passing along the sides, was lost in the lead color within 18 or 20 inches of the tail, and another, much less distinct, ran parallel to this. Very exact measurements were also given of the position and dimensions of the external parts. The animal had just been harpooned, and seemed to be quite new to the fishermen.

The fœtus must have been mature, or very nearly so, being 38 inches, or nearly half the length of the mother. According to Mr. Owen, the cetacea, in general, are remarkable for the large size of the fœtus at birth. It had Sir William Jardine's characteristics of a true dolphin, the "convex forehead and the snout in form of a beak, distinguished from the forehead by a marked furrow;" in form, moreover, it pretty nearly resembled the *Delph. delphis*, L., as figured in the Naturalist's Library, though it will be shown to differ in structure from that species, if, indeed, it is always the same species that is described under that name. The back was of a dark bluish gray, and the belly nearly a salmon color, but this last may originally have been white, as the same change of color was observed in the *D. globiceps*; no longitudinal stripes, as in the mother, but some very indistinct, broad, transverse stripes were seen towards the back. The teeth had not yet appeared. Since the dissection the animal has been stuffed, and the specimen is now in the Boston Museum.

As to the number of vertebræ, there were 7 cervical, 14 dorsal, and 55 posterior to these. In the *Dauphin ordinaire* (by which is understood the *D. delphis*, L.) there are said by G. Cuvier to be 14 dorsal, and 52 posterior to these, (Anat. Comp. i. 103,) though in the *Oss. Fossiles* (v. 303) he says the dorsal are 13, and the whole number, without the cervical, 60, leaving 47 only posterior to the dorsal; F. Cuvier (Cet. p. 140) quotes this last. Lesson (Cet. p. 226) says there are 13 dorsal and 53 lumbar in the common dolphin, and in Griffith's Cuvier the same numbers are given; Sir William Jardine says 12 dorsal and 52 lumbar. Of the cervical vertebræ, the first and second were large and scarcely movable upon each other; the other five were much smaller and rather more movable, the second being more, and the seventh less developed than in the *D. delphis*, according to Cuvier (Oss. Foss. v. 303); these vertebræ, he says, are fused into a single piece, and yet, he elsewhere says, (Anat. Comp. i. 105,) that in the dolphins the atlas and axis only are united, the other cervical vertebræ remaining separate, though extremely thin. Lesson (Cet. p. 226) describes the six first as quite thin in the *D. delphis*, and the last as somewhat thick. These discrepancies, upon so important a point as the number and form of the vertebræ, can only be explained by the confounding of species, and, with regard to the present individual, its specific appellation must be left undetermined.

The stomach, with the œsophagus, and part of the intestine, having been inflated, dried and varnished, showed the form, and, to a certain extent, the structure of the different cavities, better than if they had been laid open, and from this specimen a very correct drawing was taken by Dr. Parker. (Pl. XIV. fig. 2.) The œsophagus is $5\frac{1}{2}$ inches in length, and about 7 lines in diameter; the first cavity of the stomach (*a*), which is perfectly identical with it in structure, dilates gradually, and is $1\frac{1}{2}$ by 1 inch. The second cavity (*b*), continued in a line with the œsophagus, is about $1\frac{1}{2}$ inches in length, and terminates in a blunt cone, so far corresponding with the general description by Mr. Hunter and others of the first; it differs, however, entirely in structure from what is here described as the first, being more red, thicker, and much more muscular; the two are also separated by a deep groove externally, and a corresponding fold of membrane within, though they still communicate freely, (portions of the cavities have been cut away so as to show their internal relations); it is equally remarkable, then, whether considered as an additional cavity, or as a modification of the first, which is so generally uniform in shape and structure; and it is the more interesting as something of the kind was found in the *globiceps*. Sir E. Home has described and figured (Phil. Trans. 1807) the stomach of the very species (*D. delphis*, L.) which the present individual most nearly resembles externally, and the first cavity is continuous and uniform, as usual in the cetaceans. The third cavity (*c*), generally described as the second, is 2 inches by 1 inch, curved upon itself, and communicates freely with the first; in the recent state it felt very thick and fleshy, and now strongly marked rugæ are seen upon the inner surface, giving it somewhat of a coarse honeycomb structure. The fourth, not seen in the figure, is a small, rounded cavity, about ½ inch in diameter, and resembles the intestine in structure now that it is dried; its communication with the third is not two lines distant from that between the first and third cavities; in some of the cetacea this small cavity is said not to appear externally. The fifth cavity (*d*) is about 3½ inches in length, somewhat dilated at first, but towards the further extremity about four lines in diameter; it is very strongly bent upon itself, and in structure resembles the fourth. Between the third and fourth cavities, the fourth and fifth, the fifth and the sixth, as many would have it, there is stretched a thin transverse septum, perforated by a very small opening.

The intestine was 20 feet 8 inches in length, or about six and a half times that of the animal, whereas it should be eleven or twelve times, according to Fred. Cuvier (Cet. p. 86.) G. Cuvier does not give the length in the dolphin or porpoise, but merely remarks upon it as "passablement long." Just at its commencement it is considerably dilated, and measures in the dried specimen (*e*) ½ inch in diameter; this is generally described as an additional cavity of the stomach (as above stated,) but, in the present case, from the gradual diminution of size and the absence of anything like an abrupt curve, such as was noticed in the whale, it is impossible to regard it otherwise than as part of the intestine; the communication with the last cavity of the stomach is very small. The folds in the mucous membrane were wholly longitudinal and not abundant. One narrow Peyer's patch, 8 inches in length, was found below the middle of the intestine, and two smaller ones higher up; they were not strongly marked, though the follicles were distinct; no other appearances of glands, except in the rectum, where they were very numerous though minute. The difference in length and structure of the intestine in this specimen and the last, was very remarkable.

The hepatic duct opened, as usual in the cetacea, into the dilated portion of the duodenum, two lines only from its commencement, and not near its termination, as stated by G. Cuvier; neither was there any dilatation of the duct in its passage through the parietes of the intestine, as described by him, or rather by Duvernoy, in the common dolphin. (Anat. Comp. vol. iv. part 2d, p. 531.) The hepatic veins were large. The umbilical vein opened largely into the vena portæ, but the opening into the general venous system was not found. No dilatation of the vena portæ near to the liver was observed, as has been described in the dolphin.

The heart, which is generally described as semilunar, had the apex quite marked, contrasting strongly with the whale's, as it did also with regard to the muscular columns, which were not strongly developed in any of the cavities. The fossa ovalis was quite marked, at the bottom of which was an exceedingly delicate membrane, and at the upper part of this, was the foramen ovale, which seemed quite small; the ductus arteriosus, also, was small.

The aorta, which was not dilated, as some have described it in the dolphin, sent off two vessels from the arch close together. The right gave, first, a large branch, which was distributed as the superior intercostal, and yet the recurrent branch of the par vagum passed around it, as if it had been the subclavian; secondly, a large branch which entered the base of the skull, and may be called the internal carotid; thirdly, a rather smaller branch, which also passed up the neck, and may be called the external carotid; fourthly, a large trunk, which subdivided into, first, the subclavian; and, secondly, a large branch which followed the phrenic nerve, and was distributed like it upon the diaphragm, sending off a very small internal mammary artery near its origin. The left innominata divided mainly like the right, but the subclavian was accidentally cut off. The left superior intercostal arose separately from the aorta, one inch beyond the second great trunk, a vessel corresponding in situation being also found in the whale.

The *plexus* on each side of the spine was well marked, and, on cutting away extensively the wings from the bodies of the vertebræ, it was seen to pass freely into the spinal cavity, and completely to surround the theca, being there very strongly marked. In the lower part of the abdomen the plexuses were not so distinct.

The air-cells communicated, so that through one of the secondary bronchi the whole lung could be inflated; in size they about equalled those of man, being considerably larger than in the whale. The muscular fibres, which have been described as surrounding the lungs, I did not find. The trachea was much flattened antero-posteriorly, and fifteen rings were counted on one side. Just above the bifurcation a large bronchus was given off to the upper part of the right lung, and in the substance of the lungs the rings were continued nearly or quite down into the smallest tubes, as has been often observed.

The spiracle, or blow-hole, being exposed on one side by a longitudinal section through the skull, was found to be a regular and continuous passage for about one half its extent upwards from the fauces. The upper half was very irregular, being dilated mainly into two large sacs, each of which would probably hold ℥ j ss. or more, and which seemed to burrow beneath the skin as the finger was passed into them through the external semilunar orifice; the expulsor muscles about these sacs were very large.

Mr. Hunter says of the cetacea generally, "I could not observe anything like a thyroid gland." It existed, however, in the present case, as a soft mass, of a dark red color, situated just below the larynx, and in form and size resembling the same organ in man ; it was also found in the globiceps, and I think it must have existed in the porpoise. I was not aware, when these observations were made, that this body had been met with in any of the cetaceans, but I have recently seen Mr. Owen's statement that it is found in the porpoise and bottle-nose dolphin.[1]

The *thymus gland* was quite large, and, in structure appeared to resemble the same in man, though, on a single transverse incision, I found no cavity. Whole length $3\frac{1}{4}$ inches ; body 14 by 15 lines, and crura half an inch in width.

The *renal capsules* were very prominent, and of a regular, oval form, though, according to Mr. Hunter, they are flat in the cetacea. *Urachus* very large where cut across at the umbilicus. The *epididymis* was more developed than it is represented in the Cyclopedia of Anatomy and Physiology. The *vasa deferentia* were large and quite distinct, and opened separately on each side of the verumontanum, which was also quite large. The *vesiculæ seminales* are wanting in the cetacea, according to the best authorities, and as shown in this and the two next dissections ; Pallas has described them in the Beluga, as quoted by F. Cuvier, (p. 211) but this is the only case, so far as I can learn, in which they have been observed. In the present case there is a marked dilatation of the last half inch of the vasa, this portion being firm, white, smooth on the inner surface, and measuring $\frac{1}{4}$ inch transversely when cut open. A similar dilatation was found in the globiceps and porpoise, and yet I have not seen the fact noticed by any anatomist.

The *brain* was from various causes unfit for a full examination. The weight of the cerebrum was $5\frac{7}{8}$ ounces, (avoirdupois,) and of the cerebellum $1\frac{1}{2}$ ounces. The two upper tubercula quadrigemina were of medium size, but the two others were

[1] Since this paper was read before the Society, some additions and alterations have been made, which it is unnecessary further to notice.

very large and directed obliquely outwards. In place of the corpora pyramidalia and olivaria was a defined, circular, raised mass, about $\frac{1}{4}$ inch in diameter and very unlike Tiedemann's figure of the *D. delphis*. The *spinal marrow* was rather small and uniformly so, closely invested by the dura mater, as remarked by Mr. Hunter, and formed the cauda equina at about the tenth vertebra from the dorsal. The cerebral *nerves* generally were large, except the first pair, of which no trace could be found; externally, the portio dura, the par vagum and some others appeared immensely large.

The pupil of the *eye* was of an elongated, rather oval form, and not heart-shaped, as in the *D. delphis*, according to F. Cuvier, Lesson, and Sir William Jardine; lens spherical; pigmentum not continued over the choroid coat, which has rather a greenish hue; numerous and distinct orifices of glands were found in the conjunctiva where it is reflected over the globe, the mucous secretion from which Mr. Hunter supposed to answer the purpose of the lachrymal gland, which is small in the cetacea. The external opening of the *ear* was just large enough to admit a small pin, and communicated with the internal organ apparently by means of a single cartilage.

OF THE PHOCŒNA GLOBICEPS. (Cuv.)

This animal was harpooned near the bath-house at Craigie's bridge, June 16th, 1842, and I saw it on the same day. It looked quite thin, and on the right side the surface was uneven to a considerable extent, as if cicatrized; this appearance is interesting, as something of the kind seems to have been observed in another individual of the same species by Mr. Couch, (Mag. of Nat. Hist. July, 1842.) It was of an uniform, dark slate color, except on the belly, where was an ill-defined, narrow, clouded, white streak, extending from beneath the jaw to about the anus, being much broader and whiter in some parts than others, and most so beneath the jaw. Weight estimated at 255 lbs.

The figure at the end of the volume, by Dr. William T.

Parker, represents the animal as it appeared after the removal of the organs; and, from the rounded form of the head, the slight projection of the upper jaw, the narrow, elongated, pointed anterior fins, and the color as above described, I think there can be no doubt of its being the globiceps.

Measurements, taken on the first day, were as follows: from the anterior extremity of the head to the centre of the tail, 7 feet 2 inches; to the pectoral fin, 20 inches; to the dorsal, 38 inches; to the blow-hole, $9\frac{3}{4}$ inches; to the eye, $9\frac{1}{2}$ inches; to the penis, 4 feet 1 inch, and to the anus, 4 feet 8 inches. Span of tail 21 inches, with a notch 1 inch deep in the centre; pectoral fin $5\frac{1}{2}$ inches across the base; 21 inches along the anterior edge, and $15\frac{1}{2}$ inches along the posterior. Dorsal fin about 15 inches across the base, 18 inches along the anterior edge, and 6 inches along the posterior. Circumference in front of dorsal fin, 3 feet 10 inches; blow-hole concave anteriorly, and $1\frac{3}{4}$ inches across, from tip to tip; eye $\frac{3}{8}$ of an inch. The external opening of the ear was so small as only to admit a pin, and was not found till after the cartilage had been cut through; according to Cuvier, and the statement is repeated by Sir William Jardine and by Mr. Beale, this opening was not discovered in any one of the seventy globiceps stranded in Brittany in 1812; one of these specimens was sent to G. Cuvier, besides many of the heads and other parts, (Oss. Foss. v. 285); but I do not find that he alludes to the external ear, nor scarcely to any other point of anatomy, except the stomach, which he describes in the Anatomie Comparée.

Of the teeth, there were counted, on the left side, nine in the upper jaw and three in the lower, several of them being quite loose. On dissection, there were found to be nine on each side in the upper jaw; in the lower, eight on each side, and behind these two others on the right side which were considerably smaller than the rest.

The stomach inflated and dried, is represented in Plate XV. drawn by Dr. J. Wyman, and portions of the parietes having been cut away as in case of the dolphin, the communication between the cavities was distinctly shown. The 1st (*b*) was $11\frac{1}{2}$ inches in length, and $4\frac{3}{4}$ inches in width superiorly. The 2d (*c* and *c′*) was of a somewhat globular form, and smaller than the first, with which it communicated largely; when recent, it felt about as thick as the first, though evidently quite different in structure; and, on being dried, the characteristic rugæ are distinctly seen. Between these two, is a small supplementary cavity, partially seen in the figure (*d*), of a crescentic form, extending about half round the organ, and opening largely throughout its whole extent into the first cavity, with which it seems to be connected; the parietes, however, are thinner than those of the first; it is separated from both the cavities by broad septa, and the limits externally are well marked, so that it should perhaps be rather regarded as a distinct cavity. The third cavity (*e*) is quite small, but perfectly distinct, and equal to between one and two inches in diameter. The fourth (*f*) is about three times as large as the last, and equally distinct, of a rounded form, and quite prominent. The fifth (*g*) is elongated, curved upon itself, and thin like the two last; it is $13\frac{1}{2}$ inches in length, following the curve, and about $6\frac{1}{2}$ inches in circumference midway, though larger at the two extremities. Connected with these is what has been described as an additional cavity of the stomach, but which, as above stated, I should certainly regard as a dilatation of the intestine. This cavity (*h*) is $3\frac{3}{4}$ inches long, $7\frac{1}{4}$ inches in circumference at its commencement, and $3\frac{1}{3}$ inches at its termination, at which last part there is a marked contraction (*i*), but without the feel of anything like pylorus. Immediately below this, the intestine becomes suddenly much thicker, as if from the commencement of valvulæ conniventes. As in the dolphin, the second and third cavities of the stomach, the third and fourth, the fourth and fifth, the fifth and sixth, as many would call the last, are divided by a thin, transverse septum, perforated by a small opening.

The intestine was 57 feet, or eight times the length of the animal. Being cut open, it measured transversely $1\frac{1}{2}$ inches on an average, $2\frac{1}{3}$ inches at the upper or largest part, and 2 inches at the largest part of the rectum. Valvulæ conniv. strongly developed, except in the last 10 or 12 feet, and most so in the upper part; the valves were transverse, instead of being oblique as in the whale; and it is remarkable that G. Cuvier should not have mentioned these in the globiceps, when he is speaking (Anat. Comp.) of the longitudinal folds in the intestine of the porpoise and the dolphin; neither is anything said by Mr. Hunter of marked transverse rugæ, nor by F. Cuvier, nor Lesson, so far as I have seen. In the last 10 or 12 feet, the mucous membrane was in irregular folds, more longitudinal than transverse. No Peyer's nor other glands seen. Muscular coat thick, the longitudinal fibres being quite marked at the upper part. The intestine terminates at last, not directly upon the surface of the body, but in a fissure eight or ten inches in length.

The right lobe of the *liver* was from two to three times as large as the left. The vena cava passed in a groove behind the organ; umbilical vein pervious, opening freely into the vena portæ, but seemed to be gradually obliterated towards the umbilicus. The hepatic duct ran directly to the intestine, then turned abruptly, and ran along the dilated portion of intestine, forming a part of its parietes, and opened just at the contraction between this portion and the proper intestine. The duct was considerably larger where it turned than at first, measuring about half an inch across when cut open; continued large and thick in the parietes of the intestine, but without any dilatation.

The *pancreas* was a well-defined organ, 2 by 4 inches in extent, white, quite soft, but glandular as in man. The duct opened into the hepatic, where it turned, and was 7 lines across when cut open in the substance of the gland.

Spleen connected with first cavity of stomach; a dark red, very firm organ, of a flattened spherical form, about 4 inches in diameter, and $1\frac{1}{2}$ inches thick; also two smaller, supplementary organs.

The *heart* was a strongly developed, muscular organ, not flattened, nor unusually broad, the apex being sufficiently marked, though between the ventricles there is a considerable groove. Ventricular portion 7 inches across the base, and about 5 inches long. Some muscular interlacement in appendices of auricles. Foramen ovale closed, with very little of a fossa on the right, and none on the left side. Tricuspid valve $7\frac{1}{4}$ inches along the adherent edge, and well developed. Right ventricle $\frac{1}{3}$ to $\frac{1}{2}$ of an inch thick, and the muscular columns rather coarse. Pulmonary artery $4\frac{3}{4}$ inches in circumference just above the valves, and aorta $3\frac{2}{3}$ inches. Left ventricle one inch at thickest part. The aorta dilated considerably, though gradually, towards the arch, where it gave off two large branches of about equal size, and afterwards a smaller one, all of which seemed to be distributed very much as in the dolphin. Intercostal plexus well marked. A large vein, entering the right side of the thorax between the upper dorsal vertebræ, was undoubtedly the azygos, as described by Breschet (Annales des Sc. Nat. 1834) in the phocœna. The lower cava received a large vessel from the lower part of the thorax, just before entering the auricle.

The *lungs* were very tough or leathery to the feel, coarse in structure, and invested by a thick membrane. These organs were pretty extensively diseased, being infiltrated with a light yellowish substance, something between pus and lymph, though nowhere hepatized, and without any well-marked tuberculous deposit. At the anterior inferior part of each lung was a large gland, similarly diseased, great numbers of enlarged lymphatics being seen on the outer surface of the lungs going to these; several glands were also found in the neck and about the lungs, enlarged and diseased. Mr. J. Couch, above quoted, remarks, that "most of the cetaceous animals taken in England have run themselves on shore; a circumstance which has been ascribed, with much appearance of probability, to the influence of sickness." Trachea, $4\frac{1}{2}$ inches long, and $1\frac{1}{3}$ inches wide;

rings very irregular. Bronchus, $\frac{3}{4}$ of an inch in diameter, sent off from about the middle of the trachea to the upper part of the right lung; the primary bronchi were about $1\frac{1}{4}$ inches long, and the rings were continued into the smallest tubes that were opened.

Thyroid gland in the usual place, dark red, and soft; $3\frac{1}{2}$ inches transversely, and about $1\frac{1}{4}$ inches longitudinally. This body, as already stated, Mr. Hunter did not find in the cetaceans.

The thyroid cartilage was quite irregular, the limit between this and the epiglottis not being felt. The cricoid was well developed posteriorly, but anteriorly it terminated in two rather blunt points, which, though they approximated, did not unite; the same is found in the beluga, according to Dr. Barclay, (Wernerian Trans. 3d vol.) and he is the only writer, so far as I have seen, who has mentioned the fact; I believe it existed also in the porpoise. Epiglottis about $3\frac{1}{2}$ inches long, and $\frac{2}{3}$ of an inch wide, though wider at the top. Arytenoid cartilages about 3 inches long, not rising quite so high as the epiglottis, nearly united at the top, but more separated below, and seeming to run into the cricoid. Glottis quite distensible.

Pharynx contracted about glottis, but, above this, capacious. Mucous follicles in the posterior nares, and the muscular structure strongly developed, as described by Hunter, and as they were in the dolphin.

The renal capsules, situated above the kidneys, were about $1\frac{1}{2}$ to 2 inches in diameter, and 3 or 4 lines thick. Bladder small; portion towards the urethra long and narrow, as it was in the porpoise.

Testes and epididymis very much as in the dolphin; the first $2\frac{3}{4}$ inches by $\frac{3}{4}$ of an inch. The vasa deferentia were tortuous nearly to the bladder, then straight, and, for the last 2 inches, so near as to appear like one tube. Behind the bladder, they were $1\frac{1}{2}$ lines in diameter; and, on being cut open, the parietes were found quite thick, and the canal

$1\frac{1}{2}$ lines across. For about 2 inches before their termination, they became quite thin, and the canal increased to 5 lines; dilatation not sudden; opened at last separately on the verumontanum by a small orifice or slit.

Connected with the vasa deferentia, and forming undoubtedly a part of the genital system, was a single canal, $2\frac{1}{2}$ inches long, opening on the verumontanum, just in front of the vasa, and so closely connected with them as not distinctly to appear, except for about $\frac{1}{3}$ of an inch just before the vasa came together. At this last part, where it terminated in a cul de sac, it appeared as large as the vasa, but was thinner, and the cavity larger, the inner surface being white and rugous. It afterwards became smaller, but, before termination, the cavity enlarged to 5 or 6 lines. No glands seen on the inner surface. A similar canal was found in the porpoise.

Prostate large; ducts large and numerous, and opened on each side of the verumontanum.

Penis 11 inches in length, and $1\frac{1}{2}$ inches in diameter midway; no septum; fibrous parietes thick and dense. The last $4\frac{1}{4}$ inches tapers to a point, and is free, though concealed beneath the surface of the body. Erector muscles strongly developed, but the acceleratores less so. A strong retractor pair, also, appearing like one muscle, arose near the perineum, and was inserted about the commencement of the free portion of the organ.

The animal having been purchased for the Society, the bones were macerated with a view to the skeleton; but they were found to be too imperfectly ossified, some of the epiphyses being not merely separate but scarcely formed. The vertebræ were 58 in number; bodies of 6 of the cervical co-ossified; 11 dorsal, as stated by Cuvier in the globiceps (Oss. Foss. vol. v.); but posterior to these were 40, whereas he makes but 37. The cranium corresponded sufficiently well with his description and figures of the globiceps (pl. xxi.), with which it was very carefully compared, though not so well as an old cranium in the Society's Cabinet; the under surface of the superior maxillary bones in both our specimens, however, are less broad and flat than he represents them. In the young one, there is considerable space between the occipital ridge and the nasal bones, formed, I suppose, by the interparietal bones fused to the occiput; the foramen opticum is not formed, but, in the place of it, a deep notch in the ant. sphenoid; in the post. sphenoid is a large foramen, which I supposed to be the carotid, but no rotundum nor ovale, neither was there in the old specimen, though the optic was well formed. The condyloid foramina, in both specimens, were found in the lateral portion of the occiput. No bony tentorium, though, in the old specimen, it was well marked. The sternum was composed of four pieces, the third being in two lateral portions, and the fourth quite cartilaginous; deep notch in the first, as stated by Cuvier. Eleven pairs of ribs, the last five being connected only with the transverse processes of the vertebræ, as stated by Cuvier; cartilages ossified. Pelvic bones about $2\frac{3}{4}$ inches long, and half an inch in diameter. As to the phalanges, from the very imperfect degree of ossification, the exact number was not ascertained, but they did not seem to correspond with Cuvier's description.

ANATOMY OF THE PORPOISE (Phocœna communis, L.)

July 13th, 1842, Dr. Storer saw and examined a specimen that had just been taken at Nahant. Length 4 feet 5 inches. Externally it resembled the figure of the common porpoise in the Naturalist's Library, though the form of the head was more like that of the Cape porpoise in the same plate. Pectoral fins lead-colored above, like the upper part of the body generally, but white below; in the work just quoted they are said to be brownish. Dorsal emarginated just back of the tip, and at the upper part, anteriorly, it exhibited quite a number of small tubercles or dentations. At the suggestion of Dr. Storer, the organs were then carefully removed by Mr. Johnson, of Nahant, and on the following day, were sent to me in a perfectly fresh state.

The first cavity of the *stomach* was somewhat heart-shaped, and had a marked mamillary process at the apex, though no corresponding depression internally. Length 8 inches, and transversely, at the upper part, 6 inches. Cuticular coat thick, dense, dead white, and much more rugous than in the œsophagus. Cavity nearly full of half-digested fish and bones, showing that it is not a mere reservoir, as Hunter supposed. Second cavity, of a regular, elongated form, somewhat curved upon itself, 7 by 3 inches before being cut open, and very thick to the feel. The orifice was not far from the œsophagus, and admitted the fore-finger, but the outlet was considerably smaller; no projections about the orifice, as stated in the Cyclop. of Anat. & Phys. Contained only a little thick liquid. Mucous membrane everywhere thrown into dark red, very thick and prominent, longitudinal, close-set rugæ, and, in cutting it across, the linear appearance was seen, which has been described by Sir David Brewster in the porpoise as tubular (Cyclop. of Anat. & Phys.); the limit between this and the cuticular coat of the first stomach was strongly defined, but there were not the strongly marked rugæ about the orifice, described by G. Cuvier. Muscular coat thin, allowing the rugæ of the mucous membrane to be seen through from the external surface, like the convolutions through the membranes of the brain. The third cavity was exceedingly small, though as distinct as any of the rest; limits externally well marked, and measured $1\frac{1}{2}$ by $\frac{3}{4}$ inches. The orifice is amongst the rugæ of the second cavity, a short distance from its extremity, and admits the last joint of the little finger, so that it can be passed about within its cavity; the outlet is from 4 to 5 lines in diameter. Structure and feel of this and the next, thin and membranous. Fourth cavity, quite serpentine in form; 11 inches following the curve; transversely, about $1\frac{1}{4}$ inch midway, and $1\frac{3}{4}$ inch at each extremity, before being opened; outlet $2\frac{1}{2}$ lines in diameter. Contained little or nothing. Mucous membrane firm and moderately thick.

Intestine, $61\frac{1}{4}$ feet, or nearly 14 times the length of the animal, varying considerably from the last two specimens, as they all three do from F. Cuvier's statement. (Cétacés, p. 86.) Lower half, generally about the size of the fore-finger, increasing somewhat downwards, though, for the last foot or more, it becomes much smaller; upper half, to a considerable extent, smaller than the little finger, though longer at the very upper part; according to F. Cuvier, the diameter of the intestine, in the "dauphins et marsouins," is regular, diminishing but very little from the pylorus to the anus; these would include the present specimen and the globiceps, as well as the dolphin, and yet his remark is not confirmed in either case. The dilatation at the commencement of the intestine was strongly marked: $4\frac{1}{4}$ inches long, and $2\frac{3}{4}$ inches transversely at commencement; parietes about as thick as the intestine below, but the mucous membrane of the two differed greatly in structure, and the change was rather abrupt, though there was no contraction nor anything like a valve. The mucous membrane of the dilated part was quite smooth, polished, somewhat transparent, and, after being in spirit for one night, showed several opaque points which were evidently glands, whereas that of the intestine immediately below was just the reverse, opaque with marked longitudinal rugæ. These rugæ extended more or less throughout the intestine, but were not very numerous, being much less than in the dolphin; none transverse. Several patches of Peyer's glands were seen, $\frac{1}{2}$ to $\frac{3}{4}$ inch wide; generally several inches, and one of them 15 inches in length; the follicles, which were small, and very close set, were not situated directly upon the inner surface of the intestine, but upon a distinct fold, which was attached to the mucous membrane by its centre only. Cuticle continued about 3 inches within the rectum. Some inflammation and enlargement of the solitary glands was observed, and some of them were ulcerated.

Right lobe of the *liver* two or three times larger than the left. Umbilical vein pervious, as above stated. Some disease in this organ also, being such as I have occasionally seen in man; apparently a partial obliteration of the ducts, and a collection of the secretion beyond. The hepatic duct opened directly into the dilated portion of the intestine, upon a little protuberance, half an inch before the rugous portion of the intestine began; no dilatation. The pancreatic duct opened into the hepatic, not far from its termination.

Spleen about $\frac{2}{3}$ of an inch in diameter, and closely attached to the first cavity of the stomach, with three or four others of the size of peas scattered in the omentum at some distance.

The *lungs* were fleshy to the feel, but much less so than in the globiceps; air-cells quite as large as in man. The cricoid cartilage had been cut through in the removal of the organs, but from what remained, it appeared, as in the globiceps, not to close anteriorly. A dark red, firm body was found in the place of the thyroid gland, but this, too, had been cut across. In the bronchi were great numbers of thread-like worms, probably filariæ, and quite a collection were seen hanging from an open ulcer upon the inner surface of the stomach; several ascarides were also found free in the cavity of this last organ.

Of the *heart*. The apex was well marked, and the structure not remarkable. Fossa ovalis rather deep, but foramen closed. Two vessels given off at the arch of the aorta close together, and a third a little way beyond.

The *testes*, $3\frac{1}{2}$ inches long, and $1\frac{1}{2}$ inch wide, appeared much enlarged, or swollen, which probably was the case, as the animal was killed during what is supposed to be the rutting season. Epididymis not separated from the gland, as in the globiceps and dolphin. Vasa deferentia tortuous at first, but straight for some distance before termination, whereas, according to G. Cuvier, they are tortuous, in the porpoise, as far as the opening in the urethra; opening separately upon the verumontanum, which is moderately developed. Before terminating they dilate, as above stated, measuring from four to five lines transversely, when cut open. Here again was an organ, similar to that above described in the globiceps, and which may perhaps have existed in a rudimentary state in the dolphin, being so small as to be overlooked. A single canal, opening on the verumontanum, just in front of the vasa deferentia, and closely connected with these last, so that it did not appear except for about $1\frac{1}{4}$ inch before the vasa came together. At this last part, it was much smaller and thinner than the vasa, and, as it extended upwards, it became so small, thin and transparent, that, when first seen, I took it for an enlarged lymphatic; it tapered off to a point, and was gradually lost. After it joined the vasa, the cavity enlarged considerably, so that a probe moved freely within it, and it contained some transparent, viscid fluid, whereas that in the vasa was more opaque. This organ is not mentioned by G. Cuvier in his description of the genital organs of the porpoise, as quoted by F. Cuvier, (Cétacés, p. 172,) neither has it before been observed in any of the cetaceans, so far as I can learn.

The *prostate* was tolerably large, and seemed to be a tissue of ducts filled with a transparent, viscid fluid; the under surface covered by a strong muscle.

The *penis* seemed very large for the size of the animal: 18 inches from the tip to the membranous portion, and $4\frac{3}{4}$ inches in circumference at the largest part. Free portion concealed beneath the surface of the body, 6 inches in length, and tapering, though not quite so pointed as in the globiceps. No septum. Mr. Hunter remarks, on the urethra, as being near the centre of the organ in the porpoise, but in the present case it was not much more so than in the mammalia generally. The retractor muscles seemed to be continuous with the muscles about the lower part of the rectum, and strongly developed, though the erectors were smaller than in the globiceps.

This finishes the detail of these dissections; and I think they prove the truth of what has been said with regard to the inaccuracies and omissions that are to be found in the standard authors above quoted; and I have only further to add, if the facts require confirmation, that the most important parts from the last three specimens, as well as those of the first, have been preserved, and can at any time be reëxamined.

ART. XII. — MUSCI OF EASTERN MASSACHUSETTS. By John Lewis Russell, A. A. S., Corresponding Member of the Boston Society of Natural History, &c., &c. Read December 4, 1844.

Would we seek for elegance amid the minuter wonders of the vegetable kingdom — for delicacy of structure; for instances of exquisite design, or for subjects of patient and instructive study; to no department of scientific research may we turn, with greater hope of success, than to the Mosses. Their tiny roots; their curious leaves, rigid and like bristles in some, or broad or simple in others, or of the most complicated tissue of network in others, — in all, a great variety: and so fitly adapted to the circumstances of their places of growth; their anomalous floral organs, but dimly shadowing forth the sexual differences in phænogamous plants; the grace of their fruitstalks, *(setæ)*; the proportion, of their capsules; the peristome of a simplex or else of a complex character; the columella invested with spores *(seeds)* and operculum, to protect them from injury when immature; the veil or calyptra surmounting the whole, and cast aside, when no longer needed, by a variety of ingenious devices; their mode of propagation; utility to man; and indirect agency in the economy of the material world: superadded, the names of illustrious men who have made them their study, — these, and other circumstances beside, render an accurate knowledge of them an object of value and of constant interest.

The species mentioned in this paper, were determined from specimens, collected, as will be seen, in the vicinity of Boston; many of which were presented to me by different friends, and others collected by myself. Those about which I entertained doubts, were compared with authentic American, British and European specimens, in several herbaria, especially in rich collections of B. D. Greene, to whose generosity and coöperation I am most particularly indebted. For their systematic arrangement, I have mainly followed the Synopsis of Genera adopted by Hooker in the second volume of the British Flora, Part I.[1]

Musci Acrocarpi Astomi.

Mosses with terminal fruitstalks; capsules destitute of a mouth (*stoma*) in consequence of the adhesion of the lid (*operculum.*)

Phascum *patens.* Hedw. Sp. Musc. p. 20. Muscol. Brit. p. 7, tab. 5. Br. Fl. p. 3. Brid. Bry. Univ. I. p. 33. On wet soil; fruit in September. Chelmsford!

P. *subulatum.* (Linn.) Muscol. Brit. p. 6, tab. 5. Brid. Meth. p. 7. Brid. Bry. Univ. I. p. 37. Sandy soil: Plymouth!

Musci Acrocarpi Gymnostomi.

Mosses with terminal fruitstalks; lid deciduous; mouth of the capsule without a fringe *(peristome.)*

[1] Authors quoted:

Brid. Meth. Methodus Nova Muscorum, &c.; a Sam. El. a Bridel. Gothæ, 1819.

Brid. Musc. Rec. Muscologia Recentiorum; a Sam. El. a Bridel. 3 vols. 4to.

Brid. Sp. Musc. Supplement to the same work: or, Species Muscorum; a Sam. El. a Bridel. Gothæ, 1806.

Brid. Bryol. Univ. Bryologia Universa, &c.; a Sam. El. a Bridel-Brider. Lipsiæ, 1826. 2 vols.

Drummond's Musci Americani. Mosses collected in British North America, during the Second Land Expedition under Sir John Franklin, R. N.

Hedw. Sp. Musc. Species Muscorum Frondosorum. Op. Posthum. Editum a Fr. Schwægrichen. Lipsiæ, 1801.

Schwægr. Suppl. Supplement to the above work; in several parts; by the same editor.

Hooker & Greville: in Brewster's Journal of Science. Vol. i.

Hook. & Tayl. Hooker and Taylor's Muscologia Britannica. 2d Edition. London, 1827.

Hooker's British Flora, Vol. ii.: or, the English Flora of Sir James Edward Smith, Class xxiv., Cryptogamia. By Wm. Jackson Hooker, LL. D., F. R. A., &c., &c. London, 1833.

Hooker's Musci Exotici. 2 vols. London, 1818.

Dillenii Historia Muscorum. London, 1768, (*the plates.*)

List of Mosses in the Dillenian Herbarium; by G. A. W. Arnott, Esq. and William J. Hooker: in Hooker's Journal of Botany, vol. i. pp. 88, 97.

SPHAGNUM *squarrosum.* (Weber and Mohr.) Muscol. Brit. p. 14, tab. 4. Br. Fl. II. p. 5. Finely in fruit. Tewksbury, *B. D. Greene!*

S. *obtusifolium.* (Ehr.) Br. Fl. l. c. With the tops of the stems and branches rose-colored, without fruit: Manchester, *Oakes!* also — *var. β minus.* Br. Fl. l. c. With fruit. Hingham!

S. *acutifolium.* (Ehr.) Br. Fl. l. c. Schwaëgr. Suppl. I. p. 15, tab. 5. Danvers! also, in water of four feet depth, in Magnolia Swamp, Manchester, *Oakes!*

GYMNOSTOMUM *fasciculare.* Hedw. Sp. Musc. p. 38, tab. 4, fig. 5–8. Muscol. Brit. p. 23, tab. 7. Br. Fl. II. p. 9. Sandy soil. Chelmsford!

G. *truncatulum.* (Hoffm.) *Var. α* (capsule turbinate.) Br. Fl. p. 8. Muscol. Brit. p. 22, tab. 7. Chelmsford! — *Var. β* (capsule oblong.) Muscol. Brit. l. c. Br. Fl. l. c. Sandy garden-walks: fruit, October. Salem!

G. *pyriforme.* (Hedw.) Muscol. Brit. p. 24, tab. 7. Dill. Musc. tab. 44, fig. 6. Hedw. Sp. Musc. p. 38. Vicinity of Salem!

SCHISTIDIUM. Brid. Bry. Univ. tab. 1.

S. *serratum.* Wilson, in Drummond's Southern United States Musci, No. 20. Growing with *Phascum patens.* Chelmsford! Fructification, March.

ANICTANGIUM *ciliatum.* Hedw. Sp. Musc. p. 40. Muscol. Brit. p. 26, tab. 6. Br. Fl. II. p. 11. Common on bowlders, rocks and stone walls, appearing very green in moist weather.

A. *filiforme.* (Hedw.) Catalogue of Plants growing without cultivation in Massachusetts, appended to Hitchcock's Geological Report of the State, &c. Brid. Sp. Musc. I. p. 23, sub *Anictang. ciliato,* and considered a variety. Collected by Andrew L. Russell, on Taghannoc Mountain, Sheffield!

MUSCI ACROCARPI PERISTOMI.

Mosses with terminal fruitstalks; lid deciduous; mouth of the capsule furnished with a peristome.

APLOPERISTOMI.

(With single peristomes.)

DIPHYSCIUM *foliosum.* (Mohr.) Muscol. Brit. p. 32, tab. 8. Br. Fl. II. p. 13. This little moss seems to have a wide distribution and various situations of growth. I have found it in the pine woods of Sandwich; on shady hill-sides at Plymouth; in similar situations at Hingham; in profuse abundance on a hard-trodden path in woods at Danvers, literally affording a carpet of bristly perichætia; I have specimens from *Dr. Porter*, Plainfield! and it occurs also, in abundance, about Ipswich, *Oakes!*

TETRAPHIS *pellucida.* Hedw. Sp. Musc. p. 45, tab. 7, fig. 1. Muscol. Brit. p. 33, tab. 8, &c. Abundant on decaying stumps of trees in shade of woods, and easily distinguished by its peristome of *four* teeth, and the frequent occurrence of rosular, obcordate leaves on the tops of the barren stems. Hingham! Plymouth! Ipswich!

SPLACHNUM *ampullaceum.* (Linn.) Muscol. Brit. p. 39. tab. 9. Br. Fl. II. p. 15. Schwaëgr. Suppl. II. p. 52. Shady borders of woods, Manchester, *Oakes!*

WEISSIA *microdonta.* Hedw. Sp. Musc. p. 67, tab. 11, fig. 7–13. Synonym. *Weissia viridula β microdus.* Brid. Bry. Univ. I. p. 335. Crevices of rocks at the limekilns, Chelmsford! also on shady borders of woods, South Hingham! Fructification, October.

W. *controversa.* (Hedw.) Muscol. Brit. p. 84, tab. 15. Fruit in November, Hingham!

W. *acuta.* (Hedw.) Muscol. Brit. p. 87, tab. 15. Br. Fl. II. p. 24. Vicinity of Boston. *B. D. Greene!*

W. *lanceolata.* Hooker & Taylor. Muscol. Brit. p. 80, tab. 14. Br. Fl. II. p. 20. Sheffield; *Andrew L. Russell!*

GRIMMIA *pilifera.* (Pal. de Beauv.) Brid. Bryol. Univ. I. p. 173. Synonym. *Grimmia Pennsylvanica,* Schwaëgr. Suppl. tab. 25. On rocks, Brookline. *George B. Emerson!* also, finely in fruit, in similar situations, South Hingham!

G. *maritima.* (Turn.) Muscol. Brit. p. 66, tab. 13. Schwaëgr. Suppl. I. p. 95, tab. 22. On rocks, Nahant, *B. D. Greene!*

G. *alpicola.* (Swartz.) Brid. Bry. Univ. I. p. 165. Hedw. Sp. Musc. p. 77, tab. 15, fig. 1–5, (leaf not sufficiently elliptical.) Considered to be hardly distinct from *Grimmia apocarpa.* Hab. Nahant, *B. D. Greene!*

G. *pulvinata.* (Smith.) Muscol. Brit. p. 68, tab. 13. Synonym. *Fissidens pulvinatus*: Hedw. Sp. Musc. p. 158, tab. 40. Abundant on rocks: Young fruit appearing in November. Chelmsford!

Didymodon *purpureum.* Hook. & Tayl. Muscol. Brit. p. 113, tab. 20. Br. Fl. II. p. 28. I have beautiful specimens of this moss, from the western part of the State, received from *Dr. Porter!*

D. *capillaceus.* (Schrad.) Muscol. Brit. p. 119, tab. 20. Resembles some of the smaller *Brya.* Occurring with perfect fruit in January, Hingham! also Salem!

Trichostomum *pallidum.* Hedw. St. Cr. vol. I. tab. 27. Brid. Bry. Univ. I. p. 489. "Environs of Boston," *B. D. Greene!*

—— *Var. β strictum.* (Swartz.) Schwaëgr. Suppl. tab. 123: a more delicate and smaller form, occurring at Plymouth! Hingham!

Dicranum. § *Leaves bifarious,* Fissidens. *Hedw.*

D. (Fissidens) adiantoides. (Swartz.) Br. Fl. II. p. 36. Muscol. Brit. &c. tab. 16. In shade of woods, and near water: Hubbardston! Hingham! Chelmsford!

— §§ *Leaves inserted on all sides of the stem.*

Dicranum *glaucum.* Hedw. Sp. Musc. p. 135. Schwaëgr. Suppl. I. p. 187. tab. 48. Br. Fl. II. p. 37, &c. Western Massachusetts; with fruit, from *Dr. Porter!* with fine fructification, from Manchester, *Oakes!* also common in moist woods about Boston!

D. *flagellare.* Hedw. Sp. Musc. p. 130. Brid. Bry. Univ. I. p. 422. In dense tufts at the roots of white cedar (*Cupressus thuyoides*, Linn.) in sphagnous swamps, Hingham! Scituate! also Ipswich, *Oakes!* Obs. The flagella must not be mistaken for young fructification just rising, which they resemble in a striking manner.

D. *heteromallum.* (Linn.) Hedw. Sp. Musc. p. 128. Dill. Musc. tab. 47. figs. 37, 38. Muscol. Brit. &c. tab. 18. In perfect fruit, December, Hingham! also abundant near the habitat of *Oakesia Conradi* (Tuckerman,) at the cemetery, Plymouth!

D. *varium.* (Hedw.) Muscol. Brit. p. 102. tab. 17. Brid. Bry. Univ. I. p. 435. Chelmsford! Hingham!

D. *scoparium.* (Hedw.) Muscol. Brit. p. 101. tab. 18. Brid. Bry. Univ. I. p. 410. Common. Chelmsford! Hingham! Salem! Ipswich! &c.

D. *rugosum.* (Dill. Hoffm.) Brid. Bry. Univ. I. p. 414. Synonym. *Dicranum polysetum.* (Swartz.) Schwaëgr. Suppl. I. p. 165. tab. 41. In pine woods, near the Middlesex Canal, Chelmsford! also Ipswich, *Oakes!*

D. *strictum.* (Schleicher.) Schwaëgr. Suppl. I. p. 188. tab. 43. Hingham! also Ipswich, *Oakes!*

D. *longifolium.* Hedw. Sp. Musc. p. 130. Muscol. Brit. p. 83. tab. 16. Brid. Bry. Univ. I. p. 430. Prospect Hill, Waltham!

— §§§ *Capsule swelling at its base,* ONCOPHORUS, *Bridel.*

D. (Oncophorus) *falcatum.* Brid. Bry. Univ. I. p. 389. Hedw. Sp. Musc. p. 150. tab. 32. fig. 1–7. "Environs of Boston." *B. D. Greene!*

TORTULA *unguiculata.* (Hook. & Tayl.) Muscol. Brit. p. 57. tab. 12. Br. Fl. II. p. 45. Plymouth, *Andrew L. Russell!*

POLYTRICHUM. § *Calyptra naked,* CATHARINEA. *Ehr.*

P. (Catharinea) *undulatum.* Hedw. Sp. Musc. p. 98.

Muscol. Brit. p. 43. tab. 10. Brid. Bry. Univ. II. p. 102. Margin of brooks, Chelmsford ! Plymouth !

P. (Catharinea) *angustatum.* Brid. Sp. Musc. I. p. 79. Hook. Musc. Exot. tab. 50. Brid. Bry. Univ. II. p. 105. On moist, grassy banks. Common. Synonyms. P. (Catharinea) *incurvatum.* Mihi. Journal Essex County Natural History Society, p. 92 (where dele "*Polytrichum lævigatum* Wahl.") —*Polytr. controversum.* Hedw. Sp. Musc. p. 98. Dill. Musc. tab. 46. fig. 19. Brid. Bry. Univ. II. p. 105. A variety, growing on decayed trunks of trees, and also on the ground in shady woods. Chelmsford !

— §§ *Calyptra invested with filaments,* Polytrichum, *Auct.*

P. *commune.* (Linn.) Muscol. Brit. p. 46, tab. 10. Br. Fl. p. 49. Abundant in sunny pastures, and varying much in size.

P. *piliferum.* (Schreb.) Brid. Bry. Univ. II. p. 142. Muscol. Brit. p. 44, tab. 10. Common on rocks; distinguished by its long, pellucid, hair-like, pointed leaves.

P. *Pennsylvanicum.* Hedw. Sp. Musc. p. 96. Dill. Musc. tab. 55, fig. 12. Synonyms. *Polytrichum boreale,* Mihi, in Journ. Essex Co. Nat. Hist. Soc. p. 92, (*a dwarf condition.*) —— *Pogonatum brevicaule.* Brid. Bry. Univ. II. p. 144. This is a small species, with leaves closely appressed to the stem, and subject to much variation in the length of its peduncle. Abundant on sandy soil, gravelly banks, &c. Chelmsford ! Hingham ! Finely in fructification amidst a thick stratum of pale green, confervoid filaments, (its primordial growth.) December. South Hingham !

Diploperistomi.

(*With double peristomes.*)

Funaria *hygrometrica.* Hedw. Sp. Musc. p. 172. Dill. Musc. tab. 62. fig. 75. Muscol. Brit. p. 121. tab. 20. On burnt spots in woods; also by road sides, Chelmsford ! In shade of woods, Danvers! Hingham! Plymouth! On garden paths, Salem!

§ ORTHOTRICHUM. (Obs. Sometimes the inner peristome is wanting.)

† *Species with single peristome.*

O. *saxatile.* Brid. Sp. Musc. II. p. 9. — Meth. p. 110. — Bry. Univ. I. p. 274. Vicinity of Salem!

†† *Species with double peristome.*

O. *affine.* (Schrad.) Muscol. Brit. p. 127. Br. Fl. II. p. 54. A small species on bark of trees. Common.

O. *Hutchinsiæ.* (Smith.) Muscol. Brit. p. 131. tab. 21. Schwaëgr. Suppl. II. p. 145. tab. 138. Br. Fl. II. p. 56. On rocks, among *Anictangium ciliatum.* Chelmsford!

O. *strictum.* Brid. Bry. Univ. I. p. 289. On rocks; Ipswich, *Oakes!* also Chelmsford!

— §§ *Leaves or foliage crisped:* ULOTA, *Mohr.*

O. (Ulota) *crispum.* Hedw. Sp. Musc. p. 162. Brid. Meth. p. 112. — Bry. Univ. I. p. 299. Muscol. Brit. p. 133. tab. 21. On trunks of white maple (*Acer eriocarpum,* M'x.) Hingham! also Ipswich, *Oakes!*

DRUMMONDIA. Hooker, in Drummondi Musci Americani.

D. *clavellata.* (Dill.) Drummondi Musci Am. No. 62. Synonyms. *Orthotrichum clavellatum.* Hooker & Greville, in Brewster's Edinburgh Journal of Science, Vol. I. p. 114, tab. 4. Dill. Musc. tab. 85, fig. 17. — *Gymnostomum prorepens.* Hedw. Sp. Musc. p. 35, tab. 3. — *Leiotheca clavellata.* Brid. Bry. Univ. I. p. 728. On trees, Waltham: also Ipswich, *Oakes!*

§ BRYUM. *With a single fruitstalk.*

B. *androgynum.* Hedw. Sp. Musc. p. 178. Dill. Musc.

tab. 31. fig. 9. Muscol. Brit. tab. 28. Fruit in June: Chelmsford! also finely in fruit, May, Hingham!

B. *palustre.* (Swartz.) Br. Fl. II. p. 57. Muscol. Brit. tab. 28. In moist situations and among bushes in edges of woods; generally furnished with barren heads (*capitula.*) Young fruit November, Chelmsford!

B. *argenteum.* (Linn.) Muscol. Brit. tab. 29. Br. Fl. II. p. 60. Hedw. Sp. Musc. p. 181. Brid. Bry. Univ. I. p. 657. On hard trodden paths; garden walks; old walls, and on soil in pots of cultivated plants: fruiting in October. Common.

This little interesting moss is subject to great variation, such as, of a more or less silvery hue: of greater or less stature: of stouter or more attenuated proportions: with a short or longer capsule: with leaves more or less appressed, &c. When exceedingly hoary, from the circumstance of the leaves being furnished at their extremities with white points, it is the *Bryum lanatum* (Pal. de Beauv.) fide, Brid. Bry. Univ. I. p. 659, of which I have specimens from several localities.

B. *capillare.* (Linn.) Muscol. Brit. p. 200, tab. 29. Brid. Bry. Univ. I. p. 665. On Prospect Hill, Waltham!

B. *cæspititium.* (Linn.) Br. Fl. II. p. 61. Muscol. Brit. p. 201, tab. 29. Dill. Musc. tab. 50, fig. 6. In rocky pastures and roadsides: fruit in early spring. Common.

B. *nutans.* (Schreb.) Br. Fl. II. p. 61. Muscol. Brit. tab. 29. Dill. Musc. tab. 50, fig. 61, &c. On old decaying stumps of trees: fruit in June. Capsule and fruitstalk of an orange-red color when mature. Hingham!

B. *ciliare.* Greville, in Annals of the Lyceum of Natural History, of New York, Vol. I. p. 273, tab. 23. Resembles *B. ligulatum, Schreb.*, and also *B. affine, Blandov.* much more, but distinguished from the former by serratures at the edge of the leaf, consisting of articulated ciliæ, and from the latter by a solitary fruitstalk. Margin of brooks. Hingham! "Environs of Boston," *B. D. Greene!*

— §§ With several fruitstalks, Polla, *Bridel.*

B. (Polla) *roseum.* (Schreb.) Br. Fl. p. 63. Muscol. Brit. tab. 29. Synonyms: *Mnium roseum.* Hedw. Sp. Musc. p. 194. Dill. Musc. tab. 52, fig. 77. — *Bryum rosaceum.* M'x. Fl. Bor. Am. II. p. 306. Brid. Bry. Univ. I. p. 696. On comparison of specimens of this superb moss with the *Bryum roseum* of Europe, it would certainly, at first sight, seem to be distinct, although considered identical in Drummond's Musc. Amer. Its habit is very much like that of *Bryum umbraculum,* Hooker, Musc. Exot. tab. 133. It is a profuse fruit-bearer, producing frequently five peduncles from the same stem, exceeding in size the European co-species, and remarkable for its beauty. In shade of pine woods, on decaying logs and stumps of trees. Chelmsford! Also Tewksbury, *B. D. Greene!* I also possess specimens without fruit, which I gathered at Lancaster, N. H., near the White Mountains.

B. (Polla) *rostratum.* (Schrad.) Brid. Bry. Univ. I. p. 700. Muscol. Brit. p. 208, tab. 30. Synonym: *Bryum longirostrum.* Brid. Meth. p. 119. On wet rocks, Hingham!

B. (Polla) *punctatum.* (Schreb.) Brid. Bry. Univ. I. p. 706. Muscol. Brit. p. 207, tab. 30. Synonym: *Mnium punctatum.* Dill. Musc. tab. 53, fig. 81. An elegant species. On the margin of Cold Spring Brook, Hingham! Also Ipswich, *Oakes!*

B. (Polla) *cuspidatum.* (Linn.) Brid. Bry. Univ. I. p. 702. Muscol. Brit. tab. 31. Br. Fl. II. p. 64. Fruit in April. Chelmsford! Also Ipswich, *Oakes!* Also Hingham!

B. (Polla) *hornum.* (Linn.) Brid. Bry. Univ. I. p. 695. Muscol. Brit. p. 209, tab. 31. Br. Fl. II. p. 64. Dill. Musc. tab. 51, fig. 71. Gathered in fine fruit at Tewksbury, by *B. D. Greene!* Also without fruit, Hingham!

B. (Polla) *marginatum.* (Dicks.) Hook. and Tayl. Muscol. Brit. p. 208, tab. 31. Br. Fl. II. p. 64. Syn. *Bry. ser-*

ratum. Brid. Meth. p. 119. — Bryol. Univ. I. p. 689. With young fruit, October. On moist rocks, Prospect Hill, Waltham!

Arrhenopterum *heterostichum*. Hedw. Sp. Musc. p. 198, tab. 46, fig. 1–9. M'x. Fl. Bor. Am. II. p. 313. Brid. Meth. p. 121. Synonyms: *Mnium heterostichum*. Brid. Bryol. Univ. II. p. 12. — *Bryum heteropterum*. Dill. Musc. tab. 45, fig. 11. Shade of woods, Hingham! "Environs of Boston." *B. D. Greene!*

Bartramia *longifolia*. Hooker, Musc. Exot. tab. 68. Brid. Bry. Univ. II. p. 39. In the crevices of shady rocks. Common.

B. *fontana*. (Swartz.) Br. Fl. II. p. 67. Muscol. Brit. p. 146, tab. 23. Dill. Musc. tab. 44, fig. 2. On rocks over which water trickles. Danvers!

B. *crispa*. (Swartz.) Brid. Rec. Musc. Vol. 2, Part III. table 1, fig. 4. Brid. Sp. Musc. III. p. 84. — Bry. Univ. II. p. 41. Duxbury! also Ipswich, *Oakes!*

Buxbaumia *aphylla*. (Linn.) Br. Fl. II. p. 68. Muscol. Brit. p. 143, tab. 22. Dill. Musc. tab. 68, fig. 5. A single specimen, discerned by *B. D. Greene*, in the pine woods at Sandwich! Also, a group of several, in a shady spot in woods, South Hingham! (This moss may be justly considered *rare*, as well as singular and curious; and, with the exception of the single specimen gathered several years since by Mr. Greene, it never came under my observation, until I found it comparatively plenty, in the autumn of 1843, just rising into fruit in November.)

Musci Pleurocarpi Peristomi.

Mosses with *lateral* fruitstalks: mouth of the capsule furnished with peristome.

Aploperistomi.

(*With single peristome.*)

Pterigynandrum *intricatum*. Hedw. Sp. Musc. p. 85.

tab. 18. fig. 1–5. Brid. Bry. Univ. II. p. 179. Brid. Meth. p. 127, &c. On apple trees, Chelmsford! On Elms; Hingham! Found also at Ipswich, by *Mr. Oakes!* (Its habit is densely cæspitose, with surculi irregularly extending outwards, and bearing short, upright branches.) Fruit in December.

Pt. *hirtellum.* Hedw. Sp. Musc. p. 83, tab. 17, fig. 6. Brid. Bry. Univ. II. p. 188, &c. Synonym. *Pterigonium hirtellum.* Schwaëgr. Suppl. p. 108. Investing the bottoms of trunks of trees with a dense, green layer, elegantly extending itself upwards in feathery surculi, and generally abundant in fruit; in which state, after the fall of the operculum, may be easily seen the white teeth of the peristome, singularly cohering at their tips. Common.

Leucodon *brachypus.* Brid. Bry. Univ. II. p. 210. From collections of *B. D. Greene,* under the name of *Leucodon brevisetum,* and gathered by him in Tewksbury! Also from Ipswich, *Oakes!*

Diploperistomi.

(*With double peristomes.*)

a. Interior peristome with free ciliæ.

Neckera *pennata.* Hedw. Sp. Musc. p. 200. Br. Fl. II. p. 71. Muscol. Brit. Suppl. Tab. 4. On trunks of birch and of some other trees, Hingham! abundant at Hubbardston! also Ipswich, *Oakes!*

N. *cladorhizans.* Hedw. Sp. Musc. p. 207, tab. 47, fig. 1–7. M'x. Fl. Bor. Am. II. pp. 307, 308. In the shade. Chelmsford!

N. *seductrix.* Hedw. Sp. Musc. p. 208, tab. 47, fig. 8–13. Brid. Meth. p. 138. Near the roots of trees, Chelmsford!

b. Interior peristome consisting of a reticulated, conical membrane.

Fontinalis *antipyretica.* (Linn.) Muscol. Brit. p. 140, tab. 22. Dill. Musc. 33, fig. 1. Brid. Bry. Univ. II. p. 655.

Rivers; streams; brooks, Common. Seldom found with fruit. Larger than the European co-species in length of stem and breadth of foliage. Hingham! Chelmsford! also Marshfield, *Dr. Porter!*

F. *squamosa.* (Linn.) Muscol. Brit. l. c. Brid. Bry. Univ. II. p. 657. A smaller, flat-leaved species. Western part of the State, *Dr. Porter!* Also, found abundant in brooks at Hingham!

F. *capillacea.* (Dickson.) Muscol. Brit. p. 142, tab. 22. Br. Fl. p. 74. Dill. Musc. tab. 33, fig. 5. Brid. Bry. Univ. II. p. 660. Hingham! Also from *Dr. Porter!*

F. *subulata.* (Pal. de Beauv.) Brid. Meth. p. 186. —Bry. Univ. II. p. 661. Hanging on bushes, principally the *Cephalanthus occidentalis*, Linn., in partially desiccated mill-ponds, and full of fruit in November, Chelmsford! also, in similar situations, Hingham! *Obs.* The occasional deprivation of water seems necessary to produce fructification in species of mosses whose habitat is in streams.

c. Exterior peristome, consisting of sixteen lanceolate, linear, acute teeth, bent inward; interior, of a membrane split to the base into as many ciliæ, which are frequently connected by transverse bars.

Climacium *Americanum.* (Rich'd.) Brid. Sp. Musc. II. p. 45. —Bry. Univ. II. p. 273. A beautiful, tree-like moss, and not uncommon. Hingham! Chelmsford! Waltham! Also Ipswich, *Oakes!*

d. Exterior peristome, consisting of sixteen subulate teeth, bent inward; interior, of a membrane split into sixteen linear, equal ciliæ, or processes.

Leskea *compressa.* Hedw. Sp. Musc. p. 231, tab. 56, fig. 1–7. Brid. Meth. p. 141. —Bry. Univ. II. p. 287. On the ground, and at roots of trees. Plymouth! Hingham! Ipswich!

L. *acuminata.* Hedw. Sp. Musc. p. 224, tab. 56, fig. 14–18. Brid. Meth. p. 144. —Bry. Univ. II. p. 296. Near roots of trees, with both ripe and immature capsules. December. Hingham! Plymouth!

L. *imbricatula.* Hedw. Sp. Musc. l. c. t. 52, fig. 1–6. Brid. Meth. l. c. —Bry. Univ. p. 298. Abundant on trunks of trees, twigs, and pieces of wood, very near to streams. Hingham!

L. *gracilescens.* Hedw. Sp. Musc. p. 222, tab. 56, fig. 8–13. Brid. Sp. Musc. II. p. 64. —Bry. Univ. II. p. 299. On bark of elms, Chelmsford! Also in similar habitat at Cambridge, *B. D. Greene!*

L. *polycarpa.* (Ehr.) Hedw. Sp. Musc. p. 225. Brid. Op. cit. II. p. 74. —Bry. Univ. II. p. 314. Ipswich, from *Mr. Oakes!*

L. *attenuata.* (Schreb.) Hedw. Op. cit. p. 230. Dill. Musc. tab. 42, fig. 66. Brid. Meth. p. 147. —Bry. Univ. p. 317. Among jungermanniæ and lichens on bark of fruit-trees. Chelmsford!

E. Outer peristome of 16 teeth; inner, of a membrane cut into 16 equal segments, with filiform processes between them.

HYPNUM *riparium.* (Linn.) Muscol. Brit. p. 152, tab. 24. Dill. Musc. tab. 40, fig. 44, E. Growing on stones in brooks. Fruit in December. Hingham! Chelmsford!

H. *salebrosum.* (Hoffm.) Brid. Bry. Univ. II. p. 477. On grassy banks, among rocks, and in pastures. Common. Hingham! Salem! &c.

H. *polyantha.* (Hooker.) Muscol. Brit. p. 164. Suppl. Tab. 5. Br. Fl. p. 82. (A Leskea?) In young fruit, December. Hingham!

H. *alopecurum.* (Linn.) Muscol. Brit. p. 168, tab. 25. Brid. Meth. p. 164. —Bry. Univ. II. p. 444. Common among bushes in very wet situations, or near brooks. Hingham!

H. *splendens.* Hedw. Sp. Musc. p. 262, tab. 67, fig. 6–9. Muscol. Brit. p. 170, tab. 25. Dill. Musc. tab. 35, fig. 13.

In the deep shade of woods. Hingham! Also Ipswich, *Oakes!*

H. *proliferum.* (Linn.) Muscol. Brit. p. 170, tab. 25. Br. Fl. p. 85. Dill. Musc. tab. 35, fig. 14, and tab. 83, fig. 6. In woods and among bushes. An elegant species, and liable to considerable variation. Chelmsford! Hingham! Also Ipswich, *Oakes!*

H. *minutulum.* Hedw. Sp. Musc. p. 260. Brid. Sp. Musc. II. p. 141. —Bry. Univ. II. p. 578. In woods, on the ground. Fruit in November. Hingham!

H. *prælongum.* (Linn.) Brid. Bry. Univ. II. p. 399. Hedw. Sp. Musc. p. 258. Dill. Musc. tab. 35, fig. 15, &c. On overflowed banks of streams. Young fruit in May. Hingham!

H. *rutabulum.* (Linn.) Hedw. Sp. Musc. p. 276. Br. Fl. II. p. 88. Dill. Musc. tab. 38, fig. 29, &c. Shedding its seeds (spores) in April. Hubbardston!

H. *sipho.* (Pal. de Beauv.) Brid. Meth. p. 154. —Bry. Univ. II. p. 391. On overflowed rocks in ravines, &c. Fruit in August. Hingham!

H. *undulatum.* (Linn.) Muscol. Brit. p. 153, tab. 24. Brid. Bry. Univ. II. p. 397. "Environs of Boston," *B. D. Greene!*

H. *serpens.* (Linn.) Muscol. Brit. p. 155, tab. 24. On roots of alders, (*Alnus serrulata, Willd.*) and on decaying wood. Fruit in May. Chelmsford! Very common. A species subject to very great variation.

H. *Schreberi.* (Willd.) Muscol. Brit. p. 159. Dill. Musc. tab. 40, fig. 47. Brid. Bry. Univ. II. p. 420. Hingham! Also Manchester, *Oakes!*

H. *Boscii.* (Schwaegr.) Brid. Bry. Univ. II. p. 430. Synonym: *Hypnum illecebrum.* Hedw. Sp. Musc. p. 252, tab. 66, fig. 1, 2, (*leaf and capsule.*) On shady rocks, and on decaying stumps of trees in moist places. Hingham!

H. *catenulatum.* Brid. Bry. Univ. II. p. 450. Muscol.

Brit. p. 160, tab. 24. *Not* Hypnum conferva, *Schwaegr.* Near Marblehead!

H. *moniliforme.* (Wahl.) Muscol. Brit. p. 159, tab. 24. On dry rocks. Hingham!

H. *abbreviatum.* Hedw. Sp. Musc. p. 249, tab. 45, fig. 1–4. In wet situations, on roots of trees, and in crevices of rocks. Fruit in November. Hingham!

H. *cordifolium.* (Hedw.) Brid. Bry. Univ. II. p. 565. Muscol. Brit. p. 179, tab. 26. Synonym: *Hypnum phyllorhizans, (Pal. de Beauv.)* fide Brid. Op. cit. Vicinity of Boston, *B. D. Greene!* Also about Hingham! *Obs.* The leaves vary in shape, and frequently throw out roots at their tips.

H. *triquetrum.* (Linn.) Br. Fl. II. p. 91. Drummond's Musci Americani, No. 182. Dill. Musc. tab. 38, fig. 28. On shady hill sides. Fruit in May. Chelmsford! Hingham! Ipswich! Also finely in fruit at Mount Auburn, Cambridge!

H. *fluitans.* (Linn.) Br. Fl. II. p. 93. Dill. Musc. tab. 38, fig. 33. In a small brook, Chelmsford!

H. *cupressiforme.* (Linn.) Muscol. Brit. p. 189, tab. 27. Br. Fl. II. p. 95. Dill. Musc. tab. 37, fig. 23; and tab. 36, fig. 22; and tab. 41, fig. 53. A most common species, on rocks, trees, &c. and liable to very many varieties. Fruit in January. Chelmsford! Hingham! Ipswich! On the living trunks of red cedar, (*Juniperus Virginiana,*) and of the hemlock-spruce, (*Pinus Canadensis, L.*) it produces most elegant, slender ramuli of more than 12 inches length, and without fructification; in which condition it becomes the *H. cupressiforme var.* ϑ filiformis, Brid. Bry. Univ. II. p. 609, or *var.* γ *tenue,* Muscol. Brit. l. c. Of this *variety* I have found large specimens of much beauty in Hingham!

H. *serrulatum.* (Muhl., Hedw.) Hedw. Sp. Musc. p. 238, tab. 60, fig. 1–4. Brid. Meth. p. 154. —Bry. Univ. II. p. 390. Grassy banks, in the shade, Duxbury! Woods, Hingham! Chelmsford! Also Manchester, *Oakes!*

H. *curvifolium.* (Muhl., Hedw.) Hedw. Sp. Musc. p.

285, tab. 75, fig. 4–9. Brid. Meth. p. 178. —Bry. Univ. II. p. 613. Grassy banks, and by roadsides. Fruit in January. Common. Hingham!

H. *imponens.* (Muhl., Hedw.) Hedw. Sp. Musc. p. 290, tab. 77, fig. 1–5. Brid. Meth. p. 179, &c. Hingham! Ipswich!

H. *reptile.* (M'x.) Brid. Meth. l. c. —Bry. Univ. II. p. 535. "Environs of Boston," *B. D. Greene!*

H. *molluscum.* (Hedw.) Br. Fl. II. p. 96. Muscol. Brit. p. 191, tab. 27. Dill. Musc. tab. 36, fig. 20, A. Finely in fruit in a white cedar swamp in January. Scituate!

H. *crista-castrensis.* (Linn.) Hedw. Sp. Musc. p. 287, tab. 76, fig. 1–4. Br. Fl. p. 96. Muscol. Brit. p. 191, tab. 27. In woods, on perpendicular faces of rocks, and similar shady situations, not uncommon, and of most elegant contour. Hubbardston! Also Manchester, *Oakes!*

Doubtful Species.

Hypnum *filicinum?* (Linn.) Br. Fl. p. 92. Hedw. Sp. Musc. p. 286, tab. 76, fig. 5–10. Brid. Bry. Univ. II. p. 527. Barren stems, collected at Sheffield, by *A. L. Russell!*

Gymnostomum *ovatum?* (Hedw.) Muscol. Brit. p. 21, tab. 7. With leaves more obovate, and furnished with a shorter hair point, than described in work cited, but producing in great abundance the *gemmæ* in the middle of the nerve, on the upper side of the leaf. On trunks of elms. Chelmsford and Hingham!

ART. XIII.—DESCRIPTIONS AND FIGURES OF THE ARANEIDES OF THE UNITED STATES. By NICHOLAS MARCELLUS HENTZ, Tuscaloosa, Alabama.

[Continued from Vol. IV. page 396.]

4. DOLOMEDES SCRIPTUS.

Plate XVI. Fig. 1.

Description. Pale brownish; cephalothorax varied with black and white; abdomen with a broad blackish band intersected by waved white lines, and usually edged with whitish, pale spotless underneath; feet varied with obscure brown, ultimate joint tipped with blackish.

Observations. This species was found in great numbers on the margin of a stream under stones. The two triangular black spots, visible on the cephalothorax of D. *urinator* and D. *lanceolatus*, are obsolete on this. Many were examined, and agreed with this, only the white edge of the band being less distinct in some.

Habitat. Alabama. March.

5. DOLOMEDES ALBINEUS.

Plate XVI. Fig. 2.

Description. Mouse-colored; abdomen varied with angular markings above, beneath with a yellowish longitudinal band, edged with black; feet with alternate black and white rings, the white rings formed by long white hairs; the legs have also a few black bristles; male with legs 1. 2. 4. 3. As large as D. *tenebrosus* nearly.

Observations. This species which, at first sight, might be taken for D. *tenebrosus*, does not dwell habitually in caves and cellars, but is usually found on the trunk of trees, yet in dark shady places. Several females were found, and a male, also. One of those females was captured by a child, who transfixed her cephalothorax with a pin. Finding she was full of eggs, I was desirous to see whether she could survive the wound. I placed her in a glass jar, and, according to my expectations, nature made an effort, that she might live for the protection of her progeny. The wound, which in other cases would have proved immediately mortal, healed readily, and after remaining inactive about three days, she made a cocoon of a light brown color and orbicular, in which her eggs were placed. She held it constantly grasped in her cheliceres, and seemed intent on watching it to the last, but the effort being made, her strength failed; the wound opened again, and the fluids running out, she very gradually lost all her muscular powers, but faithful to her duties, the last thing which she held was the ball containing her future family. Can maternal tenderness be more strikingly exhibited?

Habitat. Alabama.

(Ripuariæ.) 6. DOLOMEDES URINATOR.

Plate XVI. Fig. 3.

Description. Livid brown, somewhat hairy; cephalothorax with obscure marks uniting towards the centre, two approximate wedgelike black spots on the disc; a black spot behind the external posterior eyes; abdomen varied with curved blackish lines, and with eight, ten, or twelve white dots surrounded with black; feet with brownish rings.

Observations. This large spider is found near water, on which it runs with great swiftness. When closely pursued, it dives under the surface, and conceals itself under some leaves or rubbish till danger is past. It is to this species, probably, though possibly to D. *lanceolatus*, that must be referred a sketch sent me by Dr. T. W. Harris, with the description of the web made by the female. I have not yet been fortunate enough to find the web of either species. I have found a specimen of this, on the 3d of March, in Alabama, basking in the sunshine on the south side of a tree, on the margin of Cypress creek. I took it for Micrommata *Carolinensis*, notwithstanding its large size, but its markings corresponded entirely with this; only its general color was bordering on testaceous or pale brown.

Habitat. North Carolina, Alabama.

7. DOLOMEDES LANCEOLATUS.

Plate XVII. Fig. 12.

Description. Brownish; cephalothorax with two approximated triangular black spots, and a yellowish band round the disc which does not extend to the margin, and is interrupted at base; abdomen with a yellowish band, which has on each side two branches directed towards the disc; feet varied with pale rings.

Observations. This spider is always found near or on water, running on it with surprising agility, preying often on large aquatic insects. A female of Dolomedes was twice found on high bushes by my friend, T. W. Harris, in Milton, Massachusetts, "on a large, irregular, loose, horizontal web, at one extremity of which was situated her follicle, or egg-bag, covered with young. The parent appeared watching them at some distance." This spider can dive and stay a considerable time under water, to avoid its enemies. It was found in March, in Alabama, under stones near a stream of water.

Habitat. North and South Carolina, Massachusetts, Alabama.

8. DOLOMEDES SEXPUNCTATUS.

Plate XVI. Fig. 5, 6.

Greenish; cephalothorax with a blackish margin, a white line each side, terminating at the anterior angle, disc blackish green with a longitudinal paler line in the centre; abdomen greenish black with four white dots near the base, and four very minute ones nearer the apex. Male same color; cephalothorax pale blackish green, a pale yellowish line each side; pectus pale, with six black dots; abdomen greenish black above, with four black rings near the base, sides and venter cinereous; trophi and first joints of feet pale testaceous underneath; thighs unspotted apple green, the other joints gradually deeper towards the tip.

Observations. This species dwells on ponds, and dives with great agility, hiding itself under floating leaves or rubbish when pursued.

Habitat. North Carolina.

Genus Micrommata. Latr. (Sparassus, Walck.)

Characters. *Cheliceres moderately strong; maxillæ parallel, rounded at the extremity; lip short, rounded, wider near the base; eyes eight, subequal, in two rows, the upper one longest, curved from the base towards the lower row; feet long, slender, second pair longest, then the first and fourth, the third being the shortest.*

Habits. Araneïdes making no web for dwelling, but wandering and casting some irregular threads to arrest their prey; making a tent among leaves for the protection of the cocoon and the rearing of the young.

Remarks. I could not adopt the two families of Walckenaer, because the eyes, when large, are unequal; this shows the great affinity between Micrommata and Dolomedes. My first tribe, the Arcuatæ, approaches very closely to that subgenus, particularly Micrommata *undata.*

Tribe I. Arcuatæ. *Lower row of eyes straight, middle eyes of the upper row larger, or borne on tubercles.*

Tribe II. Biarcuatæ. *Upper and lower rows of eyes bent and opposed, the lower being bent towards the base, eyes equal or subequal.*

(Arcuatæ.) 1. MICROMMATA UNDATA.

Plate XVI. Fig. 7.

Description. Testaceous or yellowish; cephalothorax with a broad, brownish band; abdomen with a scolloped, dusky band; feet slightly marked with dusky.

Observations. This spider is usually found on blossoms, watching for prey, in the manner of THOMISUS. It seems perfectly distinct from M. *Carolinensis*, but specimens occur in which the cephalothorax is much wider: is it owing merely to the state of the abdomen, which has become narrower when the eggs are laid? It makes no web, but, when attacked, it leaves a thread behind. This is a common species, which does not reach the size of D. *Carolinensis.*

Habitat. Alabama. All seasons.

2. MICROMMATA SERRATA.

Plate XVI. Fig. 8.

Description. Pale yellowish gray; cephalothorax with two parallel, longitudinal, narrow, greenish bands; abdomen with a narrow, scolloped, brownish band above, beneath with two longitudinal blackish lines, approaching each other, and becoming narrower towards the apex; feet slightly marked with grayish rings, in all specimens, $\overbrace{2.\ 1.\ 4.}$ 3. A small species.

Observations. This singular little spider is commonly found on plants, particularly on broad leaves, more abundantly in damp places. It spreads its feet, and seems fond of basking in the sunshine. Its webs are various; sometimes it throws out only a few threads on the upper surface of a leaf; at other times, it makes a web in the tops of bushes, like that of several species of THERIDIUM; and it has also been found in a web similar to that of AGELENA, but open equally at both ends. I had once supposed that this might be the young of M. *undata;* but I am convinced it is a very distinct species, never acquiring a large size. *Habitat.* North Alabama. Summer.

(Biarcuatæ.) 3. MICROMMATA MARMORATA.

Plate XVII. Fig. 5.

Description. Pale gray or whitish; abdomen with an obsolete scolloped band, grayish black; feet, varied with grayish black, 2. 1. 4. 3., or sometimes 2. 4. 1. 3. A large species.

Observations. This spider lives on trees and bushes, where it watches for prey, with extended legs. A female was found in May, in the leaf of a Morus multicaulis. It had made its cocoon there, and surrounded itself with a snow-white tent in all directions. Transferred under a tumbler, it moved its cocoon twice before it could be satisfied with a new location, and made another smooth, white web. It remained constantly by its cocoon, which it embraced closely with its long legs. The cocoon is white, orbicular, and suspended by one thread in the middle of the tent.

Habitat. North Alabama.

4. MICROMMATA CAROLINENSIS.

Plate XVI. Fig. 9.

Description. Testaceous or brownish; cephalothorax with two approximate longitudinal darkish bands on the disc; abdomen with two longitudinal rows of abbreviated lines, and two rows of small dots within these, white; sometimes attaining great size, 1.84, nearly two inches, from the end of the first pair of legs to that of the fourth.

Observations. This spider is found wandering on trees, walls, &c., and sometimes in houses, in search of prey. It is very destructive of flies, and very voracious. Its cocoon, usually made under some large leaves, is white, orbicular. The mother hatches her progeny, and continues with the young for some time after they are come out; the young living together under a common tent. A specimen was found in December, the cephalothorax of which was wider, the lower row of eyes straight, the abdomen small and tapering, with only a few abbreviated lines. Was this a distinct species? A male was found, Alabama, April, measuring over three inches from the end of one of the second pair of legs to the end of the other. *Habitat.* North Carolina, Alabama.

Genus Oxyopes. Latr. (Sphasus, Walck.)

Characters. *Cheliceres elongated, fang short; maxillæ narrow, elongated, tapering towards the tip; lip as long as, or longer than the maxillæ, tapering towards the tip; eyes eight, subequal or unequal, in four rows, two smallest ones forming the first, two largest ones forming the next which is wider, two smaller ones forming the next which is widest, two small ones forming the last which is not as narrow as the first; feet, first pair longest, the second and fourth nearly equal, the third being shortest.*

Habits. Araneïdes wandering after prey, making no web, except around the cocoon, but casting some threads to secure their prey; cocoon conical, surrounded with points, placed in a tent made between leaves drawn together as a covering.

Remarks. The habits of this singular subgenus are very similar to those of the tribe Arboreæ, of the subgenus Dolomedes. They are found on the stems of trees, or on the blossoms of umbelliferous plants, with their legs extended, like Thomisus or Micrommata, and patiently waiting till some unsuspecting insect comes within their reach.

1. OXYOPES VIRIDANS.

Plate XVII. Fig. 2.

Description. Tender grass-green; cephalothorax with small brown spots on the sides and at base; abdomen with yellowish, oval spots, edged with brownish, obliquely turned towards the centre, about four each side; feet and palpi pale, hairy; thighs and palpi with minute black dots beneath; feet, 1. 2. 4. 3. Large size.

Observations. This elegant species is by no means common. It is usually found on umbelliferous plants, where, like a Micrommata or Thomisus, it watches for the insects attracted by the blossoms. A specimen, taken in September, was kept several weeks in a glass vessel, where it soon made a cocoon of a conical form, with small eminences, to which are attached the threads that hold it suspended firmly in the air, as that of THERIDIUM *verecundum*. After it was finished, the mother watched it constantly, never leaving its unprotected family. Unfortunately, a rat, finding its way into the room, ate the watchful parent, leaving the cocoon, out of which the young were hatched on the 14th of October. These were of a deep orange color, measuring full 0.9 inch. The cocoon was of a pale greenish color. These habits show an affinity to MICROMMATA. It is possible that the mother carries its young like LYCOSA.

Habitat. North Carolina, Alabama.

2. OXYOPES SCALARIS.

Plate XVII. Fig. 4.

Description. Gray, varied with white and black; feet hairy.

Observations. This spider is usually found on trees, wandering after prey. It has the habitus of a LYCOSA, and was observed by the writer for some time, before it was discovered that it belongs to a distinct subgenus. It is sought after by, and becomes the victim of the different species of the genus SPHEX, a hymenopterous insect, which makes tubes of clay for the reception of its eggs, and in which it deposits great numbers of spiders, that are benumbed by its sting, but not entirely deprived of vitality, so that they continue alive till, the egg of the Sphex being hatched, the young larva finds in them fresh nourishment. It is common, where found at all.

Habitat. North Carolina.

3. OXYOPES SALTICUS.

Plate XVI. Fig. 10.

Description. Pale or yellowish; cephalothorax with four longitudinal blackish lines; abdomen, above, with various slender, abbreviated, black and brownish lines, underneath whitish, with a longitudinal blank band; feet with very long hairs or bristles.

Observations. This species, usually found in the woods, is extremely active, leaping like an Attus. It is rather rare, but very distinct from any other.

Habitat. North Carolina, Alabama.

4. OXYOPES ASTUTUS.

Plate XVII. Fig. 1.

Description. Cephalothorax golden yellow, with four obscure, subobsolete, narrow bands; pectus with blackish marks each side; eyes, palpi, and trophi at base, black; abdomen greenish, with a silvery tinge; feet grassy green, hairy, 1. 2. 4. 3. or 1. 4. 2. 3.

Observations. This being adult, is much too small to be taken as the male of O. *viridans*. It has some affinity with O. *salticus*, but it is not probable that it will prove to be the male of that spider. When enclosed in a glass tube, it spun a web like that of Theridium, but composed of only a few threads. It was found in April, and also in September, strictly agreeing in size and markings.

Habitat. Alabama. September.

Genus Lyssomanes. Mihi.

Characters. *Cheliceres moderately strong; maxillæ parallel, short, rounded; lip conical, slightly truncated at tip; eyes eight, unequal, in four rows, the first composed of two very large eyes, the second of two smaller ones, placed farther apart, on a common elevation with the two forming the third row, which is narrower, the fourth about as wide, composed of two eyes placed on separate elevations; feet, first pair longest, then the second, then the third, the fourth being the shortest.*

Habits. Araneïdes wandering after prey, making no web, cocoon.

Remarks. The singular spider which serves as the type of this new subgenus could not with propriety remain in the subgenus Attus, in which the position of the eyes is subject to very slight variations. Its habits are analogous. This is the only spider in which the legs diminish in length from the first pair to the fourth.

This subdivision will serve as link between Oxyopes and Attus.

LYSSOMANES VIRIDIS.

Plate XVII. Fig. 3.

Description. Tender grass-green; cephalothorax with some orange-colored hairs near the eyes, and a little black line on its disk; abdomen with six or eight black dots, sometimes wanting. The two lowest large eyes are black, but appear green when seen sideways; the other six eyes stand on four tubercles. Feet hairy, except the thighs, which are bare. 1. 2. 3. 4.

Observations. This elegant species is very active, and apparently fearless, jumping on the hand that threatens it.

Habitat. North and South Carolina.

Genus Attus. Walck. (Salticus, Latr.)

Characters. *Cheliceres strong, not long, except in some males; maxillæ parallel, widening above the insertion of the palpi, cut obliquely above the lip; lip as long as, or longer than, half the length of the maxillæ, widest above the base, bluntly truncated at tip; eyes eight, unequal, in three rows, the first composed of four eyes, the two middle ones largest, the second composed of two very small eyes, placed behind the external ones of the first, the third composed of two larger eyes, placed parallel to the second row; feet varying in length.*

Habits. Araneïdes wandering after prey, making no web, but concealing themselves in a silken valve, for the purpose of casting their skin, or for hibernation.

Remarks. I have formerly stated my reason for preserving the name ATTUS, given by Walckenäer to these araneïdes. The species being very numerous, it would facilitate their study to arrange them in suitable subdivisions; but this is a difficult task. The families proposed by Walckenäer are vaguely characterized and insufficient. The relative position of the eyes offers some variations, but I could not succeed in obtaining satisfactory characters for subdivision from those variations. As the least objectionable mode, I have taken the relative lengths of the legs for the formation of my six families; that classification is somewhat artificial, but so is any other proposed. Moreover, the fifth tribe (that of the Saltatoriæ) offers a very natural subdivision. The third pair of legs, when longest, enables spiders to leap to an astonishing distance. The habits of the subgenus ATTUS will be best described by the history of the different species.

Tribe I. PUGNATORIÆ, *first pair of legs longest and largest, the fourth next.*

(Pugnatoriæ.) 1. ATTUS AUDAX.

Plate XVII. Fig. 6, 7.

Description. Black; abdomen with a spot, several dots and lines, white; cheliceres brassy green; feet with gray and white hairs, 1. 4. 2. 3.

Observations. There is some obscurity in regard to the distinction between this and A. 3 *punctatus*, but there can be little doubt that there are two different species. This spider is very bold, often jumping on the hand which threatens it.

Habitat. Massachusetts.

2. ATTUS INSOLENS.

Plate XVII. Fig. 8.

Description. Deep black; abdomen above, orange-red, with six blackish spots, wholly black beneath; cheliceres metallic green; the tip of the second joint of the palpi and the feet are varied with tufts of white hairs; the rest of the hair is black, except on the abdomen, where it is rufous above; feet, 1. 4. 2. 3. A male.

Observations. This species is probably rare, having occurred only once.

Habitat. North Carolina.

3. ATTUS CARDINALIS.

Plate XVII. Fig. 9.

Description. Scarlet; cephalothorax darker at base; cheliceres scarlet at base, steel-blue at their apex; palpi black; feet black, two last joints rufous at base, 1. 4. 2. 3.

Observations. I do not remember whether this spider was found by me, or given by Mr. Dutton.

Habitat. Southern States?

4. ATTUS CAPITATUS.

Plate XVII. Fig. 15.

Description. Piceous; cephalothorax with a narrow white band each side, and a whitish spot on the disc; second joint of palpi covered with white hairs; abdomen above with a narrow, curved, yellowish white band near the sides, beneath yellowish on both sides; feet with a few white hairs, 1. 4. 2. 3. A male.

Observations. This spider has great affinity with ATTUS *militaris*, but is sufficiently distinct. The female probably differs from this in markings, and possibly is among my descriptions; but this can be established only by future observers, who, after all my labors, have still a wide field before them to perfect the history of the spiders of North America. This was communicated to me by Mr. Thomas R. Dutton, a young naturalist of great perseverance, energy, and discrimination, who collected it in Georgia.

5. ATTUS MILITARIS.

Plate XVII. Fig. 10, 11.

Description. Rufous, varied with brown; cephalothorax with one, sometimes two, white spots; abdomen above with two longitudinal blackish bands, on which are oblong white dots, which near the base are usually joined so as to form a narrow band, beneath whitish with a blackish longitudinal band. Male rufous or piceous; cephalothorax with a spot and a band around the anterior portion, and a narrow longitudinal line on the disc, white; abdomen above with a white band on the margin, which does not quite reach the apex, pale grayish brown beneath; feet, in the female, $\overbrace{1.\ 4.}\ \overbrace{3.\ 2.}$ in the male, 1. 4. 2. 3.

Observations. Much as the sexes differ from each other, I cannot doubt their constituting one species, having repeatedly found them enclosed quietly in the same silk tube, and having always found the males and the females with the characters given above. The spots and markings of these spiders are formed by hairs or scales, which have certain metallic reflections. The motions of this spider are slow, and exhibit caution; it is found usually on trees, and often hibernates under the bark of decaying trunks. The male, remarkable for his enlarged, nearly horizontal cheliceres, is a very bold little fellow, always ready for action, and determined to see all things for himself, raising and turning his head towards the object that approaches him, and usually jumping upon his enemy instead of ingloriously retreating. This species is a common one.

Habitat. North Carolina, Alabama.

6. ATTUS MULTICOLOR.

Plate XVII. Fig. 13.

Description. Cephalothorax black, with a pale, irregular band each side of the disc; abdomen metallic green, with a band at base, and a diagonal spot each side, orange, and with eight small white spots; underneath obscure gray, with reflections of green on the pectus; feet rufous or pale, varied with piceous, 1. 4. 2. 3.

Observations. This species is related to A. *otiosus* and *mystaceus*, but distinct from both by the absence of the tufts of hair on the cephalothorax, and other characters. The palpi are pale yellow, and there is a black band more or less visible on each side of the abdomen.

Habitat. Alabama. June — August.

7. ATTUS SEXPUNCTATUS.

Plate XVII. Fig. 14.

Description. Black; cephalothorax with the two posterior eyes near the base, which is wide and suddenly inclined at nearly a right angle with the upper surface, cheliceres with a strong inner tooth, and a long, curved fang; abdomen with six dots, and a line in front, white; feet, 1. 4. 2. 3., first pair with enlarged thighs and quite long.

Observations. This cannot be confounded with Attus *fasciolatus*, which is also designed from a female. By the characters derived from its cheliceres, it approaches Epiblemum. I suppose it must be a rare species, having never met with any other specimen.

Habitat. North Carolina.

ART. XIV.—DESCRIPTIONS OF SOME NEW AND INTERESTING INSECTS, INHABITING THE UNITED STATES. By JOHN L. LE CONTE. Read November 6, 1844.

THE Scarites subterraneus has long been known to be subject to great variations; but I am not aware that any one has attempted a division of this species, on sufficient grounds. On comparing a remarkably large specimen from Georgia with others from the same locality, I discovered several very evident, though apparently slight, differences; and on continuing the examination with numerous specimens from various parts of our republic, I became convinced that no less than six different species have been heretofore confounded under the name of *subterraneus*. Of these, three are large, and three small. The large ones, as far as I am aware, are never found in the Eastern or Middle States, and the only two, with the habits of which I am acquainted, are invariably found under the bark of dead trees, while the small ones live by burrowing in the earth, under stones and pieces of wood. This difference in habits, conjoined with the variation in size, would, long ago, have justified the formation of at least two species, had the science of entomology been cultivated, on this continent, with the attention that its importance merits.

The indolence of our entomological observers is the more deplorable, as we are few in number, and therefore more is to be expected from each individual. The field of research is still open, and any one who travels in it, with even ordinary care and attention, will not fail, under the numerous stones scattered on its surface, and on the weeds which apparently obstruct his path, to discover as fine insects as have ever graced the cabinet of a Hope or a Dejean. I trust that the day is past, when our insects must be sent to Europe for determination. Are we to be bound by the mere *dictum* of some European entomologist, of equal indolence with ourselves, who chooses to *name* the insects which we have discovered? Where should our insects be better known than in the country which gives them birth; but in what civilized land are they less studied?

These remarks may appear rather high-flown to one who is not interested in the subject; but I trust I may be pardoned for this outburst of feeling, for, with Juvenal, "*siccum jecur ardeat ira*," when I see—shall I say ship-loads?—of our finest insects sent off to Europe, with no authority but a cabinet name, or perhaps not even with that, until some person of more than ordinary industry, into whose hands they chance to fall, describes them, and acquires great praise for doing that which he ought not to have had a chance of doing. Can it be wondered at that there is so much confusion about the synonymy of our species, when they are published in every country of the globe, but that in which they ought to be published?

1. Scarites substriatus. Tab. XVIII. Fig. 1.

Mandibularum parte exteriore sulco lævi, profundo, lineâ elevatâ obliquâ diviso; parte interiore oblique striatâ.

Habitat in provinciis australibus, sub cortice arborum emortuarum. Long. lin. $14\frac{1}{4}-12$, lat. $4\frac{1}{3}-3\frac{1}{2}$.

S. *substriatus*. Haldeman, Proceed. Acad. Nat. Sc. Philad. S. *otus* nobis, MSS.

Caput posticè læve, anticè rugoso-striatum; impressionibus frontalibus magnis, profundis, rugosis, quæ partem intermediam elatam, arcuatam et leviusculam complectuntur; lineaque obliquâ ab angulo anteriore ad impressionem frontalem extendente, cum lineâ transversali vix conspicuâ angulum formante. *Mandibulæ* exterius lineis duabus elevatis, ad apicem conjunctis, quæ sulcum profundum formant, versus basin lineâ alterâ elevatâ, obliquâ divisum, paucisque rugulis indistinctis notatum; interius, sicut in omnibus, obliquè striatæ. *Antennæ* articulis quatuor primis glabris, reliquis pilosis. *Thorax* sublunatus, basi medio leviter emarginatus; impressione transversali anteriore distinctâ, margine remotâ, margine posteriori confluente, vix conspicuâ; basalibus obliquis, brevibus, profundis, leviter punctatis. *Elytra* leviter striata, striis lævibus, tertia punctis tribus impressis, primo propè basin, secundo ad dodrantem elytri, tertio propè apicem sito; margine exteriore, sicut in omnibus, granulato. *Tibiæ* anticæ internè bi-dentatæ, externè sub-quinque-dentatæ, dentibus tribus anticis magnis validis; intermediæ spinis duabus externis.

2. Scarites ephialtes. Tab. XVIII. Fig. 2.

Mandibulis totis obliquè striatis; capite anticè rugoso; impressionibus frontalibus rugosis. Long. lin. 14½, lat. 4½.

Habitat cum priore rarius.

Caput anticè profundè rugoso-striatum, posticè rugis paucis leviter impressis instructum; impressionibus frontalibus magnis profundis, longioribus, rugosioribus; parte intermediâ rugulis indistinctis notatâ, elatiore, lineâque obliquâ sicut in priore impressâ; lineâ transversâ paulo evidentiore. *Mandibulæ*, sicut in priore divisæ, sulco obliquè striatæ. *Thorax* lateribus rugosis, præsertim ad angulum anteriorem; ceteris cum priore quadrat, sed impressione transversâ anteriore a margine minus remotâ, rugisque solitis paulò evidentioribus. *Elytra* striata, striis lævibus, tertia punctis tribus, sicut in priore sitis. *Tibiæ* et *antennæ* sicut in præcedente.

3. Scarites intermedius. Tab. XVIII. Fig. 3.

Mandibularum sulco valdè profundo indiviso, lævi. Impressionibus frontalibus latioribus, rugosis, profundioribus.

Habitat in provinciis occidentalibus. Long. lin. 12, lat. 3½.

S. *intermedius*, Le Conte MS.

S. *subterraneus*, var. Dejean Cat.

Caput anticè rugoso-striatum, posticè rugulis vix conspicuis, præsertim ad oculos; impressionibus frontalibus latioribus, profundioribus, rugosis, lineâque solitâ ad angulum capitis extendente, rugulis paucis notatâ; lineâ transversâ obsoletâ. *Mandibulæ* sulco indiviso, excavato, lævi. *Thorax*, quàm in præcedente, paulo angustior; impressione transversâ anteriore, margine approximatâ ; basalibus parvis, subrotundis, inconspicuè punctatis. Elytra leviter striata, striâ quintâ propè basin dilatatâ, tertiâ ceteris paulo evidentiore. Interstitio quarto puncto ad quartam partem a basi, striâquè tertiâ punctis duobus posterioribus situ solito impressis. Ceteris præcedentes refert.

4. Scarites subterraneus. Tab. XVIII. Fig. 4.

Mandibularum sulco lævi, rugulis solum paucis indistinctis; impressionibus frontalibus lævibus. Long. lin. 9; lat. $2\frac{3}{4}$.

Habitat ubique.

S. *subterraneus*, Auctorum.

Caput læve, impressionibus frontalibus latis, profundis, vix rugosis, parte complexâ minus elatâ ; lineâ obliquâ fortiter impressâ, transversâ, satis distinctâ, foveâque parvâ antè impressionem sitâ. *Mandibulæ* sulco lævi, rugulis paucis indistinctis notato. *Thorax* basi leviter emarginatus, impressione transversâ anteriore, medio subsinuatâ ; lineâ longitudinali profundâ ; impressionibus basalibus leviter impressis, inconspicuè punctatis. *Elytra* thorace paulo angustiora, striata, striis punctatis, tertiâ punctis tribus solitis, sed secundo ad apicem magis approximato. Ceteris præcedentes refert.

5. Scarites affinis. Tab. XVIII. Fig. 5.

Mandibularum sulco lineâ obliquâ elevatâ diviso, lævi ; impressionibus frontalibus rugosis, lineâ obliquâ solitâ satis distinctâ. Long. lin. 9, lat. $2\frac{3}{4}$.

Habitat ubique.

Caput anticè rugoso-striatum, posticè fere læve ; impressionibus frontalibus rugosis, longioribus, lineâ obliquâ et transversâ satis distinctis. *Mandibulæ* sulco lævi, lineâ obliquâ elevatâ diviso. *Thorax* basi læviter emarginatus, rugis paucis ad angulum anteriorem, impressione transversâ anteriore, medio subsinuatâ, margine approximatâ ; longitudinali mediocri ; impressionibus basalibus satis distinctis, leviter punctatis.

Elytra satis profundè striatis, striis lævibus, tertiâ punctis tribus impressis, primo ad trientem, ceteris situ solito. *Tibiæ* anticæ externè 3-dentatæ, dentibus validis.

6. Scarites patruelis. Tab. XVIII. Fig. 6.

Mandibularum sulco profundo, excavato, lævi; impressionibus frontalibus profunde rugosis. Long. lin. 6¾, lat. 2¼.

Habitat in Georgia, sub lignorum fragmentis.

Caput anticè rugosum, posticè læve, rugis paucis ad oculos; impressionibus frontalibus latis, profundis, rugosis, et striatis; lineâ obliquâ solitâ profundè impressâ, rugis quibusdam signatâ, alterâque brevi, levi, aliorsum infra tendente. *Mandibulæ* sulco profundo, excavato, lævi, indiviso. *Thorax* omnino ut in S. *subterraneo*. *Elytra* profundè striata, striis vix punctatis, tertia punctis tribus solitis. Ceteris præcedentem refert.

Cicindela Audubonii. Tab. XVIII. Fig. 7.

Viridis; capite thoraceque æneo-micantibus; elytris margine laterali aureo, fasciâ mediâ sinuatâ, abbreviatâ, guttâ posticâ submarginali, lunulâque terminali albis.

Habitat ad ripas fluminis Yellowstone, apud Fort Union.

Supra viridis; caput thoraxque æneo-micantes: illud inter oculos rugosum, posticè cyaneo-marginatum; oculi brunnei; antennæ æneo-obscuræ; labrum album, medio satis porrecto, acutè tridentato. Thorax granulatus, impressionibus solitis; margine toto viridi-cyaneo. Elytra lævissimè granulata, punctis crebris elevatis nitidis; tenuiter aureo marginata; fasciâ mediâ subsinuatâ, utrinque abbreviatâ, guttâ posticâ juxta marginem, maculâque terminali albo-testaceis. Caput subtus viridi-æneo splendens; thorax subtus cupreus. Abdomen viridi et cyaneo variegatum. Pedes cuprei, tarsis obscuris.

Ornithologo præclarissimo J. J. Audubon, qui a Territorio Missouriensi hanc speciem pulchram cum sequentibus tulit, dedicatur.

Calosoma lepidum. Tab. XVIII. Fig. 8.

Nigrum, elytris nigro-brunneis, profundè striatis, transversè rugosis, foveisque viridi-æneis triplice serie.

Habitat in Territorio Missouriensi.

Latum, sub-convexum, nigrum. Caput rugosum, impressionibus inter oculos latis. Thorax rugosus, anticè vix emarginatus, lateribus valdè rotundatus, margine tenuiter reflexo: basi plana, impressionibus transversis leviter notatis, lineâ longitudinali nullâ: basalibus profundis, fortiter punctatis, ferè cribratis. Elytra nigro-castanea, medio pallidiora, profundè striata, et transversè rugata; foveis viridi-aureis serie triplice impressis, punctoque elevato medio foveæ singulæ.

Specierum omnium Americanarum mihi notarum minima, et formosissima.

C. triste. Tab. XVIII. Fig. 9.

Nigrum, elytris obsoletissimè punctato-striatis, punctisque majoribus triplice serie impressis.

Habitat in Territorio Missouriensi.

Ovatum, subelongatum, posticè subconvexum, nigrum. Caput anticè punctatum, posticè minutè rugulosum; impressionibus leviter notatis, posticè incurvatis. Thorax leviter punctato-rugosus, punctis versus basin majoribus; anticè vix emarginatus, lateribus rotundatis, posticè tenuiter depressis; angulis posticis infra basin ferè planam extendentibus; impressione transversa anteriore nulla, posteriore leviter notata: lineâ longitudinali obsoletâ: impressionibus basalibus ordinariis, profundè punctatis. Elytra obsoletissimè punctato-striata, rugulis paucis transversis, valdè indistinctis; foveolis minimè profundis, quaque puncto mediali elevato, triplici serie impressis.

Calosoma indistinctum, Say, (quod a Comite Dejean sub nomine *luxato* descriptum est,) valde refert, sed majus et elongatius est: striæ foveæque elytrales vix conspicuæ; foveæ autem C. *indistincti* nigro-cyaneæ.

Dytiscus marginicollis. Tab. XVIII. Fig. 10.

Ellipticus, supra viridi-olivaceus, infra brunneus; thoracis limbo, scutello, elytrorum margine pedibusque testaceis.

Habitat in flumine Missouri.

♀ Ellipticus, supra viridi-olivaceus. Caput parte anteriore testaceo, macula angulari, verticali, angulo posticè spectante rubro-testacea: antennæ et palpi testacei. Thorax æqualis, punctis paucis ad latera; testaceo latè marginatus, margine postico medio dilatato. Scutellum testaceum, puncto elevato utrinque. Elytra testaceo-marginata, posticè ad apicem variegata; ponè medium leviter punctata, punctisque obsoletis triplici serie notata. Infra brunneo testaceoque variegatus; abdomen brunneum. Trochanteres postici acuti, divergentes. Pedes testacei; tibiis tarsisque posticis piceo-brunneis.

Mas hucusque latet.

Lamia Bellii. Tab. XVIII. Fig. 11.

Nigra, transversè albo fasciata.

Habitat in Territorio Missouriensi. (Habitat etiam in provinciis australibus.)

Nigra, nitidissima. Caput deflexum, fronte albo irrorato; fasciis duabus lunatis ponè oculos, vertice coadunatis, albis. Antennæ articulo quarto sequentibus vix longiore, corpore paulo longiores, articulis duobus primis pilis grisescentibus. Thorax subcylindricus, impressionibus transversis duabus, basi plana: spinâ magnâ, validâ, acutâ e lateris medio utrinque procedente; anticè et posticè albo marginatus, lineâ perpendiculari subincurvâ, basi dilatatâ ejusdem coloris. Scutellum album. Elytra nigro et albo irregulariter octo-fasciata; margine externo et suturali albis. Subtus densè albo-irrorata, maculâ nigrâ nitidâ utrinque mesosterni. Pedes grisescentes.

In honore Johannis G. Bell, ornithologi illustris, a quo capta erat hæc insignis et pulcherrima species.

Duas alteras exemplas, apud Novum Aurelianum captas, vidi.

ART. XV.—PLANTÆ LINDHEIMERIANÆ; AN ENUMERATION OF THE PLANTS COLLECTED IN TEXAS, AND DISTRIBUTED TO SUBSCRIBERS, BY F. LINDHEIMER, WITH REMARKS, AND DESCRIPTIONS OF NEW SPECIES, &c. By GEORGE ENGELMANN and ASA GRAY.

MR. LINDHEIMER's plan for exploring the botany of Texas, and preparing specimens of dried plants for distribution, was announced in Silliman's Journal for July, 1843. The collection of that season, owing to various misfortunes, having been much smaller than was anticipated, it was thought best to defer its distribution until that for the year 1844 should come to hand. A part of the second collection was lost in the course of transmission to St. Louis; those which were received in sufficient quantity for distribution extend the number to 318. Mr. Lindheimer is now entering upon an unexplored field west of the Colorado River, and we may confidently expect that a rich harvest of peculiar plants will reward his efforts during the present season. This collection will be assorted and distributed without delay, and our account of them duly published in the pages of this journal.

The collection of 1843 was made on Galveston Island, around Houston, on the Brazos, &c. The series commences with some species of RANUNCULUS, allied to *R. pusillus*, which, having been long since distinguished by Dr. Engelmann, and communicated to various botanists under the following names, the characters as assigned by him are here given.

1. RANUNCULUS TEXENSIS (*Engel. MSS.*): caule erecto ramosissimo basi hispido; foliis petiolatis, inferioribus ovatis subcordatis denticulatis, superioribus lineari-lanceolatis, basi petiolorum membranaceo-dilatata bracteisque ciliatis; petalis 5 oblongis sepala ovata obtusa longe superantibus; staminibus plurimis; carpellis subglobosis acutis minutim tuberculosis in capitulum globosum congestis.—Margin of ponds, &c. near

Houston. April. A span to a foot high, with conspicuous bright yellow petals.

2. R. TRACHYSPERMUS (*Engel. MSS.*): caule ramoso glabro; foliis petiolatis, inferioribus plerumque orbiculato-ovatis obtusis subintegris, superioribus lanceolatis lineari-lanceolatisve denticulatis, basi petiolorum membranaceo-dilatata bracteisque subciliatis; sepalis 3–4 ovatis reflexis petala 3–5 minima lineari-spathulata superantibus; staminibus 5–10; carpellis compressis obtusis undique tuberculosis in capitulum oblongum seu cylindricum congestis. — Margin of ponds near Houston, &c. April, May.

3. R. TRACHYSPERMUS, β ANGUSTIFOLIUS (*Engel. MSS.*): foliis omnibus lanceolatis lineari-lanceolatisve; — and γ? (an spec.?) LINDHEIMERI (*Engel. MSS.*): foliis inferioribus ovatis; sepalis 3–5 ovatis obtusis patentibus petala 3 lineari-spathulata æquantibus; carpellis compressis obtusiusculis tuberculosis in capitulum globosum congestis. — Near Houston, &c. but not growing together with No. 2.

4. CLEMATIS CYLINDRICA, *Sims.* A narrow-leaved variety; the herbaceous stem beginning to flower in April, when only a foot or so in height. Houston.

5. C. RETICULATA, *Walt.* Houston. June.

6. ANEMONE CAROLINIANA, *Walt.* Prairies, Houston. February, March.

7. COCCULUS CAROLINUS, *DC.* Houston. June.

8. STREPTANTHUS HYACINTHOIDES, *Hook. Bot. Mag.* t. 3516. West of the Brazos. July.

9. CRISTATILLA EROSA, *Nutt.*; *Torr. & Gr. Fl.* I. p. 123. Sandy prairies on the Brazos. August.

10. CLEOMELLA MEXICANA, *DC.* High prairies west of the Houston. April, August.

11. POLYGALA LEPTOCAULIS, *Torr. & Gr. Fl.* I. p. 130. West of the Brazos. August. — More or less branched. Capsules ovate, with glands along the dissepiment on the face of the valves.

12. P. INCARNATA, *Linn.* Houston. April.

13. KRAMERIA LANCEOLATA, *Torr. in Ann. Lyc. New York*, II. p. 168. The root of Krameria lanceolata is ligneous, 2 to 3 lines thick, and very long, of a dark red color, and has the same chemical and medicinal properties as the South American *Ratanha*, (root of K. triandra, *R. & P.*) As the plant appears to be common in some parts of Texas, it might become valuable for collection and export.[1]

14. DROSERA BREVIFOLIA, *Pursh*. Galveston Island. April.

15. HELIANTHEMUM CAPITATUM, *Nutt*. (ex *Torr. & Gr. Fl.* I. p. 151.) H. polifolium, *Torr. & Gr. l. c.*, which name is preoccupied in the genus. The clusters are seldom capitate. May.

16. LECHEA DRUMMONDII, *Torr. & Gr. Fl.* I. p. 154. With the preceding.

17. HYPERICUM GYMNANTHUM (*n. sp.*): annuum, caule simplici vel superne ramoso erecto quadrangulari; foliis e basi cordata ovatis ovati-oblongisve amplexicaulibus 5–7-nerviis pellucido-punctatis; cyma dichotoma pedunculata strictiuscula laxiflora aphylla, nempe foliis floralibus in bracteis parvis lanceolato-subulatis diminutis; floribus pedicellatis; sepalis lanceolatis acutis petala superantibus; staminibus 10–12;

[1] Professor A. Braun, after examining the flowers of species of this genus, has suggested that the natural affinity of *Krameria* is with *Leguminosæ*, rather than with *Polygalaceæ*. And, indeed, at least in this species, the two lateral glandulous petals *cover* in æstivation the stamens; they cannot therefore belong to an interior circle, as Bentham supposes. The ovary is one-carpellary (against the type of *Polygalaceæ*) and irregularly one-sided, like the ovary of *Leguminosæ*; it is imperfectly bilocular, by the inflection of the placenta, as in some *Leguminosæ*; but in both cases are the cells always side by side; on the contrary, in *Polygalaceæ* one is before the other. *Krameria* may, then, be considered a pentandrous *Leguminosa*, where one or two stamina are abortive. In *K. lanceolata*, it is the lowest stamen, opposite the three connected petals, which is wanting; but, in some flowers, a sterile filament occupies this place; it corresponds with the free 10th stamen of most papilionaceous flowers, as the four others, which are united in *K. lanceolata*, are analogous to the tube of nine connected filaments. The lateral sessile petals correspond with the carina, and the three others, whose claws are connected, with the alæ and carina; the five sepals alternate with them, as the stamens alternate with the petals. The fruit resembles somewhat the indehiscent spiny legume of an *Onobrychis*; and, in all the specimens we have examined, it is one-seeded when ripe. *Engel. MSS.*

capsula ovato-conica calycem vix superante uniloculari; seminibus flavis longitudinaliter costatis. — Clayey soil in pine woods near Houston. June. Also in Louisiana, Arkansas, &c. not uncommon. This is the plant mentioned in *Torr. & Gr. Fl. N. Amer.* under *H. mutilum.* It appears so different from the ordinary form of that species, that we are obliged to separate it. It varies from 6 to 20 inches in height.

18. Paronychia Drummondii, *Torr. & Gr. Fl.* I. p. 170. July.

19. P. setacea, *Torr. & Gr. l. c.* West of the Brazos, with the preceding, &c.

20. Silene Antirrhina, *Linn.* var. subglabra; and

21. var. lævigata; the leaves smooth, and with smooth margins. Galveston.

22. Linum Berendieri, *Hook. Bot. Mag.* t. 3480. Sandy downs of Galveston Island. April, May. Perennial? No doubt distinct from L. *rigidum.* Styles connate above the middle. The name should, if we mistake not, be *L. Berlandieri.*

23. Xanthoxylum Carolinianum, *Lam.* "*Pepper-tree, Toothache-tree.*" March.

24. Sida Lindheimeri (*n. sp.*): annua? puberula; caule erecto ramoso; foliis linearibus vel oblongo-linearibus serratis basi subcordatis; stipulis lanceolato-setaceis petiolum subæquantibus; pedunculis folium demum æquantibus; carpellis 10–12 reticulato-rugosis, apice breviter birostratis extus pubescentibus et angulo interno in dentem subuncinatum brevem introrsum productis. — Prairies east of the Brazos. June to August. (Also collected in Louisiana by Dr. Carpenter.) About 2 feet high; the leaves 1–2 inches long, and 2–4 lines wide. Peduncles articulated about three-fourths of an inch below the fruit. Flowers (the yellow corolla an inch or more in diameter) and fruit larger than in S. *rhombifolia*, from which the carpels of the present species differ by their shorter and blunter horns, reticulated sides, and by the tooth project-

ing from the internal angle at the summit. *S. Elliottii* has narrower leaves, shorter peduncles, and about 9 orbicular carpels, which are only slightly bimucronate.

25. Malvaviscus Drummondii, *Torr. & Gr. Fl.* I. p. 230. Wet places, Houston. August. Leaves 4 or 5 inches in breadth. This proves to be a very ornamental plant in cultivation.

26. Vitis bipinnata, *Torr. & Gr.* Prairies, Houston. June.

27. Vicia Ludoviciana, *Nutt.* Galveston and Houston. April.

28. Vigna glabra. Savi? Thickets, Houston, &c. June, July. — The plant is hirsute, but the leaves are almost glabrous when old; the flowers hardly larger than those of the garden bean; the vexillum pale yellow, the carina deep yellow. Legume compressed, somewhat torulose, black, hirsute with whitish hairs; the seed black, with a white hilum. The leaflets are broadly oval; but there is a variety β angustifolia, which has lanceolate or linear-lanceolate leaves. Near brackish water on the coast of Galveston Bay. July.

29. Rhynchosia minima, *DC.; Torr. & Gr. Fl.* I. p. 687. Houston. September.

30. R. menispermoidea, *DC.* With the preceding, in hard, clayey soil.

31. Daubentonia longifolia, *DC.* Houston. August.

32. Tephrosia onobrychoides, *Nutt.* A variety with silvery pubescence, and somewhat persistent stipules. Flowers white, soon turning to pale scarlet; the vexillum green in the middle. Prairies from Houston to the Brazos. April, August.

33. T. Virginiana, *Pers.*, and

34. Indigofera leptosepala, *Nutt.* Houston and the Brazos. June, July.

35. Psoralea rhombifolia, *Torr. & Gr. Fl.* I. p. 303. Sandy places, Galveston Island, May. (Also collected by Dr.

Wright.) Stems diffuse, decumbent, from a filiform, often tuberiferous root. Leaflets of the lower leaves orbicular, of the upper rhombic-ovate and mostly acute. Peduncles in our specimens commonly shorter than the leaves. Legume membranous, suborbicular, rostrate, *transversely dehiscent;* the upper part strigose-pubescent, the lower glabrous and somewhat rugose. Seeds orbicular, compressed. The singular transverse dehiscence of the pod appears to confirm the opinion that Psoralea belongs to the tribe Hedysareæ.

36. P. OBTUSILOBA, *Torr. & Gr. l. c.* Dry prairies east of the Brazos, flowering early in the season. Legumes glandular. The allied, but distinct, P. *floribunda* is wrongly described as "canescent but not glandular," whereas the plant is generally glandular, often very much so.

37. AMORPHA PANICULATA, *Torr. & Gr. Fl.* I. p. 306. Thickets, Galveston Bay, and west of the Brazos. June, July. A stately plant, 6 to 9 feet high, the long spikes clustered in ample panicles.

38. A. GLABRA, *Desf.; DC. prodr.* 2. p. 256. Wet prairies, Houston, &c.

39. DALEA AUREA, *Nutt.* West of the Brazos. June to August.

40. PETALOSTEMON OBOVATUM, *Torr. & Gr. Fl.* I. p. 310. Brazos. August.

41. P. PHLEOIDES β MICROPHYLLUM, *Torr. & Gr. l. c.* Sandy elevations in the prairies west of the Brazos. July.

42. P. VIOLACEUM, *Michx.:* a pubescent variety.

43. P. MULTIFLORUM, *Nutt.* On the Brazos. August.

44. TRIFOLIUM REFLEXUM, *Linn.* Galveston. May.

45. ASTRAGALUS NUTTALLIANUS β TRICHOCARPUS, *Torr. & Gr. Fl.* I. p. 334. Coast of Galveston Island, on soil composed of fragments of shells; while A. *Nuttallianus* is found in prairies in the interior of the island. The present variety, if such it be, has rather shorter as well as hairy pods, with usually 7–8 seeds in each cell, while in the true A. *Nuttallianus* there are commonly 10–12.

46. A. LEPTOCARPUS, *Torr. & Gr. l. c.* April, with the preceding.

47. MIMOSA STRIGILLOSA, *Torr. & Gr. Fl.* I. p. 399. Tetramerous, octandrous. Hard clayey soil. April, June. — We have this plant in cultivation. The foliage is nearly as sensitive to the touch as M. *pudica.*

48. NEPTUNIA LUTEA, *Benth. in Hook. Jour. Bot.* IV. p. 356. Acacia lutea, *Leav.; Torr. & Gr. l. c.* Moist prairies, April — June.

49. ACACIA HIRTA, *Nutt. in Torr. & Gr. l. c.*; and

50. β GLABRIOR. Dry, open woods around Houston; May, June, and frequently flowering again in September.

51. ACACIA FARNESIANA, *Willd.; Benth.* Nearly the only shrub on Galveston Island, where it attains the height of 6 or 7 feet, and forms considerable thickets. Its odorous flowers are produced in April or May. Certainly indigenous to Texas, and probably also to Florida.

52. LYTHRUM ALATUM, var. γ, *Torr. & Gr. Fl.* I. p. 482. "L. *foliosum,* n. sp." *Engel. MSS.* (who has noticed two states, viz., 1. *stamineum;* filaments as long as the darker colored petals, the style not exceeding the calyx, and the ovary frequently sterile? 2. *stylosum;* filaments as long as the calyx only, the style as long as the apparently smaller and paler petals, or longer.) But, if a distinct species, it will fall under L. *lanceolatum,* Ell.

53. ŒNOTHERA DRUMMONDII, *Hook.* Downs of Galveston. April, May; also in the autumn.

54. Œ. LINIFOLIA, *Nutt.* Galveston Island.

55. Œ. SPECIOSA, *Nutt.* Houston. April, May.

56. Œ. RHOMBIPETALA, *Nutt. in Torr. & Gr. Fl.* I. p. 493. This handsome species, so remarkable for its acute or acuminate petals, has been cultivated in the botanic garden of Harvard University from seeds received from Mr. Lindheimer. His specimens have broader leaves and petals than those from Arkansas; the upper leaves ovate-lanceolate, closely sessile and somewhat cordate. The pods are cylindrical-prismatic, some-

what hairy and often incurved. (*Œ. bifrons*, Don, has rounded petals.) Galveston to the Brazos. June, July.

57. Ludwigia hirtella, *Raf.*; *Torr. & Gr. l. c.* Houston.

58. L. linearis, var. puberula: caule ramosissimo angulato foliisque junioribus minutim puberulis; lobis calycis triangulari-lanceolatis acuminatis tubum æquantibus capsula elongato-turbinata subpedicillata dimidio brevioribus; petalis flavis conspicuis. — Prairies and road-sides, Houston. June, September. Also in Alabama, Louisiana, &c.; these characters gradually shading away into the ordinary L. *linearis*, in its branching forms, so that we cannot consider it as a distinct species.

59. Jussiæa decurrens, *DC.* Houston, &c.

60. Gaura sinuata, *Nutt.* Steep river-banks, &c., west of the Brazos. August.

61. Gaura Lindheimeri (*n. sp.*): perennis, erecta, virgato-ramosa, strigoso-pubescens vel hirsuta; foliis infimis spathulatis lyrato-pinnatifidis sinuatisve, caulinis sessilibus lanceolatis acutis sinuato-dentatis vel undulatis, supremis plerumque integris; bracteis ovato-lanceolatis acuminatis scariosis caducis; calycis tubo ovarium sessile æquante segmentis (in alabastro hirsutis) multo breviore; petalis 4 spathulato-rhomboideis breviter unguiculatis subadscendentibus staminibus 8 styloque deflexis paulo brevioribus; nuce tetraquetra circumscriptione ovali utrinque acuta, faciebus usque ad medium carinato-costatis fere lævigatis. — Prairies from Houston to the Brazos, flowering from April to May, and through the summer. In the botanic garden of Harvard University, where it is cultivated from seeds collected by Mr. Lindheimer, it also flowers through the whole summer, and proves to be a very showy and elegant species. It attains the height of from 3 to 6 feet, and its copious racemose branches produce a long succession of blossoms which are of a large size for this genus. The petals, which are often three-fourths of an inch long, are pure white changing to rose color; the calyx is reddish. Flowers always tetramerous and octandrous. This is probably the

same as the Texan plant referred by Spach to G. *tripetala*, Cav.; but it does not agree with the figure of Cavanilles, nor exhibit any trimerous flowers.

62. Eryngium coronatum, *Torr. & Gr. Fl.* I. p. 604. Bottom woodlands on the Brazos. August.

63. Cynosciadium pinnatum, *DC.* β pumilum. Differs from the larger and erect form (which is usually a foot or two in height,) in its low and diffuse stems, its umbellets with only four or five rays, and few or no involucral leaves. Prairies, Galveston. April, May.

64. Leptocaulis echinatus, *Nutt.* Galveston Island.

65. Discopleura capillacea, *DC.* Galveston. May.

66. Spermacoce glabra, *Michx.* Near Houston. Sept.

67. Mitreola petiolata, *Torr. & Gr.* Swampy thickets west of Houston.

68. Polypremum procumbens, *Linn.* Houston. June.

69. Hedyotis Boscii, *DC.* Houston. May and June.

70. Vernonia angustifolia, var. γ *Torr. & Gr.* Wet prairies west of the Brazos. July.

71. Liatris elegans, *Willd.* Houston to the Brazos.

72. L. acidota. = L. mucronata, *Torr. & Gr. Fl.* II. p. 70, non *DC.* Houston to the Brazos, in wet praries. August, September. In the Flora of North America, this species, which is apparently common in Western Louisiana and Texas, was hesitatingly referred to L. *mucronata, DC.*, from the character of which it differs in some respects, principally in the form of the involucral scales. But among Lindheimer's plants, some specimens of what is no doubt the true L. *mucronata, DC.* occur, (which have been distributed in some sets, probably mixed with L. *acidota,*) and which render it clear that the present is a different, although very nearly allied species. We have accordingly given a new name. The diagnosis may be expressed as follows; the habit, foliage, &c. being nearly the same in both; and the involucral scales more or less ciliate when young.

L. *mucronata*: capitulis in spicam strictam arcte digestis;

invol. squamis ovalibus obtusis abrupte mucronatis; pappo plumoso achænio pubescente vix longiore; caudice globoso. — Capitula (3–5 flora) et flores magnitudinis illorum L. *tenuifloræ.* Texas, *Berlandier, Lindheimer;* near Houston, and near the mouth of the Brazos.

L. *acidota:* capitulis in spicam strictiusculam sæpius elongatam digestis; invol. squamis oblongo-lanceolatis (extimis tantum ovatis) purpurascentibus, sensim acuminato-cuspidatis; pappo plumoso achænio puberulo subglabrove longiore; caudice perpendiculari incrassato e cormo globoso. — Capitula (sæpius 3-flora) squamæ floresque iisdem L. *mucronatæ* duplo majora. Western Louisiana, *Hale.* Texas, *Drummond, Lindheimer.*

73. L. ACIDOTA, β VERNALIS: caulibus humilibus (spitham. — pedal.) multicipitibus; spicis brevibus laxiusculis; capitulis sæpius 4–5-floris. —Wet, sandy prairies, near Houston. April, May.

74. L. PYCNOSTACHYA, *Michx.* Houston to the Brazos. August.

75. EUPATORIUM ROTUNDIFOLIUM, *Linn.* Houston. Aug.

76. E. INCARNATUM, *Walt.* Thickets near Houston. September — October. (This delicate species, which is quite rare in herbaria, grows abundantly on the rocky banks of the French Broad River, North Carolina, about ten miles below Asheville.)

77. MIKANIA SCANDENS, *Willd.* Houston, &c.

78. ASTER PHYLLOLEPIS, *Torr. & Gr. Fl.* II. p. 113. Prairies, Houston. June — October.

79. ERIGERON SCAPOSUM, *DC.* Quicksands of the downs of Galveston Island. April, and continuing to flower until October.

80. GUTIERREZIA TEXANA, *Torr. & Gr. Fl.* II. p. 194. Dry, barren soil, Houston. September — October.

81. SOLIDAGO NITIDA, *Torr. & Gr. l. c.* Prairies on Chocolate Bayou, 50 miles south of Houston. September, October.

82. S. TENUIFOLIA, *Pursh.* Wet prairies. October.

83. S. LEPTOCEPHALA, *Torr. & Gr. l. c.* Wet prairies, Houston. September.—We have two forms; one with broader leaves and larger heads, bearing about 5 disk and 11 ray-flowers; another, with narrower leaves and smaller heads, which have about 3 disk and 10 ray-flowers.

84. S. BOOTTII, *Hook.; Torr. & Gr. l. c.* Houston. July—September.

85. S. TORTIFOLIA, *Ell.* With the preceding.

86. BIGELOVIA NUDATA, β VIRGATA, *Torr. & Gr. l. c.* Prairies on Chocolate Bayou. September.

87. BRADBURIA HIRTELLA, *Torr. & Gr. Fl.* II. p. 250. Prairies, in hard, clayey soil, west of the Brazos. July, August.—The flowers of this very interesting and pretty plant are certainly yellow (a point which could not be positively determined from Drummond's specimens,) and the genus was therefore rightly placed in the homochromous series.

88. HETEROTHECA SCABRA, *DC.* Houston, &c. July.

89. CHRYSOPSIS GRAMINIFOLIA, *Nutt.;* and

90. C. PILOSA, *Nutt.* Houston, &c.

91. AMBROSIA CORONOPIFOLIA, *Torr. & Gr. l. c.* Subsaline prairies, Galveston Bay, &c. July.

92. BERLANDIERA TOMENTOSA, β DEALBATA, *Torr. & Gr. l. c.* Sandy prairies west of the Brazos. June.

93. ZINNIA MULTIFLORA, *Linn.* With the preceding.

94. ECHINACEA ANGUSTIFOLIA, *DC.* Pine woods near Houston. April, May. The slender and original form of this species, which varies much as does E. *purpurea.* The peduncles are scarcely incrassated at the summit, the head hemispherical, with 8 to 13 narrow, rose-colored rays. The northern form, (E. *sanguinea,* Nutt.) is a much stouter plant, the peduncle much thickened at the summit, the head twice the size, and at length conical, with 12 to 16 dark red rays. Both forms are quite variable.

95. RUDBECKIA ALISMÆFOLIA, *Torr. & Gr. l. c.* Houston to the Brazos.

96. Helianthus cucumerifolius, *Torr. & Gr. Fl.* II. p. 319. Sandy soil, west of the Brazos. July, August. The mottled stems, with the leaves all cordate and coarsely toothed, and the narrow involucral scales quite reflexed and tapering gradually into long subulate points, are uniform in all the specimens. The foliage is deep green.

97. H. præcox (*n. sp.*): annuus vel biennis; caule hispido ramoso; foliis alternis longe petiolatis (subcinereis) leviter serratis deltoideo-ovatis in petiolum abrupte attenuatis, infimis tantum cordatis; pedunculis elongatis monocephalis; involucri foliolis lanceolatis, subulato-acuminatis discum vix superantibus; corolla fl. disci atro-purpurea gracili; achenio piloso; paleis pappi lanceolatis puberulis. — In loose sandy soil impregnated with salt, Galveston Island. April and May; in cultivation flowering from June to October. Plant $1\frac{1}{2}-2\frac{1}{2}$ feet high; the heads about as large as in H. *cucumerifolius*, to which it is nearly allied; but from which it is constantly distinguished by its smaller size, the slightly toothed and seldom cordate leaves, the broader and more abruptly pointed involucral scales, the slender disk-corollas, the nearly flat (instead of hemispherical) disk in fruit, &c., &c.

98. H. occidentalis β plantagineus, *Torr. & Gr. l. c.* Bottom lands, south of Houston. August, September.

99. H. rigidus, *Desf.* Fertile prairies. June — August.

100. H. angustifolius, *Linn.* Wet prairies. June — Aug.

101. Coreopsis Drummondii, *Torr. & Gr. l. c.* Sandy downs of Galveston Island. May — October.

102. C. tinctoria, *Nutt.* Prairies on Galveston Island.

103. Gaillardia picta, *Don.* Galveston Island, on a soil formed of fragments of shells. May.

104. G. amblyodon, *Gay.* In sandy or gravelly soil, west of the Brazos. May — July. This species is equally showy with the preceding in cultivation: the copious rays are deep reddish-flame-color, with brown-purple at the base, and underneath.

105. G. lanceolata, *Michx.* Galveston Island, &c.

106. Palafoxia Texana, *DC.* Wet prairies, Houston. August. Annual, as is P. *Hookeriana* also.

107. Hymenopappus artemisiæfolius, *DC.* Open oak woods, &c.; west of Houston, &c.; flowering from March to September. Radical leaves very variable.

108. Helenium tenuifolium, *Nutt.* Open woods. September.

109. Leptopoda brachypoda, β (purpurea.) *Torr. & Gr. Fl.* II. p. 388. May.

110. Marshallia cæspitosa, *Nutt.* Dry prairies, Houston, &c. The specific name is singularly inappropriate, at least as applied to the Texan plant; for the stems are single, scattered, and not at all cæspitose. The lowest leaves are often lanceolate-oblong or spatulate.

111. Egletes Arkansana, *Nutt.*; *Torr. & Gr. Fl.* II. p. 411. (E. Texana, *Engel. MSS.*, but agrees very well with the original Arkansan plant. A. Gr.) Downs of Galveston Island, April, May, and also in November, when it has very diffuse and decumbent stems, somewhat woody at the base; but the plant is surely annual. After flowering, the tube of the corolla of the outer disk-flowers, as well as those of the ray, become enlarged and corky at the base; and the inner part of the disk is sterile. It is quite a handsome plant in cultivation. The numerous rays are pure white above, and usually marked with pink underneath.

112. Gnaphalium purpureum, *Linn.* var. (G. spicatum, *Lam.?*) April.

113. Cirsium Virginianum, *Michx.* Open woods. March to May.

114. Centaurea Americana, *Nutt.* Moist fertile prairies, Houston. July.

115. Pyrrhopappus Carolinianus, *DC.* Dry prairies. May, June.

116. Lobelia glandulosa, *Walt.* Wet prairies and woods. September. A more or less scabrous form: bracts lanceolate from a broad base; the sinuses of the calyx very slightly re-

flexed. The specimens collected in shady places are less rough; the tube of the calyx is either hispid or nearly glabrous.

117. VACCINIUM ARBOREUM, *Marsh.* Woods. April.

118. ASCLEPIAS PAUPERCULA, *Michx.* Swamps near the coast. Stem 4–6 feet high. Root tuberous. June.

119. SEUTERA MARITIMA, *Reichenb.*, *Decaisne.* (Lyonia, *Ell.*) Wet, saline prairies, Galveston, &c. May.

120. SABBATIA CAMPESTRIS, *Nutt. Contrib. Fl. Arkans. &c.* Flowers April to May, and again in August and September; in dry prairies.

121. S. CALYCOSA, *Pursh:* a variety with rather longer calyx lobes than usual. Shady margins of streams near Houston. May, June.

122. GILIA CORONOPIFOLIA, *Pers.; Benth. in DC. Prodr.* VIII. p. 313. Dry prairies and open woods. June, July.

123. CUSCUTA NEUROPETALA, *Engel. in Sill. Jour.* XLV. p. 75. β MINOR. A smaller, earlier flowering form, growing in drier places, mostly on Petalostemon multiflorum, but also on Liatris, and even on Euphorbia corollata. It approaches C. *hispidula* so much that, not improbably, further investigation of living plants may prove both to be only varieties of a single species, for which the name of C. *porphyrostigma* would be most appropriate, as all the forms that would belong to it, are distinguished from every other known North American species by the purplish-brown stigmas. Another remarkable variety is:

124. C. NEUROPETALA, *Engel.* γ LITTORALIS: cymis paniculatis; floribus majoribus pedunculatis; tubo corollæ late campanulato calycis segmenta late ovata acutiuscula subcarinata et lacinias limbi enervias ovatas abrupte acuminatas crenulatas patentes subæquante; squamis tubum subæquantibus. — Seashore of Galveston Island, on Lycium Carolinianum, Borrichia frutescens, Iva frutescens, &c. Flowers in May. Different from the inland form by the much larger, more openly campanulate flowers, expanding in spring; by the hardly carinate, broader, and not so acute sepals, and the broad lobes of the

corolla, which are rarely somewhat nerved; stigmata also purple, and anthers purple or yellow. (*Engel.*)

125. C. CUSPIDATA (*Engel.* n. sp.): caule filiformi ramosissimo; floribus pedunculatis in cymas laxas bracteosas dispositis 5-fidis; tubo corollæ cylindrico sepala usque ad basin libera ovata concava (exteriora cuspidata) et lacinias limbi ovatas acutiusculas uninervias erectas s. patentes superante; staminibus limbo brevioribus; squamis ovatis fimbriatis tubum subæquantibus; stylis filiformibus ovario (minuto) globoso pluries longioribus; capsula globosa corolla marcescente obtecta. —Var. α. PRATENSIS: floribus minoribus; calyce bracteis paucis involucrato; tubo corollæ subcylindrico calycis et corollæ segmentibus paulo longiore; staminibus limbi laciniis ovatis acutiusculis duplo brevioribus; stylis ovarium parvum duplo superantibus. — Dry prairies west of the Brazos, on Tephrosia, Bradburia, Ambrosia, &c. June. — Var. β. HUMIDA: floribus majoribus; calyce bracteis pluribus involucrato; tubo corollæ infundibuliformi calycis et corollæ segmenta duplo superante; staminibus laciniis limbi lanceolatis acutis paulo brevioribus; stylis ovarium minutum quater superantibus. Bottom lands of the Colorado, on Iva ciliata, Ambrosia trifida, &c. August, 1844, (No. 276, infra.) — A remarkable species. The stems are very much branched, filiform; inflorescence loose paniculate, pedicels with many cuspidate bracts, some of them surrounding the calyx like an involucrum, similar in shape but smaller than the sepals; sepals somewhat lacerate or crenulate, ovate, carinate, (the carina less distinct in the var. β,) cuspidate, interior ones rather obtuse, all concave, loosely imbricated. Lobes of corolla thin membranaceous, with a strong middle nerve, formed by large oblong or linear cells; when dry, convolute; the exterior ones generally somewhat cuspidate, the interior ones obtuse; at the base the lobes are dilated and cover one another, more than in any other North American species. Styles remarkably slender and long, about the length of the stamens, but elongated after flowering, when the corolla assumes an urceolate shape, and finally covers like a

hood the upper part of the globose capsule.—It appears to be an intermediate form between *Cuscuta* proper and *Lepidanche.* The var. β has larger and thinner flowers, of paler color, and the lobes of the corolla lanceolate and acute. *Engel.*

126. C. PENTAGONA, β CALYCINA, *Engel.* Wet prairies. June.

127. C. VERRUCOSA, *Engel. l. c.* Dry prairies. July.[1]

[1] An undescribed North American species, collected in the Alleghanies of Virginia and North Carolina by Dr. Gray and Mr. Sullivant, in the autumn of 1843, is here appended. (This was named C. *oxycarpa,* n. sp.; but, just as these sheets are going to press, Dr. Engelmann writes that Mr. Shuttleworth has distributed the same plant from Rugel's collection, with a printed label, under the name of C. *rostrata,* which he therefore now substitutes for his own. A. GR.)

C. ROSTRATA (*Shuttlew. in coll. Rugel*): caule ramoso; floribus pedunculatis cymoso-umbellatis 5-partitis; tubo corollæ globoso-campanulato calycis segmenta ovata obtusa leviter crenulata et lacinias limbi ovatas obtusas patentes (demum reflexas) duplo superante; staminibus limbum subæquantibus; squamis fimbriatis (convergentibus?) basi inter se connatis; stylis filiformibus ovarium stylopodio ejusdem longitudinis coronatum pyriforme subæquantibus; corolla marcescente ad basin capsulæ (maximæ) acutatæ persistente.—Alleghany Mountains from Virginia to South Carolina, (*Mr. Buckley!* 1842.) *Prof. Gray* and *Mr. Sullivant!* 1843.—August to October.—Particular localities recorded by Messrs. Gray and Sullivant are: Grandfather and Negro Mountains, N. Carol.; Tygart's Valley, Va.; and "common in moist, shady ravines in western Virginia." The specimens which came under my observation grow on Urtica, Rubus, Aster, Solidago, Rudbeckia, and some other plants.

After repeated and careful investigation, and with some hesitation, I have admitted this mountain plant as a distinct species, different from C. *vulgivaga.* The large pointed capsule would seem to characterize it at once; but C. *vulgivaga* offers so many different forms and sizes of the capsule, that other characters were necessary; and they are found in the tissue of the corolla, which is ever destitute of the large pellucid dots constantly observed in C. *vulgivaga,* but is composed, especially about the tube, of regular, somewhat elongated, hexangular cells, easily distinguishable in dried specimens with a common glass. In the common species, the cells are linear, mostly much elongated, interspersed with the large air-cells, which have been frequently mentioned. The flowers are mostly twice as large as in C. *vulgivaga,* but of the same shape and proportion, about 2, and sometimes (especially in Tygart's Valley specimens) 3 lines long; but the elongated ovary, whose stylopodium is nearly as long, though only half as thick, as the ovary proper, distinguishes it at once even from those forms of C. *vulgivaga* where the stylopodium is unusually large. The filiform styles are at first about the length of the stamina, but soon after they are long exserted. The capsule is very large, fully 3 lines long, globose, attenuated to a bifid point; it is larger and more acute than in any other known American species.—During the same journey, the following species was abundantly collected:

C. (LEPIDANCHE) COMPACTA (*Choisy*): caule ramoso; floribus sessilibus glomeratis 5-partitis; sepalis sub-novem leviter crenulatis orbiculatis concavis adpressis,

128. Ipomæa sagittata, *Desf.; Choisy*. June — Sept.

129. Convolvulus aquaticus, *Walt.* Wet prairies west of the Brazos. Often 10 feet long. July.

130. Nama Jamaicensis, *Linn.?* Sandy prairies, &c. near the Brazos. June. Annual.

131. Lithospermum tenellum, *Nutt. in Trans. Amer. Phil. Soc. (n. ser.)* V. p. 88. On the Brazos, &c. April — August.

132. Heliotropium curassavicum, *Linn.* Galveston, &c.

133. H. inundatum, *Swartz; DC. prodr.* 9, p. 539. Banks of the Brazos. June.

134. Eutoca hirsuta = Phacelia hirsuta, *Nutt. in Trans. Amer. Phil. Soc. l. c.* p. 191. Pine woods near Houston. March and April. Corolla with 5 very obscure pairs of squamellæ at the base of the tube. Ovary 5–10-ovuled. (Vide No. 279, 280, infra.) Also Texas, Drummond's Coll. 3, No. 299.

interioribus minoribus; tubo corollæ cylindrico calycem et lacinias limbi lineari-oblongas obtusas duplo superante; staminibus limbo brevioribus; squamis pinnatifido-laciniatis; ovario cum stylopodio stylos subæquante; capsula globosa subacuta corolla marcescente obtecta 1–4-sperma. — North Carolina to Alabama, in the mountains, on shrubs, frequently on evergreens; on *Corylus rostrata*, Buncombe Co., N. Carol.; on the same, and on *Andromeda axillaris* or *spinulosa*, on the sides of Negro Mountain, N. Carol., *Prof. A. Gray* and *Mr. W. S. Sullivant;* in Alabama, on *Prinos glaber*, *Dr. Gates*, (*Herb. Gray.*)

This is clearly the *Cuscuta compacta* of Choisy's monograph, (and of *DC. prodr. excl. syn.*) described after specimens collected in Alabama and Georgia; the notice in Silliman's Journal, Vol. XLIV. p. 195, must therefore be corrected. — It is very near *Cuscuta* (*Lepidanche*) *adpressa*, which thus far has only been found on the bottom lands of the Mississippi and Illinois Rivers. This is again a remarkable instance of two nearly allied species, one growing in the mountainous region of the Southern States, the other one in the western lowlands. Analogies offer in *Baptisia alba* and *leucantha*, *Phacelia fimbriata* and *Purshii*, and others. The mountain species is distinguished from its western relative by the closer and compacter glomerules, and much more slender and mostly smaller flowers. The tube of the corolla exceeds the compact scales of the calyx considerably, and is much narrower in proportion to its length; it gives, therefore, to the capsule which it covers, a much more pointed appearance, though the capsule itself is nearly globose. This appearance of the vestiges of the corolla on the capsule distinguishes this species from *C. adpressa* just after flowering. The corolla appears to be more membranaceous than in the western species, and remains whitish when well preserved in the herbarium; the other usually turns reddish-brown.

135. Solanum Texense (*n. sp.*): perenne, inerme, tomento stellato incanum; caule (pedali) herbaceo erecto ramoso; foliis (2–4-unc.) petiolatis lanceolatis undulatis sinuato-dentatis integerrimisve sparsis; racemis terminalibus; pedunculis flore longioribus fructiferis deflexis; calyce 5-fido; corolla violacea extus ad carinas stellato-pubescente; staminibus æqualibus; baccis flavis. — Road-sides, prairies, &c., Houston to the Brazos. June — September. (This is also No. 200 of Drummond's Third Texan Collection. We likewise have specimens from Dr. Wright.)

136. Physalis pubescens? (P. maritima, *M. A. Curtis, MSS.*) Coast of Galveston Island. April — November.

137. Herpestis Monniera, *Humb. & Kunth.* Wet places. June, July.

138. Conobea multifida, *Benth. in DC. prodr. & Torr. & Gr. Fl. ined.* (Capraria, *Michx.*) Brazos. July.

139. Buchnera elongata, *Swartz, Benth. l. c.* Galveston to the Brazos. April, May, and again in July. Flowers smaller than in B. *Americana*, the teeth of the calyx and bracts less acuminate.

140. Herpestis nigrescens, *Benth.* Brazos, &c. August.

141. Gerardia spiciflora, *Engel. MSS.* G. maritima β grandiflora, *Benth. in DC. prodr. ined.* Margin of brackish ponds, Galveston Island.

142. Pentstemon Cobæa, *Nutt. in Trans. Amer. Phil. Soc.* (*n. ser.*) V. p. 182. Ravines near Houston. May.

143. Scutellaria Drummondii, *Benth. Lab.* p. 441. On soil composed of fragments of shells, on the coast of Galveston Island. May. Apparently annual: stems 10 to 29 inches high.

144. S. cardiophylla (*n. sp.*): puberula; caule erecto (1–2-pedali) ramoso; foliis omnibus petiolatis cordato-triangularibus obtusiusculis caulinis, grosse crenatis, floralibus gradatim minoribus integrioribusque lato-cordatis vel deltoideis, summis bracteiformibus; floribus axillaribus oppositis; corollis pubescentibus calyce pedicello longiore plus triplo longioribus.—Var. β. humilior, foliis omnibus parvulis. — Open woods,

&c. near Houston. Flowering through the summer. Dr. Engelmann has likewise collected the smaller variety at the Hot Springs, in Arkansas. Fruiting specimens of this well-marked species also exist in Drummond's Texan Collection, (No. 209, Coll. 3,) but we find no allusion to it in Bentham's fine Monograph of the Labiatæ. The smaller forms might be confounded with S. *parvula,* but even the floral leaves are distinctly petioliate, broadly triangular-ovate, or cordate, and more or less crenate-toothed; all are shorter than the corolla, which is three-fourths of an inch long; the uppermost scarcely exceeding the calyx. The cauline leaves are from one to nearly two inches in length, and considerably resembling those of S. *saxatilis,* Riddell: those of the elongated flower branches scarcely half an inch long. Achenia strongly tuberculate. Root apparently annual.

145. Salvia azurea, *Lam.* Houston. May to September.

146. Hyptis radiata, *Willd.* Houston. September.

147. Physostegia Virginiana, *Benth.,* var. foliis ovalibus oblongisve subdenticulatis. (Dracocephalum variegatum, *Vent., Ell.*) Wet prairies west of the Brazos. July.

148. P. Virginiana, var. foliis lanceolatis argute serratis. Dry, sandy soil. Houston. September.

149. Trichostemma dichotomum, *Linn.* September.

150. Teucrium Cubense, *Linn., Benth. Lab.* p. 668. Galveston Island. April, May.

151. Monarda Lindheimeri, (*n. sp.*): caule glabro superne piloso subsimplici; foliis ovatis acuminatis subcordatis grosse serratis glabris glandulosis margine scabris, petiolis brevibus basi pilosis; bracteis acuminatis integris capitulum laxum subæquantibus; calycibus glandulosis, dentibus subulatis diametrum tubi subæquantibus, fauce villosa; corolla glandulosa et villosa. — Prairies and margin of woods, in clayey soil. April to June, and again in October. — According to Mr. Bentham's view, this would probably be deemed a variety of M. *clinopodia.*

152. M. punctata, *Linn.* Houston. July.

153. M. aristata, *Nutt. in Benth. Lab.* p. 318, *in Mem. Amer. Phil. Soc.* (*n. ser.*) V. p. 186. Prairies east of the Brazos. June.

154. Verbena strigosa, *Hook. Compan. to Bot. Mag.* I. p. 176. Roadsides, near Houston. April — July. Lower leaves obovate and tapering into a winged petiole, doubly incisely toothed; the upper tri-multifid. The hispid pubescence of the stem is not appressed. The foliage, the more slender spikes, and the much shorter fruit distinguish the species readily from V. stricta.

155. V. spuria, var. caulibus erectis; bracteis brevioribus. Dry prairies, Galveston, to the Brazos. March to July.

156. Zapania nodiflora, *Lam.* var. foliis lanceolato-cuneiformibus. Downs of Galveston Island. April.

157. Dipteracanthus (Panicularia, folia floralia in bracteas parvas reducta, ideo cyma trichotoma terminalis) nudiflorus (*n. sp.*): parce pilosus, demum glabratus; caule erecto herbaceo; foliis ovalibus ovato-oblongisve obtusis margine obsolete repandis basi in petiolum attenuatis; cymulis trifloris in cymam laxam glanduloso-puberulam congestis; bracteis lineari-lanceolatis pedunculis multo brevioribus; tubo corollæ apicem versus sensim dilatato calycis lacinias attenuato-subulatas duplo triplove longiore; capsulis puberulis subclavato-cylindraceis vel oblongis utrinque acutis 8–12-spermis calycem æquantibus. — Open woods at Sim's Bayou, near Houston. May to July. Also, in Drummond's Texan Collection, (Coll. 2, No. 221, and 3, No. 257.) Stems one to two feet high, simple or branched from the base, slender, pubescent when young, as well as the leaves and petioles, with scattered hairs. Corolla two inches long. Anthers somewhat included; the lobes slightly mucronate at the base. Stigma a simple lamella, with a mere rudiment of the second lobe. —This well marked species differs from the rest of the genus in its inconspicuous bracts, and naked, more explicate inflorescence, which entitle it to the rank of a distinct section.

158. D. CILIOSUS, *N. ab E. in Linn.* XVI. p. 294. = Ruellia ciliosa, *Pursh.* Open woods, Houston. June.

159. DIANTHERA HUMILIS. In clear water. June.

160. DICLIPTERA BRACHIATA, *Spreng.* Shady woods, Houston. June — September. Seeds hispid, with short, minutely glochidiate bristles.[1]

161. UTRICULARIA SUBULATA, *Linn.* Wet prairies of Galveston Island. April.

162. SAMOLUS EBRACTEATUS, *H. B. K.* Sandy brackish soil, Galveston. April. It is singular that this should have been overlooked by Duby, in *DC. Prodr.*, as a North American plant. It was recorded as such by Torrey in the report on the plants collected in Major Long's Expedition, and is not uncommon along the coast from Florida to Texas. The leaves in the Texan plant, as generally in our specimens, are obovate or broadly spatulate, tapering into pretty long winged petioles, which are decurrent on the stem.

163. PLANTAGO GNAPHALOIDES, *Nutt.* Galveston Island.

164. P. ARISTATA, *Michx.* Houston, &c. April.

165. IRESINE CELOSIOIDES, *Linn.* Houston. September.

166. OPLOTHECA FLORIDANA, *Nutt.* Prairies and open woods in loose sandy soil, west of the Brazos. August.

167. ERIOGONUM LONGIFOLIUM, *Nutt.*, *Benth.* β PLANTAGINEUM: foliis brevioribus latioribusque. Dry prairies west of the Brazos. July, August. The same form occurs in Drummond's Third Texan Collection, No. 352.

168. POLYGONELLA ERICOIDES. = Gonopyrum Americanum, *Fisch. & Meyer, in Mem. Acad. St. Petersb.* (ser. 6.) IV. p. 144. Prairies, west of San Felipe, on the Brazos.

[1] Among Lindheimer's plants a few specimens were received of the Ruellia justiciæflora, *Hook. Comp. to Bot. Mag.* I. p. 176, which has also been distributed by Dr. Riddell, under the name of Eberlea. We refer it to the genus *Hygrophila*, R. Br. To the character given by Hooker, for the most part excellent, we may add, that the stem and leaves are somewhat fleshy, and that the upper lip of the corolla is not entire, but 2-cleft. The anthers of the shorter pair of stamens are smaller than the others, but are polliniferous and 2-celled. The plant grows in wet swamps, and flowers in the autumn.

July. A low shrubby plant, 1–2 feet high, with the aspect of a heath.[1]

[1] This plant also occurs in Drummond's Texan Collection (No. 19 & 348 of 3d Coll.); from which source doubtless Fischer and Meyer obtained the specimens, upon which they established the genus Gonopyrum. But their genus must be reduced to Polygonella, from which it differs only in the hermaphrodite, instead of dioico-polygamous flowers, a character which would be insufficient, even if constant, which it probably is not. The filaments of Polygonella polygama (which are more correctly described than figured by Ventenat) are not materially different from those of the new Texan species. The generic character, &c. should properly stand as follows:

POLYGONELLA, *Michx.* (Trib. Rumiceæ, *Meyer.*)

Polygonella and Gonopyrum, *Meyer l. c. supr.*

Flores dioico-polygami vel hermaphroditi. Perigonium pentaphyllum, petaloideum; phyllis seriei exterioris 2 immutatis fructif. reflexis, seriei interioris 3 erectis planis post anthesin ampliatis conniventibus fructum triquetrum includentibus. Stamina 8: filamenta dimorpha; nempe, tria phyllis perigonii interioribus opposita inferne dilatata et sæpe bidentata; cætera subulato-setacea. Styli 3: stigmata capitata. Embryo in axi albuminis rectiusculus. — Fruticuli ramosissimi glabri, in planitiebus aridissimis Amer. Bor.-Orient. calidioribus vigentes; ramis hornotinis herbaceis foliosis ochreatis (ochreis brevibus nudis unidentatis); foliis crassiusculis parvulis linearibus spathulatisve subsessilibus sparsis vel in axillis pl. m. fasciculatis; floribus (albis vel roseis) parvis spicato-racemosis; rachi dense et appresse imbricatim ochreato-bracteati quasi articulati; pedicillis solitariis articulatis, fructiferis pendulis; racemis sæpius paniculatis.

1. *P. polygama:* foliis cuneato-linearibus spathulatisve; floribus dioico-polygamis; sepalis ovalibus ad anthesin subæqualibus; filamentis tribus basi ovato-dilatatis vix aut ne vix dentatis; stylis brevissimis. — Polygamum polygamum, *Vent. Hort. Cels. t.* 65; *Ell. Sk.* I. p. 458. Polygonella parvifolia, *Michx.! Fl.* II. p. 240; *Nutt. Gen.* I. p. 256 (sub Polygono); *Meisn. Gen. Vasc. Comm.* p. 228. Polygonum (Polygonella) gracile, *Nutt. Gen. l. c.?* — In arenosis (sandy pine-barrens,) Carolinæ! Georgiæ! Floridæ (*Bartram! Leavenworth!*) et, fide *Nutt.*, in Arkansas.

2. *P. ericoides:* foliis linearibus vel anguste spathulato-linearibus fasciculatis; floribus (an semper?) hermaphroditis; sepalis orbiculatis, interioribus subcordatis exteriora virido-carinata ad anthesin superantibus; filamentis tribus basi valde bidentato-dilatatis quasi obcordatis; stylis longiusculis. — Gonopyrum Americanum, *Fisch. & Meyer, in Mem. Acad. St. Petersb. l. c. supra.* — In planitiebus aridis Texas, *Drummond! Lindheimer! Wright!* Flores duplo majores quam in præcedente, ramis crassioribus, etc.

For the first species we have adopted the older specific name of Ventenat, in place of that of Michaux, chiefly because it is the largest-leaved species of the genus.

Polygonum articulatum, *Linn.*, which is joined, by Nuttall and Meisner, to Polygonella, with which, indeed, it nearly accords in habit (though an annual herb) and inflorescence, has all the sepals uniform and erect in fruit, the three inner not at all enlarged, and the embryo is lateral as in Polygonum.

169. Stillingia sylvatica, *Linn.* Prairies. April—June.

170. S. ligustrina, *Michx.* Thickets near water-courses, Houston. May.—The staminate flowers are rather conspicuously pedicillate, not *brevissime pedicillatis*, as described by Michaux.

171. Pilinophytum Lindheimeri (*n. sp.*): annuus, stellato-tomentosus; caule (4–5-pedali) erecto ramoso; foliis longe petiolatis e basi ovata subcordatave lanceolatis sæpe acutato-mucronatis, inferioribus denticulatis; floribus fœmineis paucis ad basin spicæ masculæ; staminibus sub-12; stigmatibus plerumque 12; seminibus vix compressis.—Dry prairies, Houston to the Brazos. Also, Texas, *Drummond*, and Western Louisiana, *Leavenworth*. A taller, more upright plant than *P. capitatum* (Croton, *Michx.*,) with larger and less canescent leaves; the lower 4–5 inches long, and gradually acuminate to an usually sharp point, on petioles 3 inches long. The spike in fruit is less capitate, and the seeds are smaller and less compressed. Something like intermediate specimens between this and the *P. capitatum*, which also grows in

A remaining species, the Polygonum fimbriatum of Elliott, which has been deemed a near ally of Polygonum polygamum, may be taken as the type of a new genus, viz.:

THYSANELLA, *A. Gr.*

Flores dioico-polygami. Perigonium pentaphyllum petaloideum; phyllis omnibus erectis margine scariosis et eroso-fimbriatis, duobus exterioribus cordato-sagittatis post anthesin auctis, interioribus minoribus ovato-lanceolatis pectinato-fimbriatis. Stamina 8: filamenta filiformia perigonium adæquantia. Ovarium (infertile) trigonum: styli 3, filiformes; stigmatibus simplicibus. Fructus . . . . . . Semen . . . .—Herba ramosa, glabra, (bipedalis,) in arenosis Georgiæ vigens, caulibus virgatis strictis; foliis angusto-linearibus elongatis acutatis striatulis sessilibus; ochreis truncatis setis capillaribus longissime barbatis; floribus (incarnatis) racemoso-spicatis; spicis solitariis vel geminis, paniculatis, dense imbricatim ochreato-bracteatis; ochreis oblique truncatis in acumen aristiforme productis; pedicellis in medio articulatis.

T. Fimbriata. = Polygonum fimbriatum, *Ell. Sk.* I. p. 588.

Elliott seems to have described from specimens with hermaphrodite flowers; but in mine (which were collected by Dr. Leavenworth either in Georgia or Florida) the ovaries are apparently all sterile. The fruit and seed is, therefore, unknown to me, and I am not certain that the outer sepals increase in size after flowering.

A. Gr.

Texas, render it doubtful, however, whether this plant is specifically different. See p. 261.

172. Geiseleria glandulosa, *Klotzsch, in Erichs. Archiv.* I. (1841) p. 254. Dry woods, Houston. May, June. The calyx of the sterile flowers is 5-parted, and the stamens 9 or 10.

173. Croton argyranthemum, *Michx.* Margin of woods, Houston. April — June. The ovary is on an orbicular, not 5-glandular disk.

174. Euphorbia bicolor (*n. sp.*): annua; caule erecto foliis bracteisque undique villosis seu pilosis; foliis subsessilibus oblongo-lanceolatis vel lineari-oblongis cuspidatis basi obtusis; bracteis lineari-ligulatis elongatis basi attenuatis margine membranaceis decolorato-albidis; glandulis involucri villosi margine petaloideis suborbiculatis; capsulis dense lanatis; seminibus sparsim rugulosis. β concolor: marginibus decoloratis bractearum angustissimis aut subnullis; foliis latioribus. Prairies near Houston. June — September. Also Texas, *Drummond.* Arkansas, *Beyrich,* &c. A handsome species, resembling E. *marginata,* but distinguished by the narrower hairy leaves, much narrower bracts, &c.

175. Aphora mercurialina, *Nutt. in Trans. Amer. Phil. Soc.* (*N. Ser.*) 5, p. 174. Serophyton pilosissimum, *Benth. Bot. Voy. Sulphur,* p. 53. In denudated soil, dry prairies, &c. Arkansas and Texas. May — July. Endlicher having entirely overlooked this genus of Nuttall's, Mr. Bentham has lately characterized it anew under the name of Serophyton. To his excellent character we have only to add, that the plants are sometimes diœcious, or subdiœcious, as, indeed, is mentioned by Nuttall in the case of the original species. What Nuttall takes for sterile filaments in the fertile flowers, Bentham describes as petals, and so Nuttall's name becomes unmeaning, which, however, is no great objection. Mr. Bentham's Californian species must, therefore, bear the name of *Aphora lanceolata.* His remaining Texan species, the *Aphora Drummondii,* was also collected by Lindheimer, but

not in sufficient abundance for distribution. It is a less hairy plant. Under No. 306 we describe a fourth species, *A. humilis*, which we also find in Drummond's second collection, No. 230. The leaves in *A. mercurialina*, as in *A. Drummondii*, often turn purplish, in drying. In No. 322 of Drummond's third collection, the leaves are oblong-ovate, or ovate-lanceolate, and often acute or acuminate, as in Lindheimer's specimens. In No. 263 of the second collection they are mostly ovate-orbicular.

176. Tragia urticæfolia, *Michx.* Houston, &c. April. T. betonicæfolia, *Nutt.?*

177. Phyllanthus polygonoides, *Nutt.* (Maschalanthus, *Nutt.* = Phyllanthus proper, *Linn., Juss.*, etc.) Grassy banks. July.

178. Cnidoscolus stimulosus. = Jatropha stimulosa, *Linn.* Houston. July.

179. Urtica purpurascens, *Nutt. in Trans. Amer. Phil. Soc.* (*N. Ser.*) V. p. 169. Thickets, Galveston Island.

180. Quercus virens, *Ait.* Moist woods along the coast.

181. Taxodium distichum, *Rich.* Houston, &c.

182. Sagittaria simplex, *Pursh.?* Ponds in clayey soil, near Houston. June — September. Our plant has rather rigid linear-lanceolate leaves; the calyx as well as the ovate acute bracts are a little pubescent; the fertile flowers are on short, the sterile on rather long peduncles; the stamens from 20 to 30; and the carpels in fruit are compressed, rostrate, and falcate. Larger specimens, collected near the coast, with broader leaves, &c. bear larger flowers, with 40 to 50 stamens.

183. S. stolonifera (*n. sp.*): stolonibus radicantibus; foliis submersis lato-linearibus acutis, emersis lineari-lanceolatis 3–5-nerviis; scapo simplici; bracteis ovatis acutis vel obtusiusculis brevibus; pedunculis subternatis omnibus elongatis; staminibus 12–16; carpellis compressis oblique suborbiculatis breviter mucronatis. — S. graminea, *Nutt. in Trans.*

Amer. Phil. Soc. l. c. p. 159. Ponds near Houston. September, &c.

184. Commelyna angustifolia, *Michx.* Houston. May.

185. Xyris Caroliniana, *Walt.* β? scabra: scapo apice magis ancipiti, aciebus subtilissime serrulato-scabris. X. scabra, *Engel. MSS.* Prairies, west of the Brazos. July.

186. X. bulbosa, *Kunth, enum.* IV. p. 11, (ex descr.) With the preceding. The North American species still need thorough revision.

187. Hypoxis erecta, β. æstivalis: scapo subunifloro folia subæquante; capsulis subglobosis, (ut in α.) In prairies which have been burned over in spring. July.

188. H. erecta, γ. leptocarpa (H. leptocarpa, *Engel. MSS.*): floribus minoribus; capsulis prismatico-oblongis ellipticisve; seminibus in singulis loculis uniserialibus 4-6. Sandy soil, along rivulets, June — August.

189. Eustylis purpurea. (Nemostylis? purpurea, *Herbert, in Bot. Mag. sub. t.* 3779.) Open woods and prairies, from Houston to the Brazos. June, July. Also, Texas, *Drummond*, and Western Louisiana, *Dr. Hale.* The diagnostic characters of this genus and Nemostylis are subjoined. Alophia, *Herb.* differs, according to the character,[1] in having the inner divisions of the much more unequal perigonium naviculate, and differently shaped from the outer, in the very short filaments, &c., and in being tuberiferous instead of bulbiferous.

NEMOSTYLIS, *Nutt.* Perigonium hexaphyllo-partitum, conforme, patens, segmentis fere æqualibus, tubo nullo. Filamenta distincta, e basi lato subulata, antheris elongato-linearibus (connectivo angusto) post anthesin spiraliter convolutis

[1] The specimens of several of these Iridaceous plants, of very similar appearance in the dried state, appear to have been somewhat confused in the distribution of Drummond's Texan Collection. Under No. 414 of the Third Collection, we have, instead of *Alophia*, specimens of the Herbertia cærulea. Under No. 415, we have *Nemostylis acuta* (*geminiflora*, Nutt. Ixia acuta, *Barton*,) as well as *Gelasine Texana.* In the latter the filaments are certainly monadelphous, and the style has two or three short and simple lobes.

multo breviora. Stylus brevis (filamenta adæquans,) tenuis, apice trilobus; lobis bipartitis, partitionibus in stigmata filiformia radiatim productis.

EUSTYLIS. Perigonium hexaphyllo-partitum, conforme, patens; tubo nullo; segmentis obovatis planis, tribus interioribus modice minoribus. Filamenta distincta, e basi lato subulata, antheras subpanduriformes post anthesin immutatas æquantia: connectivum latum basi apicemque versus præsertim dilatatum, loculis marginalibus. Stylus elongatus (stamina adæquans,) ad apicem infundibuliformis, trifidus; lobis bifidis, partitionibus in stigmata filiformia recurvia attenuatis.—Habitus, bulbus, capsula, etc., omnino Nemostylis.

190. Gymnadenia nivea. (Orchis nivea, *Nutt.*) Moist prairies near Houston; April to June. The ovary remains straight; the labellum is therefore posterior. The outer lateral divisions of the perianth are also produced at the base on the upper side into a triangular blunt auricle, which is not noticed in Nuttall's description. The anther-cells are parallel and approximated.

191. Spiranthes vernalis (*n. sp.*): radice fasciculata; caule foliato; foliis linearibus, superioribus sensim minoribus vaginantibus lanceolato-subulatis; sepalis petalisque basi cohærentibus oblongo-linearibus, lateralibus angustioribus labellum reflexum crenulatum apice non dilatatum æquantibus vel superantibus.—Moist prairies, Galveston and Houston; April, May.—Stem 1 to 2 feet high, slender; lower leaves often 5 to 6 inches long, 2 lines wide; bracts ovate, acuminate. Flowers much as in *S. cernua*, from which it is distinguished by its short lip, &c.

192. Thalia dealbata, *Fraser*. Swamps on the Brazos; September.—The seed appears to contain three embryos, of which only the central one is fully developed.

193. Juncus heteranthos, *Nutt. in Trans. Amer. Phil. Soc.* (*N. Ser.*) V. p. 153. Galveston Island. May.

194. Pontederia lancifolia, *Muhl.* July.

195. Smilax lanceolata, *Linn.* Rich shady soil near

water-courses. July.—Climbing to a great height. The rhizoma bears tubers which are called "Indian bread" in Texas. Leaves varying from narrowly lanceolate to almost ovate. Stem prickly below.

196. Cooperia Drummondii, *Herbert.* Dry prairies from Galveston to the Brazos; flowering from June to November, but mostly in July, and only after heavy rains.

197. Aletris aurea, *Walt.* Houston. April.

198. Scilla (Kamassa, sed perigonium regulare) angusta (*n. sp.*): gracilis; foliis linearibus apice longe attenuato-setaceis flaccidis scapo brevioribus; bracteis e basi lanceolata membranacea subulatis pedicellos erecto-patentes subæquantibus; alabastris oblongo-linearibus; foliolis perigonii linearibus obtusis stamina duplo superantibus.—Open woods and prairies, in south-western Missouri and Arkansas, as well as Texas: flowering from April to May in Texas, but from May to the middle of June in Missouri and Arkansas, when *S. esculenta*, growing in the same region, has matured its seeds. The present plant is more slender than *S. esculenta*, with narrower leaves, sepals, etc.; but perhaps it is only a variety.—We are slow to believe that the Oregon species belongs to a different genus from the eastern.

199. Allium mutabile, *Michx.* Dry open woods, Houston. April. The capsule, in all our specimens, is one-seeded; the flowers usually rose-red, but sometimes white.

200. Ruppia maritima, *Linn.* Salt water ponds, Galveston Island.

201. Cyperus vegetus, *Linn.* Wet prairies. May.

202. C. ovularis, *Torr.* In dry and wet places. April to June.

203. C. tetragonus, *Ell.* Dry prairies near Houston. May and June. Style 3-cleft.

204. Fuirena hispida, *Ell.* Springy places west of the Brazos. August.

205. Eleocharis arenicola, (*Torr. MSS.*): culmis subspithamæis compressis sulcatis e rhizomate repente prælongo;

spicis ovatis obtusis multifloris; squamis rufescentibus membranaceis obtusis margine scariosis; stylo trifido; achenio obovato compresso triangulari opaco tuberculo distincto rostrato acuto multum majore setas 6 tenues subexcedente. — Galveston Island, May, creeping in the loose sand. (Also along the southern coast of the United States.)

206. Scirpus lacustris, *Linn.* Galveston. May.[1]

207. Spartina junciformis (*n. sp.*): humilis (1–2 pedalis); foliis convolutis angustis, caulinis paucis brevibus, radicalibus cæspitosis culmum subæquantibus; spicis 8–10 oblongis sessilibus ad rachin læviusculam adpressis; carina glumarum longitudine subæqualium paleæque inferioris ciliato-hispida. Saline prairies near the coast. May. — Plant with the foliage and much the aspect of *S. juncea*; but with the spikes and flowers different from that species, as well as from *S. lævigata.* A few specimens of a taller variety were collected in July.

208. Kœleria truncata, *Torr.* Woods, Houston. May.

209. Uniola gracilis, *Michx.* Variety with broad and hairy leaves, the florets undeveloped. Houston. June.

210. Panicum (Orthopogon) hirtellum, *Michx.* Houston. June.

211. Andropogon avenaceus, *Michx.* Houston. Sept.

[1] I wish to subjoin the character of a remarkable Scirpus, which has been discovered this season, near Providence, Rhode Island, by Mr. Olney (the author of a *Catalogue of Rhode Island Plants*, 1845,) whose name I am desirous it should bear.

Scirpus Olneyi (*n. sp. A. Gr.*): culmis triquetro-alatis 2-7-pedalibus aphyllis basi vaginatis sub apice triangulari-subulato brevi capitulam sessilem, e spicis 6–12 ovato-oblongis, gerentibus; squamis orbiculatis mucronatis; antheris apice barbulatis; stylo bifido; setis 6 retrorsum hispidulis achenium obovatum plano-convexum gibbosum apiculatum vix æquantibus. — In a salt marsh on the Seekonk river, Rhode Island, *Mr. S. T. Olney.* This species is most allied to S. pungens, *Vahl,* (S. Americanus, *Pers.*) from which it is especially distinguished by its remarkably 3-winged stem. The reëntering angles are so deep that the cross section presents the appearance of three rays, or plates with parallel sides, joined at a common centre. This species has just been detected on the coast of New Jersey by that very assiduous botanist, Dr. Knieskern, from whose specimens I have added the characters of the achenium; as the fruit has failed to ripen this year in the Rhode Island plant. A. Gr.

212. Leptochloa mucronata, *Kunth.* August.

213. Poa (Eragrostis) capitata, *Nutt. in Trans. Amer. Phil. Soc. (N. Ser.)* V. p. 147; the submasculine plant; and

214. The subfeminine plant of the same species, which has the spikelets much less crowded. Sandy places in the Brazos bottom. July.

COLLECTION SECOND, 1844.

Mr. Lindheimer's Collection of 1844, was made between the Brazos near San Felipe, and the Colorado River, in the neighborhood of Cat Spring of Mill Creek, the settlement of Industry, and thence westward towards the Colorado, and along its bottom lands. The prairies are partly of a light and even sterile sandy soil, and partly of a stiff clayey soil. The bottom lands consist of a stiff black soil. Near Industry, and on the Colorado, rocks of a secondary sandstone (probably a subcretaceous formation) appear, on which several species of Cactus are found. In the prairies ant-hills are not uncommon, and on old and deserted ones a rich harvest of peculiar plants may be made. The numbers run on consecutively from the end of the former year's collection. Additional specimens of the following plants of that collection, gathered again in 1844, are distributed to subscribers (without being reckoned) under their former numbers, namely: No. 7. Cocculus Carolinus, *DC.*, in fruit. — 8. Streptanthus hyacinthoides, *Hook.*, with linear leaves; the flowers nodding, the long siliques erect. — 18. Paronychia Drummondii; handsome specimens, gathered in May, just coming into flower. — 24. Sida Lindheimeri, *nob.*; specimens in finer state than before. — 29. Rhynchosia minima. — 39. Dalea aurea. — 40. Petalostemon obovatum. Root ligneous, perennial. The spikes, which are an inch in diameter, are at length prolonged to the length of six or eight inches. — 49. Acacia hirta, with ripe pods. — 51. Acacia Farnesiana; on the Brazos, &c. Undoubtedly indigenous, flowering in March. — 55. Œnothera speciosa. — 60. Gaura sinuata. — 80. Gutierrezia Texana. — 83. Solidago leptocephala. — 94. Echinacea angustifolia. — 96. Helianthus cucumerifolius. — 104. Gaillardia amblyodon. — 107. Hymenopappus artemisiæfolius; with the leaves, as usual, extremely variable; some of them occasionally obovate-lanceolate, and perfectly entire. — 110. Marshallia cæpitosa; growing in scattered plants on the dry prairies near the Mill Creek. — 137. Herpestis cuneifolia, in fruit. — 138. Buchnera Americana β. parviflora, in flower. — 145. Salvia azurea. — 153. Monarda aristata, which in the inland parts of Texas appears to take the place of M. punctata near the coast. — 161. Utricularia subulata. — 167. Eriogonum longifolium β. plantagineum. — 169. Stillingia sylvatica, in fruit. — 174. Euphorbia bicolor. — 175. Aphora mercurialina, in flower. — 184. Commelyna angustifolia. — 199. Allium mutabile. Shady moist places on Mill Creek. April, May. Larger specimens than those gathered in 1843, near Houston, 12 to 20 inches high, the umbel not bulbiferous. Ovary with a crown of three scales, which disappear as the capsule ripens, (in this respect unlike A. stellatum and A. reticulatum,) 6–ovuled; the capsule 1–3-seeded. — 189. Eustylis purpurea: rather common between the Brazos and the Colorado. April — August. — 198. Scilla angusta, *nob.* Dry prairies west of the Brazos. April.

215. Brasenia peltata, *Pursh.* Specimens in fine fruit, gathered in July in clear rivulets between the Brazos and the Colorado.

216. Draba cuneifolia, *Nutt. in Torr. & Gr. Fl.* I. 108. Dry grassy places, March. — In some specimens the silicles are almost, if not quite, glabrous. D. micrantha, *Nutt.*, which differs only in the like respect from D. Caroliniana, is probably therefore a mere variety of that species.

217. Vesicaria auriculata (*n. sp.*): annua, caulibus decumbentibus canescenti-hirsutis; foliis sparsim pilosis, infimis lyrato-pinnatifidis sinuato-dentatisve basi attenuatis, cæteris ovato-lanceolatis basi cordato-auriculata sessilibus vel semi-

amplexicaulibus repando-dentatis subintegrisve; petalis obovato-spathulatis sepala pilosa colorata subduplo superantibus; filamentis e basi inflata abrupte subulatis; antheris linearibus; ovarii loculis 3–4-ovulatis; stylo cum stigmate globoso siliculis vix stipitatis globosis glabris breviore; seminibus subsex marginatis. — Dry prairies near San Felipe. Feb. — March.

218. NASTURTIUM TANACETIFOLIUM, *Hook. & Arn.* Sandy bottoms. February and March. — Siliques sometimes spreading or even reflexed: in other cases considerably incurved and erect.

219. SISYMBRIUM CANESCENS, *Nutt.* A very canescent form. April — May.

220. POLYGALA ALBA, *Nutt.* (P. Beyrichii, *Torr. & Gr.*) Prairies. April — May. Lower leaves sometimes obovate-spatulate.

221. HYPERICUM MACULATUM, *Walt.*, *Torr. & Gr.* Margin of woods from Galveston to the Colorado. May.

222. PARONYCHIA DICHOTOMA, *Nutt.* Sandstone rocks near Industry. Sept. — Oct.

223. ARENARIA PITCHERI, *Nutt.* Prairies. March. Petals emarginate.

224. PTELEA TRIFOLATA, *β.* MOLLIS, *Torr. & Gr. Fl.* I. p. 680. Along water-courses. Houston to the Colorado. April.

225. ÆSCULUS PAVIA, *β.* DISCOLOR, *Torr. & Gr.* Thickets along the banks of Mill creek. March.

226. SAPINDUS MARGINATUS, *Willd.* Popularly called "Wild China-tree," forming trunks about a foot in diameter, in fertile woods. The specimens with ripe fruit were gathered in August.

227. RHAMNUS CAROLINIANUS, *Walt.* Small trees forming thickets in wet places on the prairie west of San Felipe; flowering in May. With it there is a small-leaved variety, with the flowers more crowded, &c.

228. R. LANCEOLATUS, *Pursh.* Thickets. March.

229. TEPHROSIA ONOBRYCHOIDES, *Nutt.*; with short and rusty pubescence, &c., differing somewhat from the variety distributed under No. 32. West of San Felipe. May.

230. Astragalus caryocarpus, *Ker.* Prairies west of San Felipe. April.

231. Lupinus subcarnosus, *Hook.* Prairies. April. Plant 5 to 15 inches high, branching from the base, with rather smaller and paler flowers and more silky or woolly inflorescence than the nearly related *L. Texensis,* — of which a few specimens were intermixed in the collection.

232. Cassia Chamæcrista, var. cinerea, *Torr. & Gr.* Sandy places in woods along the Colorado. August. The leaves bear setaceous glands between the 4 to 6 lower pairs of leaflets; the gland below the lowest pair is stipitate; and the 5 alternate anthers are shorter.

233. Algarobia glandulosa, *Torr. & Gr. Fl.* I. p. 399. "This shrub, or small tree, about 10 feet high, with a stem 6–8 inches in diameter, either grows sparsely or forms thickets in the low prairies. It is called *musket-tree* by the Texans. It is first found as a low shrub on the San Bernardo prairie, west of San Felipe, but becomes larger and more frequent westwardly, giving a new character to the vegetation, as in the *musket-thickets* on the Colorado, along the borders of which several Cacti, hereafter enumerated, are abundantly met with. It ripens its pods at the end of August." *Lindheimer.*—The leaflets vary, often on the same specimen, from narrow linear to oblong, and even broadly elliptical. Lindheimer's specimens are some of them in fine fruit, showing that the species is totally distinct from *A. dulcis,* (of which Bentham conjectured it might perhaps be a variety,) and also presenting some peculiarities that call for more particular remark. The mature legumes are from 5 to 7 inches long, raised on a stipe which is often an inch in length: they are narrowly linear, more or less curved or falcate, very slightly compressed, strongly torose, and from 9 to 20-seeded: the epicarp is chartaceo-membranaceous, and contains a considerable quantity of sweet farinaceous pulp which surrounds the seeds, or rather the coriaceous investment in which the seeds are singly contained. For each seed is enclosed in a distinct and almost

bony almond-shaped *putamen*, derived, we suppose, from the endocarp or lining of the carpel, though, for the want of young pods, we are unable to trace its formation. But in the ripe legume, these several husks, which are perfectly closed, are entirely unconnected with each other. They are placed obliquely in the pod, of which they occupy nearly the whole breadth. The flattened, oval seeds (about 3 lines long) do not fill the cavity. On examining an *Algarobo* pod from South America (the fruit, as we presume, of *A. dulcis*,) we find that the seeds are invested by a similar covering, only that it is much thinner and paper-like, and apparently does not separate spontaneously from the pulp. We have not seen the fruit of *Prosopis spicigera*; but we hope that this character may help to sustain the genus Algarobia, which, after having been separated from Prosopis by Mr. Bentham, has since, by the same author, been again reduced to a section of that genus. Our own species, however, would still have to be distinguished subgenerically from the typical Algarobia thus. § PLEOPYRENA. Legumen lineare, subteres, torosum, polyspermum; seminibus singulis in nucleo endocarpico coriaceo inter pulpam nidulante clausis.—In a species of STROMBOCARPA, collected by Capt. Fremont, (the curious fruit of which should separate it generically from Algarobia,) this papery lining is continuous, or merely collapsed where the seeds are deficient.

234. SCHRANKIA ANGUSTATA, *Torr. & Gr. l. c.* May—August.

235. DESMANTHUS BRACHYLOBUS, *Benth.* (Darlingtonia, *DC.*); the var. glandulosa, *Torr. & Gr.* under Darlingtonia;—fruiting specimens, collected in July.

236. PRUNUS GLANDULOSA, *Hook.*; *Torr. & Gr. l. c.* "Low shrubs on sandy hills west of the Brazos, flowering in February. Fruit yellowish-red, as large as a middle-sized cherry." *Lindheimer.* It is probably a Prunus, therefore, but the half-grown fruit upon one of our specimens is juiceless, and still clothed with the tomentum of the ovary.

237. P. GRACILIS (*n. sp.*): ramis subinermibus; foliis lan-

ceolato-oblongis vel ovato-lanceolatis utrinque acutis grosse serratis (serraturis plerumque patentibus mucronulatis eglandulosis) supra puberulis subtus cum petiolis brevibus eglandulosis tomentoso-pubescentibus; stipulis setaceis glanduliferis petiolum æquantibus; umbellulis 2–3-floris; pedicellis calycibusque (laciniis ovatis obtusiusculis) pubescentibus; petalis orbiculatis; ovario glabro. — P. Chicasa β? normalis, *Torr. & Gr. Fl.* I. p. 467. Open *post-oak* woods west of the Brazos, where it is called *Post-Oak Plum.* A low shrub, with leaves only one to two inches long. Doubtless a distinct species, which should stand between P. Chicasa and P. glandulosa.

238. Œnothera serrulata, δ. spinulosa, *Torr. & Gr.* An unusually large-flowered form; the petals an inch in length. Sandy, dry, or moist prairies. May — June.

239. Gaura longiflora (*Spach*): elata, pilis brevibus undique canescenti-puberula; caule erecto paniculato-ramosissimo; foliis lanceolatis lineari-lanceolatisve utrinque angustatis mucronato-acuminatis, sparsim repando-denticulatis, rameis multo minoribus linearibus integerrimis; spicis ramosis laxifloris; bracteis linearibus deciduis; calycis segmentis tubum plerumque superantibus; petalis spathulatis longe unguiculatis calyce et staminibus brevioribus; nuce sessili ovata canescente 4-carinata nervis 4 intermediis leviter notata. — G. exaltata, *Engel. MSS.* G. biennis, β. Pitcheri, *Torr. & Gr. Fl.* I. p. 517. — Prairies at the margin of woods between the Brazos and the Colorado, &c., where it often exclusively covers large spaces of ground; flowering in August and September. Plant taller and much more branching than G. biennis (6 – 9 feet high) with narrower leaves, smaller flowers (the petals turning from white to reddish,) and much smaller and, when ripe, rounder fruit. The G. filipes, β. major, *Torr. & Gr. l. c.*, is confused with this species. Spach described from an imperfect specimen collected in Louisiana, by Drummond. The specific name has no particular applicability.

240. G. Drummondii, *Torr. & Gr. l. c.* Dry banks and road sides. Canescently pubescent; the leaves often sinuate-

toothed, calyx-segments longer than the tube. Petals deep red in the dried specimens.

241. G. PARVIFLORA, *Dougl.* Sandy prairies, &c. July — August. Ovaries and fruit clothed with a close, soft pubescence.

242. STENOSIPHON VIRGATUS, *Spach.* High prairies on the Colorado, and on rocky soil.

243. JUSSIÆA OCCIDENTALIS, *Nutt.* Along rivulets. July. Petals obcordate.

244. OPUNTIA FRAGILIS, *Nutt.*, var. FRUTESCENS. (O. frutescens, *Engel. MSS.*) Near the *Musket-thickets*, (vide No. 233,) on the Colorado; often acquiring the height of four or five feet, with a branching ligneous stem, covered with light gray bark, and sometimes with lichens. It bears bunches of small capillary spines, with one larger one (4–5 lines long;) these disappear from the older stems. The wood is hard and close-grained. The younger branches are green and terete, (or angular when withered,) and bear the ultimate articulations, which are about an inch long, and very easily break off. These bear when young, like other Opuntiæ, short terete subulate leaves, with a single spine in their axils, and above this a bunch of small ones. The specimens are not in flower, but are covered with the obovate umbilicate scarlet fruits, which are about eight lines long, fleshy, but not juicy, and contain very few (2–5) white, compressed seeds. What is most remarkable, these fruits are often proliferous, and bear from one to four or five new branches from the upper bunches of spines. The fruit either falls off with these branches, or else dries up, persists and finally forms part of the stem.[1]

[1] Though unable to institute a proper comparison, I have little doubt that this is O. fragilis of Nuttall, attaining a fuller growth in that warm region than on the Missouri. The following species, collected in the same localities by Lindheimer, though not in sufficient quantity for distribution, have been studied in a living and (most of them) in a flowering state, by Dr. Engelmann, whose account of them is here appended. Unfortunately, neither Dr. Engelmann nor myself have access to

245. Sedum sparsiflorum, *Nutt.* Naked places in the San Bernardo prairie, between the Brazos and the Colorado. April — May.

any adequate or authentic collection of Cacti, so as to institute the proper comparisons. A. Gr.

"Mr. Lindheimer has sent seven other Cacti, mostly in living specimens, namely:

1. Opuntia, *sp.* without fruit or flower, probably O. vulgaris. It attains the height of several feet, with large obovate joints, and a few spines.

2. O. Missouriensis? Perhaps O. vulgaris, but very spiny.

3. Mammilaria similis (*n. sp.*): cæspitosa; axillis tuberculorum juniorum paulo tomentosis demum glabris; tuberculis ovatis supra leviter sulcatis (sulco basin versus subtomentoso) apice spiniferis; spinis (circ. 12) æqualibus rectis radiantibus albidis, junioribus puberulis basique tomento circumdatis; baccis sparsis globosis coccineis. — Sandstone rocks, near Industry. Evidently near M. simplex, at least to Nuttall's plant of that name, but cæspitose, forming tufts often a foot in diameter. Flowers not seen. Berries scarlet, of the size of a large pea. Seeds numerous, subglobose, scrobiculate, black, with an elongated white hilum. I have living plants, but they have not yet flowered.

4. M. sulcata (*n. sp.*): cæspitosa; tuberculis ovato-oblongis sulco subinde apicem versus prolifero superne exaratis apice spiniferis; spinis rectis radiantibus cinereis e tomento albido deciduo (in plantis adultis spina centralis subrecurva majore) ortis; floribus centralibus fasciculatis e tomento ortis glaberrimis, tubo brevi; sepalis lanceolatis acuminatis viridi-flavescentibus margine integerrimis; petalis longioribus lanceolatis apicem versus ciliato erosis cuspidatis sordide flavis ad basin intus filamentisque brevibus rubicundis; stylo supra stamina exserto; stigmatibus 7–10 flavis; baccis oblongis virescentibus. — With the preceding. Flowers opening for two or three days, in direct sunshine, two inches or more in diameter. On account of the central flowers, this should form, with M. vivipara, a distinct section. From that species it abundantly differs, not only in the color of the flower and the spines, but in the entire and smooth sepals, denticulate petals, &c. [This pretty species has also flowered in the Cambridge Botanic Garden.]

5. Echinocactus setispinus (*n. sp.*): subglobosus, apice retusus; costis plerumque 13 acutis subobliquis; aculeis 15–18 fasciculatis tenuibus flexuosis flavicanti-fuscis, superioribus 3–5 elongatis, 1–3 centralibus longissimis erectis, cæteris radiantibus; floribus minutis solitariis e macula subtomentosa supra fasciculos aculeorum ortis; sepalis in tubum concretis, apicibus liberis late ovatis acuminatis scariosis margine fimbriatis; fructibus . . . . . ; seminibus ovatis nigris opacis minutim tuberculatis. — Musket-thickets, on the Colorado River. Near E. tenuispinus, *Link & Otto*, from Brazil. Our specimens are about two inches in diameter, and an inch and a half high, with pretty sharp ribs separated by deep grooves. The longest spines are fifteen lines long. Flowers about five lines long.

6. E. Lindheimeri (*n. sp.*): hemispherico-depressus, vertice tomentoso; costis 21 verticalibus acutis subundulatis; spinis e cicatrice ovato-lanceolata tomentosa ortis fasciculatis compressis cinereo-rubellis transversim annulato-striatis, exterioribus 6–7 inæqualibus radiantibus subrectis centrali recurvata multo brevioribus; floribus e vertice depresso tomentoso ex axillis fasciculorum spinarum hornotinorum provenientibus confertissimis; sepalis (80–100) in tubum brevem infundibuliformem lanosum coalitis lanceolatis spinoso-aristatis, interioribus margine fimbriatis;

346. Galium virgatum, *Nutt.* Prairies. April.

247. Diodia tricocca, *Torr. & Gr. Fl.* II. p. 30. Fertile places in the prairie, sixteen miles west of San Felipe. (Also collected by Dr. Wright.) June. Cæspitose, depressed, and very much branched. All the specimens examined are tricarpellary.

248. Spigelia Texana, *A. DC. Prodr.* IX. p. 5. (Cœlostylis, *Torr. & Gr.*) Shady woods along the Mill-creek west of San Felipe. July.

249. Aster Drummondii, *Lindl.* Shady, moist woods and thickets. September — October. This species exhibits many varieties, in respect to pubescence, and smoothness or roughness. Among them the A. urophyllus and A. hirtellus of Lindley, are probably to be identified.

250. Chætopappa asteroides, *DC.* Dry prairies. April to July.

petalis (40–50) lineari-oblongis margine fimbriato-laceris apice bifidis aristatis; staminibus numerosissimis æqualibus inclusis e toto tubo ortis stylo compresso brevioribus; stigmate irregulariter 14–17-fido. — On deserted ant-hills, near the Colorado River. Often a foot in diameter: our specimens are eight or nine inches in diameter, and four or five inches high. Spines strongly annulate, stout, the larger ones often two inches long. Flowers about two inches in length, twelve or more aggregated in the woolly centre. The petals at the base are scarlet, verging to orange, from which a pale purple or violet midrib extends to the apex, and is prolonged into a delicate bristle of the same color, while the upper part of the petal is pearly white, with feathery margins. The flowers remain for three days, expanding only in bright sunshine.

7. Cereus cæspitosus (*n. sp.*): ovato-globosus demum cylindricus, apice depresso-umbilicatus; costis sub-15 e tuberculis confluentibus ortis rectis; aculeis numerosis ex areola oblonga albo-tomentosa demum glabrata radiatis nunc recurvis, lateralibus longioribus; floribus ex axillis tuberculorum anni prioris lateralibus; ovario oblongo tuberculis e lana villosa spinigeris stipato; sepalis 40–50 apice spinis setiformibus villoque coronatis virescentibus, intimis lanceolatis acuminato-aristatis glabris coloratis; petalis 30–40 apicem versus ciliato-denticulatis, exterioribus subito acuminatis, interioribus obtusis cuspidatis; staminibus inclusis stylo brevioribus; stigmate viridi infundibuliformi 13-partito. — Gravelly soil, near Cat-Spring, west of San Felipe. A singular reduced Cereus, quite cæspitose, and even proliferous occasionally, in the manner of Opuntia, beginning to flower when only two inches high, and scarcely taller than broad, but attaining the height of at least six inches; the ribs from twelve to seventeen. It is in flower for two days; the flowers about two inches broad when fully expanded. Petals rose-purple. Filaments reddish at the base, yellow at the summit." Engel.

251. Bellis integrifolia, *Michx.* A form with smaller heads and fewer rays than usual. Prairies. April — May.

252. Solidago angustifolia, *Ell., Torr. & Gr. l. c.* Wet prairies (and even on dry soil) and banks of rivulets, very remote from salt water. June — August.

253. Isopappus divaricatus, *Torr. & Gr. Fl.* II. p. 239. Light sandy soil. August — September.

254. I. Hookerianus, *Torr. & Gr. l. c.* Sandy prairies and on sandstone rocks on the Colorado. September. The specimens vary from six inches to two feet high; some are simple, others much branched from the base. The rigid leaves are narrowly spatulate-lanceolate; the heads pretty numerous, on short erect peduncles.

255. Grindelia inuloides, *Willd.* Prairies west of San Felipe. July — August. Stem five to six feet high, branching only above.

256. Calymmandra candida, *Torr. & Gr. l. c.* Open woods west of the Brazos. April — May.[1]

257. Silphium scaberrimum, *Ell.* Woods near Industry. May — July.

258. Halea Ludoviciana, *Torr. & Gr. Fl.* II. p. 304. Sandy *post-oak woods*, west of the Brazos. May — August. — Lowest leaves rhombic-ovate, or ovate-lanceolate, acute or acuminate, abruptly contracted into winged petioles, nearly as long as the blades, which are somewhat connate at the base. Exterior involucre with four rather strongly marked salient angles at the junction of the scales, whitish-tomentose inside.

259. Helianthus lenticularis, *Dougl.* Low woods and wet prairies. July — August. In rich bottom woods it often attains the height of ten or twelve feet, with the lower leaves six to eight inches broad. Flowers two and a half to three and a half inches in diameter; achenia oval, thicker than is usual in the genus.

[1] Pterocaulon virgatum, *DC.* A few specimens of what appears to be this West Indian species, were gathered near Houston, in open pine woods. September.

260. H. Maximiliani, *Schrad.* Prairies, margin of woods and deserted fields; common from Houston to the Colorado, flowering in October and November. Stems four to seven feet high, much branched. Well distinguished by the great and equable cinereous roughness of the stem, and of both surfaces of the lanceolate attenuate-acuminate leaves. It becomes, however, much less rough in cultivation.

261. H. Maximiliani, β asperrimus. A variety of the last, as we take it to be, with a simple stem, two to three and and a half feet high, bearing solitary or few heads. Prairies between the Brazos and the Colorado, forming large patches. October.

262. H. grosse-serratus, *Martens:* the same form, with the large leaves silvery-tomentose beneath, which was collected in Texas by Drummond, and which, as it best deserves the specific name, is assumed in *Torr. & Gr. Fl. l. c.* as the type of this variable species. Banks of rivulets and margin of woods. August — October.

263. H. grosse-serratus, β *Torr. & Gr. Fl. l. c.* A less canescent variety, with the stem, although somewhat glaucous, slightly scabrous throughout. Prairies, &c., with H. Maximiliani.

264. Cosmidium filifolium, *Torr. & Gr. Fl.* II. p. 350. Prairies west of the Brazos. May — June. This is really a perennial, and proves quite ornamental in cultivation. It extends as far north as the south-western borders of Missouri.

265. Dysodia tagetoides, *Torr. & Gr. Fl.* II. p. 361. Wet prairies, and on sandstone hills of Mill-creek. August. This is also a perennial. The dots of the leaves are orange-yellow.

266. Palafoxia Hookeriana, *Torr. & Gr. l. c.* Sandy post-oak woods, near Industry. August. We have it in cultivation, from Lindheimer's seeds. The flowers are rose-color or deep flesh-color, and about two inches in diameter; the rays large and conspicuous, but often irregular, and some of them palmate.

267. Actinella linearifolia, *Torr. & Gr. l. c.* De-

clivity of sandstone hills near Industry. May — June. Rays yellow, turning white when fading.

268 & 269. Senecio ampullaceus, (*Hook.*): annuus vel biennis; caule erecto fistuloso striato superne ramoso; foliis inferioribus obovato-spathulatis in petiolum decurrentibus, superioribus ovato-lanceolatis acutis basi subcordata semiamplexicaulibus, omnibus subintegris vel denticulatis; cyma corymbosa; pedicellis apice demum incrassatis; involucro squamis setaceis paucis calyculato; radiis 7–9; acheniis strigoso-canescentibus.

Var. *α* glaberrimus (No. 268): caule foliisque angustioribus subintegerrimis glabris. Wet prairies.

Var. *β* floccosus (No. 269): caule foliisque junioribus latioribus cano-floccosis; superioribus e basi latiore acuminatis, nunc grosse repando-dentatis. — Sandy prairies in loose, dry soil. April. Both forms are certainly annual or biennial.

270. Lygodesmia aphylla, *β* Texana, *Torr. & Gr. Fl.* II. p. 485. Prairies. June — July. Roots penetrating deep into the soil. Some of the radical leaves are runcinate-pinnatifid, with subulate lobes.

271. Pyrrhopappus grandiflorus, *Nutt.* Prairies, near San Felipe. April. Perennial; the slender perpendicular root enlarging, at the depth of a few inches, into an oblong tuber, similar to the root of Cynthia Dandelion. Scapes several from one root, with or without a bract in the middle.

272. Asclepias (Otaria) Lindheimeri (*n. sp.*): caudice perpendiculari incrassata caulem herbaceum pubescentem singulum erectum (vel plures adscendentes) emittente; foliis oppositis ovatis obtusis (aut rarius lanceolatis) basi nunc subcordatis breviter petiolatis utrinque puberulis; pedunculis brevissimis lateralibus; pedicellis gracilibus pubescentibus corollæ laciniis acutiusculis subduplo longioribus; cucullis ad apicem sensim dilatatis subtrilobatis; processu bifurco, ramo altero brevi incluso recto, altero longiore incurvo exserto; folliculis ovato-lanceolatis acuminatis puberulis carina exteriore setulis mollibus pl. m. conspersis. — Black, clayey soil, near

Industry. June — August. Also, in Drummond's Texan Collection. Stems six to sixteen inches high, from a very thick perpendicular root. Leaves mostly broadly oval, and obtuse. Flowers large and greenish: calyx pubescent, one-third the length of the corolla. Follicles ovate-lanceolate, and with a long acumination, "8-angled, the angles often somewhat tuberculated; the outer one furnished with soft spines, or a dentated crest." *Lindheimer.* This species is nearly allied to A. longicornu, *Benth.*, which we find has a similar gynostegium, only a little more decidedly 3-lobed at the apex, as well as a bifurcated horn, both lobes of which are shorter than in our species. There is also a bifurcated horn in A. obtusifolia.

273. Gonolobus cynanchoides (*n. sp.*): caulibus pluribus e radice subtuberoso debilibus basi ramosis adscendentibus pilosis; ramis teretibus; foliis inferioribus late ovatis, summis lanceolato-ovatis, omnibus basi cordatis breviter petiolatis subtus præsertim pubescentibus acutiusculis vel acutatis; pedunculis subnullis vel brevissimis bifloris; pedicellis basi subulato-bracteolatis petiolo sublongioribus; corollæ rotati-campanulatæ lobis ovatis obtusis intus glaberrimis (extus parce pilosis) calycis segmenta ovato-oblonga acuta pilosa excedentibus; corona staminea cyathiformi gynostegii basin cingente 5-loba, lobis rotundatis crassiusculis margine tenuiori cinctis, supra processu lineari scaphoideo arcuato instructis; folliculis ovoideis utrinque attenuatis coriaceis muricatis pubescentibus; seminibus (rufis) orbiculatis marginatis comosis. — Sandy soil, in open woods, near Industry. April — June. (Also, No. 190 and 203 of Drummond's second, and 237 of the third Texan collection.) Stems 6 to 15 inches high, diffuse; leaves 1–2 inches long, cordate, with an open sinus, the uppermost sometimes almost truncate at the base. Corolla greenish purple, about two lines in diameter. The fleshy lobes of the cup-shaped coronæ are furnished in the middle with a small process, which is connected at the base with the mid-nerve of the anther, and is free and incurved at the obtuse point, the

upper surface of which is excavated. The membranaceous cusps of the anther are triangular acute, and partly cover the very obtusely 5-angular and somewhat convex stigma. The small horizontal pollen-masses are oblong, slightly curved, and scarcely attenuated at the exterior (attached) end. — From the description, there can be little doubt that this plant is a congener of Chthamalia biflora, and C. pubiflora, *Decaisne, in DC. prodr.*, from which it differs in the glabrous corolla, etc.; but surely it cannot be separated from Gonolobus, as that genus is left by Decaisne. The corona of Gonolobus, characterized as "annuliformis undulato-lobata, lobis integris prominentibus," exhibits great diversities in the admitted species, from the proper annular and 5-lobed crown of G. lævis, to the campanulate one, with 10 long subulate and 5 short triangular teeth, of G. macrophyllus and G. hirsutus.

274. Eustoma Russellianum, *Don, Griseb.* Clayey, wet prairies. July — August.

275. Phlox Drummondii, *Hook.* Sandy soil, near water courses.

276. Convolvulus (Stylisma) Pickeringii, *Torr.* Dry, sandy prairies. May — July. — Specifically distinct, we suspect, from the C. tenellus, *Lam.* to which Choisy joins it.[1]

277. Cuscuta cuspidata β. Vide No. 125, supra. Bottom lands of the Colorado River. August.

278. Lithospermum breviflorum (*n. sp.*): caulibus solitariis, vel plurimis e radice nigro-purpurea fusiformi erectis apice ramosis, foliisque linearibus lineari-lanceolatisve margine revolutis utrinque strigoso-canescentibus; floribus subpedicellatis; corolla calycis lacinias lineares strigosas vix æquante fauce exannulata, lobis erectis (an semper?) minutissime crenulatis; nucibus albidis nitidis ovatis acutis, intus acute

[1] The collection also comprises a few specimens of Convolvulus hastatus, *Nutt. in Trans. Am. Phil. Soc. (n. ser.)*, V. p. 174: which name, being several times preoccupied, we propose for it the name of C. lobatus. Sandstone rocks, near Industry. May, June. Stems prostrate, 8-4 feet long. Flowers rather small, white. Dr. Wright has also sent it from the Colorado.

carinatis et impresso-punctatis. — L. Mandanense, *Torr. in Nicollet, Rep.* p. 155, non *Hook.* — Clayey prairies, near Industry. April, May. A foot high. Leaves rather scabrous above, almost exactly like those of L. longiflorum (L. incisum, *Lehm.*); the radical somewhat oblanceolate. Lobes of the corolla hirsute on the outside. Except the flowers, the plant has wholly the aspect of L. longiflorum; but the corolla is shorter than in L. Mandanense, and entirely destitute of the appendages in the throat, unless their rudiments may be obscurely discerned in the sinuses, *not opposite* the lobes of the corolla.

279. Eutoca strictiflora (*n. sp.*): cinereo-hirsuta; caulibus plurimis simplicibus e radice annua adscendentibus; foliis pinnatifidis lanceolato-oblongis (seu primordialibus integris obovatis), inferioribus in petiolum attenuatis lobis brevibus obtusis, superioribus sessilibus lobis lanceolatis acutiusculis; racemis terminalibus multifloris elongatis arcte secundis, fructiferis strictis; calycis laciniis spathulato-linearibus, fructiferis erectis auctis pedicello appresso parum longioribus; corolla late campanulata calyce sesquilongioribus, tubo obscure 10-squamigero; filamentis pilosiusculis inclusis; ovario 14–20-ovulato; capsula plerumque 12-sperma. — Sandy soil on the banks of the Brazos near San Felipe. March. A span high; the whole plant almost hoary with a hirsute pubescence. Radical leaves with about 5, the upper cauline with 2 or 3 pairs of lobes. The erect calyx-segments as well as the pedicels give the crowded racemes in fruit a very stiff and strict appearance. Corolla apparently blue, a little hairy externally; the margin very obscurely erose-crenulate; the tube furnished at the base with 5 pairs of linear and narrow appendages which are adherent by the whole margin, so as to form 5 rather inconspicuous grooves which alternate with the stamens. The corolla is almost an inch in diameter in Lindheimer's specimens. The same species occurs in Drummond's Collection (3. No. 298) apparently with smaller flowers.

280. E. patuliflora (*n. sp.*): pubescens, subcinerea; caulibus e radice annua diffusis ramosis; foliis spathulato-

oblongis obovatisve membranaceis pinnatifido-dentatis vel incisis basi angustatis sessilibus vel infimis petiolatis, dentibus subovatis obtusis; racemis terminalibus simplicibus secundis; calycis laciniis oblongis, fructiferis subspathulatis patulis pedicello filiformi patente seu reflexo multum brevioribus; corolla late campanulata calycem parum excedentibus, tubo obscure 10-squamigero; filamentis pilosiusculis inclusis; ovario 14–16-ovulato; capsula circiter 12-sperma. — Woods near San Felipe. March — April. Stems 6 to 12 inches long, often decumbent. Whole plant with somewhat the habit of Eutoca viscida, but not glandular. Leaves 1 to 2 inches long. Racemes lax; the spreading pedicels an inch long in fruit. Corolla much smaller than in the foregoing species, deep blue, yellow at the base; the margin of the lobes somewhat erose; the 5 pairs of very small squamellæ also as in *E. strictiflora.* — We can discern the obscure rudiments of the tubal appendages in the corolla of *Eutoca viscida.* In *E. hirsuta* (Phacelia, *Nutt.*) No. 134 of this collection, they are very narrow but are distinctly visible under the microscope; as also in the nearly allied *E. parviflora.* Hence we should have no hesitation in restoring the genus *Cosmanthus* of Nolte and Alph. DC. to Eutoca and Phacelia.[1]

281. Solanum mammosum, *Linn.* ? ? Road-sides in prairies between the Brazos and the Colorado. June. A stout branching perennial, with broader, more canescent and lobed leaves than *S. Carolinense.*

282. Pentstemon Murrayanum, *Hook. Bot. Mag.* t. 3472. Dry sandy soil in open woods west of the Brazos. May — June. The splendid flame-colored flowers, with a scarlet border, form a pleasing contrast with the bluish glaucous leaves. Pedicels erect, the flowers horizontal.

283. Gratiola sphærocarpa, *Ell.* Along ponds and riv-

[1] Eutoca glabra = Phacelia glabra, *Nutt. l. c.* Of this a very few specimens were collected by Lindheimer. Fine specimens in fruit exist in Drummond's Texan Coll. III. No. 302. The capsule is about 6-seeded. The calyx-segments in fruit become ovate-lanceolate or oblong.

ulets, flowering from February to April, and also through the summer.

284. Castilleja indivisa (*Engel. MSS.*): "piloso-hispida; foliis integris lineari-lanceolatis acutis basi pleraque rotundatis, floralibus apice ovato- vel obovato-dilatatis coloratis; spica demum elongata; calycis lobis late obovatis apice coloratis truncatis retusisve corolla paulo vel vix longioribus. — Valde affinis quoad flores *C. coccineæ*, et quoad folia *C. lithospermifoliæ*, ab illa imprimis foliis indivisis, ab hac statura sæpius elatiore differt, foliis acutioribus et capsulis majoribus." *Benth. in DC. prodr. ined.* — Prairies from Houston to the Colorado: March to June. Also collected by Drummond and Berlandier.

285. Hedeoma Drummondii, *Benth.*: but the verticillastri are only about 3-flowered, and the corolla is long and much exserted. Yet it is certainly the same species as Nos. 276 and 278 of Drummond's Third Texan Collection. — Sandstone rocks near Industry. July. The whole plant has the taste and odor of lemon-peel.

The two following Labiate plants, upon which Dr. Engelmann proposes to establish two new genera, viz., No. 286. *Stachyastrum* (so called from the resemblance of the plant to Stachys in habit); and 287. *Brazoria* (from the habitat on the river Brazos,) we think may, notwithstanding minor differences, be properly associated in a single genus, which will be well distinguished from Physostegia by the inflated bilabiate calyx which becomes closed in fruit by the inflexion of the lower lip. The genus should perhaps be referred to the tribe Scutellarineæ rather than Stachydeæ. It may be thus characterized.

BRAZORIA, *Gen. nov.*

Calyx late campanulatus, bilabiatus (labio superiore breviter 3-lobo, inferiore 2-lobo) per anthesin inflatus, post anthesin e surrectione labii inferioris clausus, indistincte nervosus, reticulato-venosus. Corolla tubo longe exserto, fauce inflata; limbi bilabiati labio superiore erecto subgaleato breviter bilobo vel integro, inferiore profunde trifido, lobis rotundatis patentibus seu recurvis. Stamina 4, sub labio superiore adscendentia: filamenta supra medium corollæ adnata, ubi pilosa, inferioribus eminentibus: antheræ approximatæ; loculis distinctis divaricantibus ad rimam pl. m. ciliatis. Stylus glaber apice æqualiter bifidus, lobis subulatis. Achenia sicca.—Herbæ annuæ, Texanæ, facie foliis et inflorescentia Physostegiæ. Corolla incarnata, fauce luteola.

§ 1. Eubrazoria. Calycis lobi latissimi, truncati, subæquales, mucronato-denticulati: corolla majuscula tubo prope basin piloso-annulato; fauce infra labium inferiorem intrusa quodammodo palatum efficiente; lobis omnibus eroso-crenulatis, iisdem labii inferioris æqualibus, apice bilobis: achenia triangulata, pubera.

286. Brazoria truncata = Physostegia truncata, *Benth. Lab.* p. 505; *Hook. Bot. Mag.* t. 3494.—Sandy soil on deserted ant-hills, &c., in the prairies along the Brazos: May—June. It was first collected by Drummond (No. 274 of the Third Collection); and has since been gathered on the Colorado by Dr. Wright. Stem pubescent, scarcely a foot high. Spike dense. Calyx hairy at the base, especially after flowering. Flowers nearly as large as in Physostegia Virginiana: the tube of the corolla spotted with purple. The lobes of the lower lip of the calyx are usually merely mucronulate in the middle; those of the upper are erose-denticulate with mucronulate teeth. In fruit the achenia are contained in a gibbous cavity belonging to the upper side of the calyx: this is closed by the inflexion of the lower lip, which is appressed to the face of the upper, or partly wrapped around it; so that the fructiferous calyx is flat on the lower side, and very gibbous at the base of the upper side.

§ 2. Stachyastrum. Calycis sub-7-nervis labium superius latum, lobis rotundatis; inferius angustum, lobis triangulari-lanceolatis, omnibus cuspidato-mucronatis: corolla exannulata, parvula; lobo medio labii inferioris cæteris majore, retuso, marginibus in omnibus fere integerrimis: achenia subglobosa, lævia.

287. B. SCUTELLARIOIDES, *n. sp.*—In heavy black soil on the prairies near Cat Spring, west of the Brazos: April, May. The plant was also collected by Drummond, and specimens were distributed, under No. 274, of the Third Collection, mixed with *B. truncata*, which it greatly resembles in habit and foliage. The stem is glabrous, however, though the inflorescence, as well as the calyx, is minutely pubescent. The flowers are scarcely half the size of the preceding: the calyx is more deeply bilabiate, and the lobes, except the middle one of the upper lip, pointed with a rather conspicuous cusp: in fruit the upper lobes are somewhat curved backwards, while the narrow lower lip is incurved, so as nearly to close the orifice. Corolla flesh-color: anthers purplish.

288. PHYSOSTEGIA INTERMEDIA = Dracocephalum intermedium, *Nutt. in Trans. Amer. Phil. Soc. l. c.* Wet prairies west of San Felipe, growing in patches,—a smaller plant than *P. Virginiana*, with a much more slender spike. The cauline leaves, especially the upper ones, are broadest and cordate at the base, and serrate throughout. Our plant accords with No. 275 of Drummond's Third Texan Collection. No. 274 is a form with acute and more entire leaves, more nearly that described by Nuttall. It is difficult to distinguish the species sufficiently from some forms of *P. Virginiana*.

289. VERBENA BIPINNATIFIDA = Glandularia bipinnatifida, *Nutt. in Trans. Amer. Phil. Soc. l. c.* Rich prairies, &c. March, April. A plant with more prostrate and radicant sterile stems, more dissected leaves, denser spikes, smaller flowers, shorter calyx, and also more hirsute than *V. Aubletia*.

290. DIPTERACANTHUS (§ MEIOPHANES, corolla parva caduca, limbo vix expansa) MICRANTHUS (*n. sp.*): subglaber, caule erecto ramoso; foliis lanceolato-oblongis subintegerrimis utrinque acutis in petiolum brevem attenuatis, junioribus ciliatis; cymulis paucifloris subsessilibus axillaribus bracteis ovalibus brevioribus; calycis laciniis subulato-lanceolatis piloso-ciliatis corollam inconspicuam capsulamque 8-spermam æquantibus.

—Low woods between the Brazos and the Colorado: June—Sept. Also collected by Drummond (Coll. II. No. 202.) (In similar situations, near St. Louis, *Engelmann*, and Alabama, *Buckley*.)—Plant 1 to 3 feet high, with much the aspect of *D. strepens* in fruit, except that the leaves are narrower (the lower cauline barely ovate-oblong,) or of *D. hybridus* (but nearly glabrous,) but remarkable for its quite inconspicuous flowers. Corolla only about four lines long, whitish, the limb perhaps very rarely expanding, 5-toothed. Filaments conspicuously connate by pairs at the base in a ligula: anthers muticous. Style somewhat hairy: one of the lobes of the stigma abortive, the remaining one subulate. Capsule and seeds as in *D. strepens*, &c.[1]

291. Dianthera Americana, *Linn.* Creeks of the Colorado; July—Aug.—Seeds destitute of the mucilaginous coating, and appressed hairs of Dipteracanthus, &c.

[1] There are two other well-marked new species of Dipteracanthus (Ruellia) in Drummond's Texan Collection, viz.

D. Drummondii (*Torr. & Gr. MSS.*): cinereo-pubescens et pilis mollibus hirsuta; caulibus e basi ramosis adscendentibus; foliis oblongo-lanceolatis obtusiusculis sæpe repandis arcte sessilibus; floribus in axillis subsolitariis breviter pedunculatis vel subsessilibus; bracteis lanceolatis; calycis laciniis filiformibus hirtis tubo corollæ infundibuliformis multum brevioribus capsulam clavato-ovoideam 4-spermam excedentibus.—Stems 6 to 20 inches high. Leaves 1½–2 inches long, somewhat erect, about the length of the internodes, or the upper more approximate usually very obtuse at the base. Corolla 2½ inches long, the slender tube finely infundibuliform at the summit. Anthers muticous.—Var. α. Tex. Drum. Coll. II. No. 220, and III. No. 258. β. Very hirsute and more branched. Coll. II. No. 219.

D. (Calophanes) linearis (*Torr. & Gr. MSS.*): humilis, subpubescens; caulibus e basi lignosa ramosissimis diffusis; foliis lineari-oblanceolatis integriusculis obtusis basi attenuatis subsessilibus; floribus solitariis geminisve in axillis subsessilibus; bracteis foliis conformibus calycem subæquantibus; calycis laciniis hirtis subulato-setaceis tubum corollæ paulo excedentibus capsulam oblongam tetragonam demum quadrivalvem 2–4-spermam superantibus.—Texas, Drummond's Coll. II. No. 178. Also near Columbus, *Dr. Wright*. Stems or branches a span long. Leaves an inch in length. Corolla about as large as in *D.* (*Calophanes*) *biflora* or *oblongifolia*; the tube short, and the limb somewhat bilabiate. The sepals, as in the above-mentioned species, united below into a short tube. Anthers subsagittate, the cells distinctly cuspidate at the base. Stigma single. Capsule somewhat fusiform; the valves each separating into two through the *complete* dissepiment. The hairs of the seed are very slender, and marked with extremely delicate rings.—We have not the fruit of the allied *D. biflora* (Ruellia oblongifolia, *Michx.*) Perhaps the genus Calophanes might be kept apart from Dipteracanthus, if, indeed, either be sufficiently distinct from Ruellia proper. A. Gr.

292. Utricularia personata, *Le Conte, DC.* Not sufficiently distinguishable from U. cornuta. — Wet soil. April.

293. Oxybaphus pilosa ? = Alliona ovata, *Pursh.* Calymenia pilosa, *Nutt.* — Both bad names, as the stem and leaves are sometimes nearly glabrous, and the leaves are mostly oblong-lanceolate. Prairies west of the Brazos, July, August. Leaves on very short petioles. Involucre 2-flowered. Stamens 4–5, exserted. (Also collected in Texas, by Dr. Wright.)

294. Boerhavia diffusa, *Willd.* Roadsides and prairies; a common weed. September — October.

295. Rivina portulaccoides, *Nutt. in Trans, Amer. Phil. Soc. l. c.* Woods and prairies, near Industry. June — October. — A perennial herb, with a ligneous rhizoma.

296. Polygonum cristatum (*n. sp.*): caule herbaceo volubili angulato-striato; foliis e basi subcordata vel truncata triangularibus acuminatis margine scabris; floribus in axillis foliorum glomeratis seu in spicas foliaceas laxe dispositis; floribus octandris; stigmatibus 3 sessilibus; laciniis perigonii fructiferis tria exterioribus cristato-alatis, alis crenato-incisis; nucibus parvis trigonis nitidis. — Margin of woods, &c. near Industry. July. Near Polygonum scandens and P. dumetorum, from which it is distinguished by its less cordate and more triangular leaves, and the crenately incised wings of the three outer sepals, in fruit; and also by the smaller nuts, which are just one line in length. In P. scandens the nuts are more than a line and a half, in P. dumetorum fully two lines long. In the latter the broad wings are undulate and entire. In P. scandens they are somewhat crenate, but often one or all three are wanting. In P. Convolvulus the wings are wanting, and the nuts are opaque.

297. Eriogonum multiflorum, *Benth.* Sandy prairies, near Industry. July — October. — The stamens in the fertile flowers are very woolly towards the base.

298. Aristolochia longiflora (*n. sp.*): radice filiformi elongata; caule humili adscendente ramoso; foliis longe linearibus utrinque acutissimis subsessilibus glabris; floribus axillaribus pedunculatis basi unibracteatis extus pubescentibus,

limbo e basi-cordata valde producto lineari acuminato tubo angusto multo longiore. — Shady, grassy places near Mill creek. April — July. A remarkable species, with a very long and simple aromatic root, and several weak, decumbent stems branching from the base, about a span high. Leaves three to five inches long, and one to three lines wide; the attenuated limb of the perigonium as long as the leaves. Capsule glabrous.

299. A. reticulata, *Nutt. in Trans. Amer. Phil. Soc.* (*N. Ser.*) V. p. 162. Thickets west of the Brazos. May — June. — Root similar in sensible properties to that of A. serpentaria, but of coarser fibres; and also used medicinally as a snake-root.

300. Euphorbia herniarioides, *Nutt. l. c.* p. 171. Clayey soil, near Industry. July — September. Also in Mississippi, Missouri, &c. The smallest of our procumbent Euphorbiæ; the leaves from a line and a half to two or three lines long, obliquely obtuse or subcordate at the base. Glands of the involucre narrowly petaloid-margined. Cocci smooth and somewhat carinate. Seeds grey marked with reddish, obovate-oblong, obtusely angled, smooth.

301. E. arenaria (*Nutt. l. c.*): annua, erecto-patula, glabra; foliis oppositis distantibus linearibus integerrimis obtusis mucronatis basi subobliqua acutis breviter petiolatis; stipulis e basi lata subulatis distinctis subintegris; pedicellis petiolos longe superantibus solitariis; appendicibus involucri petaloideis plerumque 4-ovatis subacutis inæqualibus; seminibus obovato-subglobosis lævibus e rubello cinereis. — Sandy places, especially about fresh ant-hills, near Industry; also on sandstone rocks. June — August. Forming large bushy masses, often six feet in circumference, and two feet or more in height. Its slender habit, long and narrow leaves, and conspicuous white flowers, give it somewhat the appearance of a large Galium.[1]

[1] A remaining species of the stipulate division of this genus is

E. Geyeri, (*Engel. MSS.*): depressa, humilis; foliis oblongis retusis integerrimis glaberrimis; stipulis setaceo-multifidis; involucri appendicibus petaloideis; seminibus minoribus quam in E. polygonifolia cinereis. — Beardstown, Illinois, and Upper Missouri, *Geyer*. Near E. polygonifolia.

302. E. Arkansana (*n. sp.*): annua, gracilis, glaberrima; caule erecto ramoso; foliis sparsis spathulato-obovatis apicem versus serrulatis mucronato-acutis sessilibus, inferioribus in petiolum angustatis; umbellis trichotomis bis dichotomis; bracteis rotundatis subcordato-ovatis mucronatis serrulatis; glandulis involucri (aurantiacis,) orbiculatis; capsulis verrucosis; seminibus (brunneis) reticulatis. — Prairies, from Houston to the Colorado. April — July. Also, Fort Gibson, Arkansas, *Engelmann*, and Western Louisiana, *Dr. Hale.* — Plant 8 to 12 inches high, with much the appearance of E. peploides, *Nutt.*; which abundantly differs in its entire and retuse leaves, entire and more cordate bracts, smooth capsules and smooth seeds. The seeds and serrulate leaves in our plant are more like E. Helioscopia on a small scale, but, besides that ours is much more slender and smaller in all its parts; the broadly-ovate acute bracts are very different.

303. E. marginata, β uloleuca: bracteis oblongis ovali-lanceolatisve acutis, marginibus latissime albidis sæpe pl. m. crispis; ramulis villosis. — Bottom lands of the Colorado. August. — Seeds tuberculate-rugose, as in the ordinary forms of E. marginata.

304. Pilinophytum capitatum, *Klotzsch*, (cf. No. 171.) Low prairies, on the Colorado. September, October.

305. Hendecandra Texensis, *Klotzsch in Erichs. Archiv*, (1841) I. p. 252. Croton muricatum, *Nutt. in Mem. Amer. Phil. Soc. l. c.* p. 173. Prairies on the Colorado, the sterile and fertile plants generally intermixed, and covering large patches of ground. An annual plant, about three feet high. Leaves often lanceolate-oblong, and half an inch wide; those of the fertile plant greener above than in the sterile, as described by Nuttall, but often wider rather than narrower. Stigmas 20–24. The hypogynous disk orbicular. — Klotzsch wrongly describes the stem as suffruticose, and has not noticed the flocciferous soft tuberculi of the capsule, which are as evident in our Drummondian specimens as in those of Lindheimer. The H. multiflora, *Torr. in Fremont's Report*, 1843, is the same species.

306. APHORA (vide No. 175, supra) HUMILIS (*n. sp.*): strigoso-pilosa; caulibus basi ramosissimis adscendentibus diffusis; foliis oblongis ovato-lanceolatisve obtusis basi attenuatis brevissime petiolatis superne demum glabratis; capitulis axillaribus folio multum brevioribus paucifloris; petalis in fl. masc. calycem paulo superantibus lanceolatis, in fl. fœmineo subulatis glandulis disci brevioribus. — In hard clayey soil, west of the Brazos. March — August. (Also, Texas, *Drummond*, Collection Second, No. 230, and *Dr. Wright.*) Plant 6 to 8 inches high; the base of the stem ligneous. Leaves an inch or an inch and a half long. The clusters contain one fertile and about four staminate flowers. The fruit and seeds not half the size of those of the two other Texan species; the latter globose and rugose, as in the other species, at first curiously striate-reticulated, but when old more even.

307. TRAGIA BREVISPICA (*n. sp.*): multicaulis, ramosa, decumbens; ramis apice flexuosis vel subvolubilibus; foliis e basi cordata truncatave triangulari-lanceolatis (superioribus fere linearibus) irregulariter acute dentatis parce pilosis petiolatis; spicis folio oppositis multo brevioribus; flore fœmineo ad basin unico, masculis paucis; capsulis hispidulis. — Black, clayey soil, in the prairies west of the Brazos. May — July. Differs from T. urticæfolia (perhaps not specifically) in the procumbent stems, which often form diffuse tufts two or three feet in diameter, and the smaller and narrower leaves, as well as the short spikes and smaller flowers and fruit; the latter is less hispid.

308. FORESTIERA ACUMINATA, *Poir.* Banks of the Brazos, near San Felipe. March. It extends as far north as on the Wabash, in Illinois.[1]

309. QUERCUS CINEREA, *Michx.* Sandy, hilly soil; forming groves in the prairies west of the Brazos, along with

[1] ULMUS CRASSIFOLIA, *Nutt.* was sparingly collected by Lindheimer; the tree was in flower, for the second time, in September. The perigonium is divided to the base into eight linear segments; and the ovary and fruit are villous.

Q. obtusiloba; flowering in February. A small tree, crooked, and much branched; the earliest flowering species in Texas.

310. Potamogeton diversifolius, β. spicatus, *Engel. in Sill. Jour.* 46, p. 102. Clear rivulets, in prairies, west of San Felipe. April. Leaves 5–7–13-nerved.

311. P. natans, *Linn.*, Var.? foliis infimis elongato-lanceolatis utrinque acutissimis pellucidis breviter petiolatis, sequentibus longius petiolatis sensim magis oblongis et coriaceis, summis natantibus oblongis ellipticisve; fructibus lenticulari-compressis margine acutiusculis. — In clear water and pools, west of the Brazos. June. Intermediate in its characters between P. natans and P. fluitans; and in the absence of the upper leaves, very difficult to distinguish from P. lucens.

312. Xyris torta, *Smith, Kunth, Enum.* 4, p. IV. (ex char.) Springy places. May. Also, in Drummond's Texan Collection.

√313. Sysirinchium minus (*n. sp.*): pumilum; caule ancipiti ramoso folioso; spatha paulo inæquali flores æquante vel subexcedente; perigonii segmentis (cœruleis) ovatis exterioribus setaceo-mucronatis; capsulis obovati-ovalibus glabris. — Margin of pools, &c. in the prairie west of San Felipe. April. Distinguished from the other North American species, by the smaller size of the whole plant (3–6 inches high,) the much branched stem, the ovate, not obcordate or emarginate, lobes of the perigonium, and the form of the capsule. Spathe not mucronate, about 4-flowered. Seeds numerous and very small, impressed-dotted, black.

314. Habranthus Texanus, *Herb.* Low prairies of the Colorado, in black, clayey soil; flowering in September. Perigonium reddish-orange outside, yellow within.

315. Eleocharis acicularis, *R. Br.* var. Ponds and pools on Mill Creek. March.

316. Tripsacum cylindricum, *Michx.* Prairies. April, May.

317. Andropogon macrourus, *Michx.* September.

318. Chara polyphylla, *Michx.*, *A. Braun.* On the

clayey bottom of clear rivulets, in the prairies between the Brazos and Colorado. July, and the whole year round.[1]

*** No. 151. MONARDA LINDHEIMERI of this enumeration must be the same as M. SCABRA, *Beck, in Sill. Jour.* X. p. 260, which name should therefore be adopted.

[1] In addition to the enumeration of the North American Charæ, published in Silliman's Journal, Vol. XLVI. p. 92, (January, 1844,) we record the following notices, communicated by Professor Braun:

Mr. Lindheimer has sent from Texas specimens of *Chara flexilis*, Linn.? (incomplete specimen,) and of *Ch. tenuissima*, Desv. This last, as well as the specimens from Massachusetts, may be distinguished as var. *Americana;* the whorls are less densely glomerate, but more approximate than in the European form.

Chara polyphylla, A. Br., is a very polymorphous plant, occurring in many different forms in America, Asia, and the Sandwich Islands. Professor Braun distinguishes seven subspecies.

a. *Ch. polyphylla Michauxii* (*Ch. polyphylla*, A. Br. in Regensb. Bot. Zeit. 1835, p. 70; *Ch. Michauxii*, A. Br. in Sillim. Journ. l. c. No. 11; *Ch. capillata*, Michaux in herb. Jussieu; *Ch. haitensis*, Turpin, Dict. sc. nat. Atlas.) Ohio, (Michaux, Dr. Frank); Missouri, (Dr. Engelmann); Texas, (Mr. Lindheimer); Hayti, (Turpin, 1796.) This is the stoutest, and also the most northern of all species and subspecies of the remarkable group of *Gymnopodæ*, A. Br. There are five species now known, belonging to this group; and of these *Ch. polyphylla* is the most polymorphous, and widest spread species. — The Gymnopodæ are distinguished by having the lowest (often very short) joint of the otherwise coated leaves (commonly called verticillated branchlets) naked, or destitute of the coating.

b. *Ch. polyphylla guadeloupensis*, (Ch. *indica*, Bert.) Guadeloupe, Bertero. More slender, with smaller, more elongated seed vessels (sporangia) and still shorter bracts.

c. *Ch. polyphylla ceylanica*, (Ch. *zeylanica*, Klein in Willd.) Ceylon, Pondicherry, Madras, etc.

d. *Ch. polyphylla javanica.*

e. *Ch. polyphylla Muhlenbergii*, (Ch. *foliosa*, Muhlenb. in Willd.; Sillim. Journ. l. c., p. 93, No. 10.) Pennsylvania, Muhlenberg. Very near subspecies *C. ceylanica*, and distinguished from *a. Michauxii*, by the bracts being much longer than the sporangia, while they are shorter in *Michauxii.*

f. *Ch. polyphylla Humboldtiana*, (Ch. *compressa*, H. B. K.) New Andalusia, Humboldt. A variety with some of the upper joints of the leaves destitute of the coating.

g. *Ch. polyphylla armata*, (Ch. *armata*, Meyen, Reisebesch.) Sandwich Islands, Meyen. Distinguished by the stronger spines, and also mostly naked upper joints and smaller seed vessels.

A second species, distinct from Ch. *polyphylla*, but also belonging to *Gymnopodæ*, has been collected by Dr. Engelmann, in lakes in the bottom lands of the Mississippi, near Saint Louis; it is called by Professor Braun

Ch. sejuncta, a more slender and greener plant than the last, but principally distinguished by the seed vessels (sporangia) and globules (often called anthers) being always found on different joints of the leaves (or branchlets,) never as in most other species, together on the same joint. — Martius has collected the same species in Brazil; the North American form is larger, and more slender, and has bracts shorter than the seeds; and may therefore be called var. *brevibracteata*, and the Brazilian variety, *longibracteata.*

ART. XVI.—DESCRIPTIONS OF THE FISHES OF LAKE ERIE, THE OHIO RIVER, AND THEIR TRIBUTARIES. By JARED P. KIRTLAND, M. D.

(Continued from page 32.)

CATOSTOMUS. Le Sueur.

C. communis. The Brook Sucker.

Catostomus communis.	Le Sueur.	J. A. N. S. Vol. I. p. 96, and fig.
" *gracilis.*	*The Brook Sucker.*	Kirtland, Rep. on Ohio, pp. 169, 193.
" *communis.*	" "	Dekay's Report, p. 196, pl. 33, fig. 106.
" "	" "	Hist. Nat. des Poissons. Cuv. et Vol. t. xvii. p. 426.

Plate XIX. Fig. 1.

Head slightly elongated, small, quadrangular, narrower than the body; *eyes* small; *iris* silvery; *nostrils* double.

Mouth and *lips* delicate, rather small.

Body sub-cylindrical, slightly compressed laterally, fusiform, the scales minute behind the operculum, gradually enlarging towards the caudal-fin; *lateral line* straight, running above the middle of the body.

Dorsal fin quadrangular, the ribs of the rays blackish.

Caudal fin small, obtuse, rather lunated than lobed. The rays at their extremities are usually blushed with red.

Anal fin narrow, attains to the base of the caudal.

Pectoral fin ovate.

Color. The back and head olive and iridescent; sides silvery; beneath, pearly white.

Length, 12 to 18 inches.

Hab. Big and Little Miami, and the Mahoning Rivers, and also in most of the smaller streams.

D. 14; C. 18; A. 8; V. 10; P. 18 rays.

Observations. A fish, which I suppose to be the male of this species, may be seen on the ripples of the small streams, collecting in great numbers in the spawning beds during the month of June. At that time the rays of the anal fin are studded with prominent tubercles, which appear to be deciduous at the close of the spawning season. Its body is so poor and slender at that time, that it has very little resemblance to the females or to itself at other seasons.

C. bubalus. Raf. Buffalo Sucker. Brown Buffalo.

Catostomus bubalus. Rafinesque. Icthyol. Ohiensis, p. 55.
" " " Kirtland's Rep. on Zool. of Ohio, pp. 169, 192.

Plate XIX. Fig. 2.

Head one fifth of the total length, rounded, rapidly declivous, gibbous between the eyes and on the forehead, compressed laterally ; *back* gibbous, sub-carinate ; *abdomen* rectilinear, thicker than the back ; *lateral line* straight ; *scales* large, somewhat radiate with minute lines. *Dorsal fin* long, commencing as far forward as the ventral, and terminating over the middle of the anal fin, the anterior portion elevated, the posterior low and horizontal.

Caudal fin bilobed, the lobes equal in length, the lower broader.

Anal fin trapezoidal, acutely terminated, extending as far as the base of the caudal.

Ventral fin nearly medial.

Pectoral fin does not extend as far back as the commencement of the dorsal.

Color. *Back* and *head* brown, *sides* bronzy and metallic, *abdomen* whitish, *iris* gilt.

Length, from one to three feet.

Hab. Ohio river.

D. 28 ; C. $18\frac{2}{2}$; A. $11\frac{1}{2}$; V— ; P. 16 rays.

Observations. This is the largest species of Catostomus found in the western waters. Its flesh is eatable, but coarse, and not highly esteemed.

The color and form vary with age. The young is nearly elliptical in its outline, and is often sold in the market as a distinct species, under the name of *Buffalo Perch.*

C. elongatus. Le Sueur. Missouri Sucker. Black Horse of the fishermen.

Catostomus elongatus.	Le Sueur.	Jour. Acad. Nat. Sc. Vol. I. p. 103, and fig.
" *niger.*	Raf.	Ich. Ohiensis, p. 56.
" *elongatus.*	Le Sueur.	Kirtland's Report, pp. 169, 192.
" "	"	Dekay's Report, p. 203.
" "	"	Hist. Nat. des Poiss. t. xvii. p. 455.

Plate XIX. Fig. 3.

Head conic-cylindrical, elongate, and glaucous. *Nose* projects beyond the mouth; *nostrils* double, circular, the anterior smaller. *Mouth* small, semicircular; *lower lip* with prominent papillæ, posterior edge acute. *Eyes* small, circular; *iris* narrow, yellow or silvery. The *head* is one-sixth of the total length, and narrower than the body.

Body regularly fusiform, gradually widening from the base of the head to the dorsal fin; and, from thence to the tail, more gradually tapering. At the dorsal, the diameter of the body is one-fifth the total length. *Abdomen* full between the pectoral and ventral fins, and the body cylindrical at that point.

Dorsal fin long, equal to one-third the length of the fish, low, with its anterior portion elevated and falciform. It extends posteriorly as far as the anal fin.

Caudal fin acutely lunated, the superior lobe the longer and narrower, scales extend upon the base and terminate abruptly.

Anal fin small, trapezoidal, scaly upon its base.

Ventral and *pectoral fins* falcate.

Color. The head dusky above, coppery on its sides. Back black, often slightly mottled. Sides and beneath dusky and cupreous. Fins dusky and livid.

Length 2 to 3 feet, and *weighing* from 2 to 15 pounds.

Hab. Ohio River.

D. 35; C. 18; A. 8; V. 9; P. 15 rays.

Observations. This singular fish is not uncommon in the Cincinnati market at certain seasons of the year, especially in the spring and autumn. It migrates down the river at the approach of winter. The peculiar color and form distinguish it from all the other species of the *Catostomi*. As an article of food, it is esteemed more highly than any other of this family.

Le Sueur drew his figure, published in the 1st vol. of the Journal of the Acad. of Nat. Sciences, at Philadelphia, from a dried specimen; and, with the exception of the dorsal fin, it has little or no resemblance to the recent fish.

C. Duquesnii. Le Sueur. Pittsburg Sucker. Red Horse of the fishermen.

Catostomus Duquesnii.	*The White Sucker.*	Le Sueur.	Jour. Acad. N. Sc. Vol. I. p. 105, and fig.
" "	" "	" "	Kirtl. Report, pp. 169, 192.
" "	" "	" "	Dekay's Report, p. 203.
" "			Hist. Nat. des Pois. t. xvii. p. 458.

Plate XX. Fig. 1. Male.
Plate XXI. Fig. 2. Female.

Male. *Head* small, protuberant before the eyes; *mouth* and *lips* not large; *eyes* circular.

Body regular fusiform, back slightly gibbous before the dorsal fin, rectilinear behind it.

Dorsal fin trapezoidal, falcated on its upper edge, the two first rays elongated and recurved, color a bright carmine.

Caudal fin deeply and acutely bilobed; the lobes produced, falcated, and at their extremities incurved; color the same as the dorsal.

Anal fin extends beyond the base of the caudal, oval, acute at its extremity; color bright carmine.

Ventral fin terminates posterior to the dorsal, orange-color.

Pectoral fin at its point extends as far as the commencement of the dorsal, ovate, slightly falcate; color the same as the ventral.

Length from 12 to 18 inches.

Color of the back and forehead dusky olive and coppery, sometimes iridescent with pale blue; sides coppery; beneath the throat and abdomen white. The colors vary in specimens from different localities, and in different seasons of the year.

Hab. The Ohio River and all its larger tributaries.

Female. The female differs from the other sex by having a larger head, mouth, and lips, larger trilobed scales, a quadrangular dorsal fin, with the caudal fin less deeply bilobed and the lobes broader. The color of the fins is also different; the caudal, anal, and dorsal of the female being of a dusky olive or brown, and the pectoral and ventral a dull orange.

Length from 1 to 2 feet.

Hab. Ohio River and its tributaries.

Observations. The size, contour, and color of the male and female, as well as the forms of their fins, differ so much, that they are often mistaken for different species. Hence, I have deemed it expedient to give a drawing of each sex. It is also very difficult to distinguish the male of this species from the male *C. anisurus.* The absence of the deep sulcation before the eyes and of the elevated protuberance on the nose in the one, and their presence in the other, will always enable us to decide the point correctly. The color of the former is also darker and more cupreous.

The Red Horse Sucker remains permanently in our waters, and, during the winter, collects into numerous shoals in the deeper waters. It rarely, if ever, bites at a baited hook, but is taken in great numbers by seines and nets. As an article of food, it is not highly valued.

C. *anisurus.* Raf. White Sucker. White nose of the fisherman.

Catostomus anisurus. Ohio Carp Sucker. Raf. Ichth. Ohiensis, p. 54.

Plate XX. Fig. 2.

Head elongate; *nose* prominent, with an elevated protuberance; between the protuberance and nostrils is a transverse sulcation. *Lips* of the female large and prominent; those of the male smaller.

Body short, thick, and slightly compressed on the sides.

Dorsal fin emarginate, quadrangular, the angles rounded. The tip extends nearly as far back as the vent.

Caudal fin large, bilobed, the upper lobe narrower, longer, and falcate.

Anal fin oval-acuminate, and reaching the base of the caudal.

Ventral fin extends beyond the base of the dorsal.

Pectoral fin attains near to the dorsal, but not to the ventral, as described by Rafinesque.

Length, from one to two feet.

Color. The body and head brownish above, sides and abdomen silvery. *Dorsal* and *caudal fins* olive, *anal* reddish, *ventral* and *pectoral* orange-colored.

Hab. Ohio river, and most of its tributaries.

D: 17; C. $22\frac{4}{4}$; A. $8\frac{2}{2}$; V. — P. 15 rays. The number differs in different specimens.

Observations. A superficial observer would hardly distinguish this species from the Red-Horse Sucker (C. Duquesnii) yet its specific characters are evident, and are permanently established. The deep, transverse sulcation before the eyes, the elevated protuberance on the nose, and the silvery lustre of the sides and abdomen will, under all circumstances, distinguish it.

The drawing was made from a female eighteen inches in length. The males are smaller, more elongate, and less gibbous on the back and forehead.

This species is common, and is taken in great quantities by means of weirs, seines, and sometimes with a hook. Its flesh is soft, tasteless, and abounding with numerous small bones. It does not migrate from the small streams during the winter.

C. melanops, Raf. Black-nosed Sucker. Spotted Sucker.

Catostomus melanops. *Black face Sucker.* Raf. Ichthyol. Ohiensis, p. 57.
" " *Spotted Sucker.* Kirtland's Rep. pp. 169, 193.

Plate XX. Fig. 3.

Head conical, one-fifth the total length, *nose* somewhat depressed, forehead slightly elevated behind the eyes; *eyes* small, circular; *iris* dusky; *nostrils* anterior to the eyes; *lips* of a medium size.

Body uniform, elliptic, full, cylindric; *back* slightly gibbous before the dorsal fin; sides hardly compressed; *abdomen* tumid; diameter equal to one-fourth the length.

Dorsal fin quadrangular, small in proportion to the body.

Caudal fin of medium size, slightly lunated.

Anal fin reaches the base of the caudal.

Pectoral fin short, small and elliptical, does not extend to the commencement of the dorsal.

Color. The nose, forehead and back dusky or blackish, the sides of the head and upper portions of the operculum marked with irregular patches of the same color; the mouth and lips white; the sides of the body often reflect a steel grey or metallic lustre, and the base of each scale is impressed with a number of abbreviated, dusky lines, which give the sides a striped or banded appearance, like the Labrax chrysops.

Lateral line obsolete; scales rather large.

Length 18 inches.

Hab. Ohio and Big Miami Rivers.

D. 13; C. $18\frac{4}{4}$; A. 9; V. 9; P. 16 rays.

Observations. Rafinesque's descriptions do not well apply to this rare species, but I believe it is the one for which they were intended, I therefore retain his name. The form and color distinguish it from the other members of this family. It is not esteemed for food even as highly as many of them.

Exoglossum. Raf.

E. dubium. Kirtland. The Sucker-mouthed Chub.

Exoglossum Lesueurianum. Rough-nosed Dace. Kirtland's Rep. pp. 169-193.

Plate XXI. Fig. 1.

Head somewhat elongated; *eyes* small, prominent; *upper jaw* projects two lines beyond the lower, which is small, semicircular, and mostly concealed by the projection of the upper when the mouth is closed; *lips* circular, the lower reflected, after the manner of the Catostomi, only smaller and less fleshy.

Body gibbous on the back, before the dorsal fin, cylindrical, slightly compressed on the sides; abdomen full; scales small oval.

Dorsal and *anal fins* trapezoidal; *caudal fin* bilobed, the upper lobe acuminate, the lower obtuse; *pectoral fin* falcate, subovate.

Color. Irides, golden yellow, *head* and *back* olive, operculum iridescent, sides dusky, *abdomen* white, *fins* fulvous.

Length, from 4 to 6 inches.

Hab. Yellow Creek, Poland, Trumbull Co., Ohio.

D. 8; C. 20; A. 7; V. 8; P. 14.

Observations. The only locality in which we have met with this fish is in the deep and dark glens of Yellow Creek, below the village of Poland. It there confines itself to the ripples in the most retired situations, where the stream, overshadowed with clusters of the spruce pine, winds among the rocks. During the spring it readily bites at a baited hook, and may be taken in considerable numbers. At that season the males are thickly armed, on both the head and body, with spinous tubercles, which are deciduous, and drop off at the approach of summer.

We formerly supposed it to be the *Cyprinus Maxilingua* of Le Sueur, the *Exoglossum Lesueurianum* of Raf., but a closer examination renders it certain that it is not that species.

In the peculiar form of its mouth it resembles some of the Catostomi, but the form of the body and fins more nearly assimilate it to the genus under which we have placed it. We usually find it associated with the *Semotilus biguttata,* and in the habits of the two there is a strong resemblance.

C. nigricans. Le Sueur. Mullet. Mud Sucker.

Catostomus	*nigricans.*	Le Sueur.	Jour. Acad. Nat. Sc. Vol. I. p. 102.
"	"	*The Black Sucker.*	Storer's Rep. on Fishes of Mass. p. 86.
"	"		Kirtland's Report, pp. 169, 193.
"	"	*The Black Sucker.*	Dekay's Rep. p. 202.
"	"	"	Hist. Nat. des Poiss. t. xvii. p. 453.

Plate XXI. Fig. 3.

Head large, quadrangular, more than one-fifth of the total length of the fish ; *eyes* oblong, with a profound impression beneath.

Body subquadrangular at its junction with the base of the head ; cylindric and tapering from the dorsal-fin to the tail ; *abdomen* full and rounded.

Dorsal fin quadrangular, elevated before.

Caudal fin deeply lunate.

Anal fin, at its tip, reaches the base of the caudal.

Ventral fin falcate, extends beyond the dorsal.

Pectoral reaches as far back as the commencement of the dorsal.

Color. The back and head dusky brown ; sides olive and brown, blotched with 4 or 5 transverse dusky brown bars, which are interrupted in their course on the sides ; abdomen and sides cupreous ; sides of the head iridescent and cupreous.

Length 12 to 16 inches.

Hab. Every permanent stream in the west.

D. 11 ; C. 18 ; A. 8 ; V. 9 ; P. 18 rays.

Observations. This is the most common species of Sucker, and is taken in great numbers by means of seines. It is common in the streams of the middle, northern and western States. During winter it is a permanent resident, and does not even seek the deeper waters. As an article of food it is not valued.

Leuciscus. Klein.

L. dorsalis. Raf. Common Chub.

Semotilus dorsalis.	*Bigback Chubby.*	Raf. Ich. Ohien. p. 49.
" "	*Smooth-headed Chubby.*	Kirtland's Rep. p. 169.

Plate XXII. Fig. 1.

Head full, round and conical, united to the back with a deep suture.

Body cylindric, back gibbous before the dorsal fin, and longitudinally sulcate.

Caudal fin slightly bilobed, the other fins rather small; the *pectoral* do not attain to the *ventral*, the *dorsal* is anterior to the vent.

Length 6 to 10 inches.

Color. Fins fulvous, the anterior part of the base of the dorsal and the centre of the base of the caudal marked with a dark brown or black spot; head and back bronzed; a brown stripe extends from the base of the tail to the head above the lateral line; abdomen white and silvery.

D. 8; C. 20; P. ?; V. 8; A. 8.

Hab. All of the western streams.

Observations. We have been disposed to consider this as only the female of the *S. cephalus*, but dissections do not sustain us in that view, and we are compelled to follow Rafinesque's arrangement. He makes it a distinct species.

It is difficult to distinguish the young of the two species, but the smaller size of the head and mouth, and the more graceful form of the body of the present species, will always enable us to draw the lines of distinction between the two that are full grown.

SCLEROGNATHUS. Val.

S. cyprinus. The Carp. Le Sueur.

Catostomus cyprinus. The Carp. Le Sueur. J. A. N. S. Vol. I. p. 91, and fig.
Labeo cyprinus. Regne Animal, Griffith's translation, p. 381.
Catostomus velifer. The Sailing Sucker. Raf. Ich. Ohiensis, p. 56.
" *carpio? Olive Carp Sucker.* A variety from age. Raf. Ich. Ohiensis, p. 56.
" *velifer. Carp of the Ohio.* Kirtland's Report, pp. 169, 192.
Labeo cyprinus. The Long-finned Chubsucker. Dekay's Report, p. 194.
Sclerognathus cyprinus. Hist. Nat. des Poissons, t. xvii. p. 474.

Plate XXII. Fig. 2.

Head short, small, compressed laterally, about one-sixth of the total length; *operculum* radiated with diverging, iridescent lines; *mouth* and *lips* small; *nose* rounded.

Body oval, compressed, the relative diameter varies with age; *abdomen* thicker than the back, slightly flattened beneath. Back carinated under the anterior half of the dorsal fin.

Dorsal fin deeply falcated, the anterior rays longer than the diameter of the body in young specimens, but the proportion decreases in the old.

Caudal fin deeply bilobed, lobes equal.

Anal fin acute, reaches the base of the caudal.

Ventral fin short.

Pectoral fin ovate.

Color. The dorsal and anal fins dusky olive, the other fins faint vermilion or orange. The head, back, and sides silvery, sometimes a little shaded with olive and blue; iridescent; belly white.

Length 12 to 18 inches.

Hab. Ohio River and Lake Erie.

D. $25\frac{2}{2}$; C. $18\frac{4}{4}$; A. $8\frac{2}{2}$; V. $10\frac{1}{2}$; P. 16 rays.

Observations. It is very rare in Lake Erie, but abundant during the whole year in the Ohio. As an article of food, it is not much valued in the market of Cincinnati. It is called the Lake Shad by the fishermen at Cleveland.

L. diplemia. Raf. Red Sides. Warty Chub.

Semotilus diplemia. *Warty Chubby. Minny. Red-fin.* Raf. Ich. Ohien. p. 50.
" " *Red-sided Chub.* Kirtland's Rep. p. 169.

Plate XXII. Fig. 3.

Head compressed laterally, flat between the eyes; snout rounded, and in the males warty; *operculum* bordered behind with a diaphanous membrane. *Eyes* flat, circular, situated near the top of the head. *Under jaw* slightly projecting.

Back elevated, sides flattish, lateral line flexuous; scales on the sides oval and elongated perpendicularly.

Color. The back olive, abdomen white and silvery, the sides iridescent and violaceous, marked with irregular and interrupted black lines on the posterior edges of the scales. Fins orange color in the females, violet or red in the males.

Length 2 to 4 inches.

Hab. All the western streams.

D. 9; C. 22; A. 9; V. 8; P. 14.

Observations. The number of rays in the different fins vary in different specimens, which will account for a discrepancy between the descriptions of M. Rafinesque and myself.

Great numbers of this fish collect on the ripples in the smaller streams during the spring of the year, and excavate extensive beds, in which they deposit their spawn. After this period, they return to deeper waters, and lose much of the brilliancy of their colors during the remainder of the year.

ART. XVII.—ILLUSTRATIONS OF FOSSIL FOOTMARKS. By JAMES DEANE, M. D. Read Feb. 19, 1845.

THE design of this memoir is to present some obvious facts and ideas connected with the recent discovery of footprints upon the stratified sand-stones of Connecticut River. Those who have not access to original examples, can hardly comprehend the intrinsic properties of these fossils, much less appreciate the profound truths they reveal. The descriptions, which are brief, will be elucidated by pictorial auxiliaries, without which it would be an impossible task to convey adequate notions of these beautiful, splendid mementos of beings long since swept from the earth.

It was not, indeed, until recently acknowledged that these vestiges were due to animals, whose organization was doubtless perfect as those of living types; but a true interpretation unseals a long chapter of the earth's infant history. This doctrine is no longer controverted, or, at least, it is recognized by all who have examined the facts. It may be resisted when conflicting with cherished opinions; for the discovery fixes the limits of perfect forms of animated existence immensely lower in the scale of advancement than hitherto had been established. "The discovery," says a distinguished author,[1] "upon the sands of the great Triassic ocean, was as unexpected and startling as the human footsteps to Crusoe on his desolate island." The announcement that signs of air-breathing, warm-blooded animals existed upon a rock of the geological antiquity of the new red sandstone, was an innovation upon the systems of modern geology, and was received with extreme caution. But I must here be allowed to assert that I never once doubted that the impressions were due to the agency of extinct birds, nor hesitated to describe them as such; and the opinions originally advanced, founded upon incontestable analogies, finally prevailed.

[1] Mantell, Medals of Creation.

Several obstacles concurred to create suspicion: the relative age of the rock, the high point of perfection which the impressions indicated, the anomalous size of many of the creatures, and, above all, the impossibility of seeing original specimens. It was contended that they might have been produced under adventitious circumstances, or be assigned to huge *biped reptiles,* inasmuch as quadrupedal monsters existed in this remote era, which was emphatically one of colossal life. But these evasive objections could not resist the force of facts, and were successively overthrown. It seems incredible that there should be any pause in acknowledging the unavoidable origin of the impressions. It might as well be denied that recent imprints upon snow were made by existing animals. From the laminated structure of the rock, it had, for a long time, been used in various domestic ways; it had been made the object of scientific examination; yet, with every favorable opportunity for discovery, it was not finally made until 1835, and then by accident. But it is unnecessary now to narrate particulars.

In the demonstration of these fossils, we must apply the laws of comparison; or, in laying down the proposition that they are referable to birds, their relations to existing types must appear. Pl. XXII. f. 4, represents the osseous distal extremity and phalanges of the Heron (Ardea cinerea) left foot. Counting the ranks in each individual toe, the inner one has two, the middle three, and the outer four (excluding the posterior toe.) Now this is the method in existing tridactylous birds, and is the basis of analogy. When we examine the foot, or trace its impression upon yielding snow or mud, the number and order of the lobate swellings corresponds to the divisions shown by the engraving. The insertion of the nails is identical in the living and extinct species. If it can be further proved that the number of feet and the order of progression corresponds, we then have irrefragable proof of the kindred affinities of extinct and existing races. These conditions do invariably exist. The faultless impressions, represented by the drawings, compare with no created thing other than the footprints of birds. In rare instances even, the papillose impressions of the integuments are true to the very life. In pursuing the line of footsteps upon the rock, it is invariably composed of alternate feet, the long and short toes in their relative positions, and the middle one pointing out the place of the advanced opposite foot. These unequivocal analogies therefore prove, what was self-evident, that no other known animal could have produced the impressions upon the sandstone rocks.

An inspection of the plates, it is believed, cannot fail to overwhelm all doubts as to the *nature of these splendid fossils.* Each represents a foot specifically distinct, yet the general resemblance is very striking. The toes in these examples are exceedingly massive: a provision adapted to resist the soft

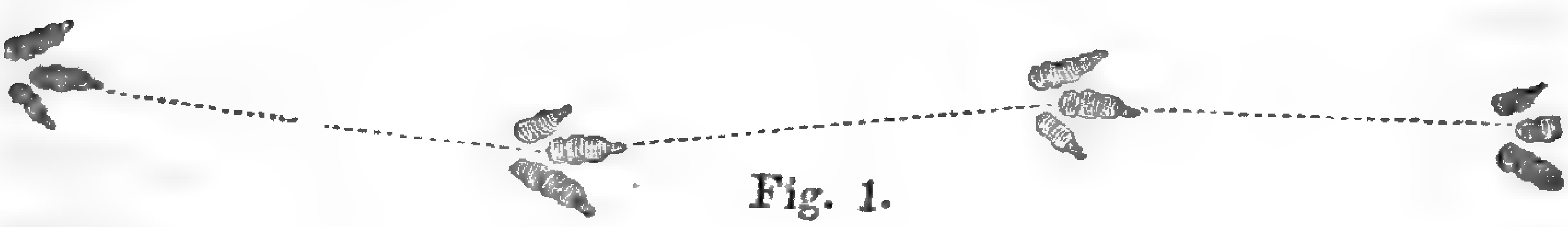


Fig. 1.

Fig. 2.

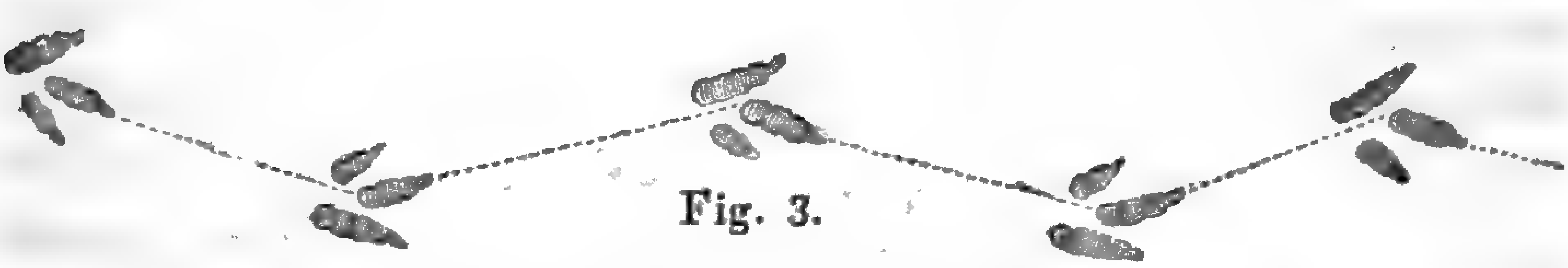


Fig. 3.

bottoms traversed by the birds. Pl. XXIII. f. 1, is a fac-simile of a superb species found nowhere but at Turner's Falls. It was a short-legged, heavy bird, as we know by the shortness of the stride as compared with its size, by the zigzag direction of a line connecting the impressions, and by their depth even upon consolidated mud. Fig. 3, in the diagram, represents the comparative size of the foot with the stride, which was, in this instance, 14 inches, and also the irregular direction from step to step. The weight of this bird was such that the bottom of the impress is moulded smooth as glass, and the toes sink so deep that the form of the heel, or metatarsal protuberances, is also impressed. There is a numerous class of impressions at Turner's Falls, having a strong family likeness to this species, differing but little except in size. It consists of all grades, from that of the plate down to two inches in length, having the same thick, stout toes, blunt nails and heel depressions. So intimate is the resemblance that it is impossible to separate them into specific divisions. As an existing fact of their being merely different individuals of the same family, the imprints are almost always associated upon the same surface. I have a slab in my cabinet, nine feet long by four wide, which contains sixty fine imprints arranged in nine or ten independent lines, and although the size of feet and length of stride differs materially, I can detect no other certain specific characters. In the collection of Dr. A. Binney, of Boston, is a beautiful example of this class derived from Turner's Falls.

It may be inferred that Pl. XXIII. fig. 3, is an individual of this group, but it is not so. It certainly presents a similitude to the eye, but the nails are very short. It is a graceful, little footstep, and belongs to a light, tall bird, and constitutes a perfect contrast to the preceding example. This is inferred from its immense stride as compared with its diminutive foot, and from the fact that the feet fall in nearly a direct line. Fig. 1, in the diagram, shows these relations. The stride is twenty-one inches, or one-half longer than Fig. 3. I have seen too many instances of this variety to suppose that this is a running gait; besides, there is always a slipping of the foot when the bird runs, the impress often being several inches advanced from the spot where the foot first strikes the ground. This beautiful species is found only at Turner's Falls, and is very rare.

In Pl. XXIII. fig. 2, we see the representative of a race of large birds, some individuals of which attained an enormous size. They were elevated upon long legs, as the stride indicates, which, in this instance, was twenty-eight inches, and it is often nearly four feet. Fig. 2, in the diagram, shows the relations.

The original of the plate is extremely shallow, the clay being much indurated at the time when the impression of the foot was given. This we know by the flattening of the phalangeal protuberances, and because the *points* only of the claws are to be traced. This is a splendid example of these speaking inscriptions of past times. The class represented by it embraces examples from three inches, and, I believe, less than that, to fourteen inches in length. I presented a specimen of the latter measure to Dr. Mantell, of England, the joints of which were thoroughly flattened by the resistance of the stiffened mud to the enormous pressure. Its middle toe was eight and one half inches in length exclusive of the claw, and its geometrical figure was identical with the central toe of the plate. I have a large slab in my collection, transversed by five individuals, whose feet present a remarkable difference in size, but are conformable in all other respects. There is one peculiarity that characterizes this species, which is the slight divergence of the toes, these members lying in contact, simply forcing up an attenuated ridge of mud between them. Another peculiarity forms a contrast to this feature, and it is the divergence of the claws of the lateral toes, which point outward at a great angle, while the toes are arranged in parallel order nearly. I am sure that the flatness of the joints is caused by the resistance of an unyielding medium. This prominent species is widely distributed through the layers, its great physical powers sustaining it through a great proportion of the period of the sandstone deposition.

It will be understood by these remarks how difficult it is to arrange many of the footprints by specific nomenclature. The numbers sustaining affinities to the foregoing species and to many others, are great, and I have ever hesitated to apply specific names to such examples as I have discovered or described. If the footprints were collected into families or groups, according to their affinities, and represented by elaborate drawings, it would constitute a feasible method of conveying ideas of the diversity, elegance and beauty of these remarkable fossils. The utility of artificial nomenclature based upon modifications of a single organ of the animal economy, appears to me to be questionable ; it is by the eye alone that we judge of distinctions, it is the form and not the substance that we investigate. Many of these forms, it is true, exhibit the clearest specific characters ; but, on the other hand, many, equally distinct, cannot be separated and arranged by mere methods of classification, however ingenious, so as to convey to the mind positive ideas of distinction from others so nearly resembling them. I, of course, do not speak in disparagement of the opinions entertained by others who are better qualified to decide upon and execute a different measure, but simply state the difficulties always to be encountered in any classification of this subject, whether artificial or natural.

The immense magnitude of some of these footprints is extremely well calculated to fill us with amazement. I have just spoken of a footstep fourteen inches in length ; but I have in my possession consecutive impressions of a tridactylous foot which measures eighteen inches in length by fourteen in breadth, between the extremities of the lateral toes. These stupendous vestiges were recovered by Mr. Marsh and myself at South Hadley Falls. Each step will hold half a gallon of water, and the stride is four feet. It is not possible to conceive of the grandeur and magnificent proportions of this tremendous bird. It was, upon the lowest supposition, four or five times larger than the African ostrich, and, on this basis, could not have weighed less than six hundred pounds. In all probability, its weight was much beyond this estimate. Every step the creature took, sank deep into the stratum, and the substrata bent beneath the enormous load. If an ox walk over stiffened clay, he would not sink so deeply as did this mighty bird. He sustained to the feathered tribes of his day the relations of the ostrich to existing races, and his colossal frame well fitted him to endure the turbulence of the era in which he reigned — the supreme monarch of his race, and the unconquered cotemporary of the leviathans that filled the seas which supplied him with subsistence. Throughout the period of the entire deposition of the new red sandstone, his gigantic traces abound; while other varieties, although powerful, seem to have been successively annihilated.

On the other extreme, there are footprints not one inch in length, with a stride of three or four inches, and between these limits there is an easy grade, in point of dimensions. Many have the fourth toe projecting backward, like the heron, with sometimes a claw standing out at right angles, or nearly so, from it. Some few have an immense projection of the heel backward, larger indeed than the foot itself. There is a slab in this place, forming the ceiling of a vault, containing two consecutive impressions of enormous size, stride four feet, with three immense toes, and an appendage pointing directly backward nearly half a yard in length, and several inches in breadth. The diversity is truly astonishing, and, view the subject in any of its aspects, we turn from the contemplation in astonishment. As a family or order these birds were doubtless waders, having left their traces upon the muddy shores and shallow bottoms of the ancient waters. They are therefore intimately related to the existing Order Grallæ. I have never seen but a single species that appears to be palmated, or at most semipalmated.

These birds existed over a country of great extent, from the northern terminus of the sandstone basin in Gill, Massachusetts, into Connecticut, where they disappear; but indications of them have been discovered in New Jersey, and indeed in Pennsylvania, in a rock of still greater age. They occur upon both banks of the Connecticut, but invariably upon the eastern declivity of the Trap formation, upon which the sandstone inclines, and the evolution of the igneous might not only have been the elevating agent of the sandstone rock, but also of its conversion into solid rock. The irruption of the igneous rock occurred upon the upper verge of the stratified portion of the sandstone formation, where it was alternately submerged and exposed to the solar action when it was the resort of multitudes of birds, great and small.

Quadrupeds congregated with the birds. The species whose imprints I have discovered are quite small, apparently of the Batrachian or marsupial order, there being the same relative distinction between the anterior and posterior feet. Bones have not yet been found associated with imprints; it may be that the argillaceous materials of the rock destroyed them, but the probable conjecture is, that if the bodies of these animals were deposited upon the narrow tract upon which the footsteps were impressed, they were swept away by the succeeding overflow of the waters. The sandstone beds are inclined between five and thirty degrees, and it is of course upon the upper extremity or limit of the inclined surfaces that explorations are made. These sandstone rocks are truly prolific in the evidences of ancient life, and the zealous explorer of their contents will never go unrewarded for his labors. In this brief notice there are many important considerations which cannot even be alluded to; it is necessarily very imperfect, written without method or arrangement; but if any ideas have been communicated or confirmed, it will not have been written in vain, and the subject may be resumed at a future time.

These eloquent inscriptions upon the sandstones of Connecticut River teach a lesson and a moral which the genius of man never has accomplished. They teach us of the unchangeableness of creative design in perpetuating races of animals through a period of time which cannot be comprehended or even conjectured, contrasted with the frailty of all human schemes. The transit of a bird over the earth's surface is as enduring as the earth itself, while the proudest monuments of man crumble to dust, or, as it is faithfully expressed, the places that once knew him know him no more forever.

Greenfield, August, 1845.

ART. XVIII.—DESCRIPTIONS OF SOME NEW SPECIES OF MARINE SHELLS, INHABITING THE COAST OF THE UNITED STATES.

By HENRY C. LEA, Philadelphia. Read Nov. 20, 1844.

PHOLAS SEMICOSTATA. Pl. XXIV. Fig. 1. *Proceed. Bost. Soc. Nat. Hist.* Nov. 1844.

P. testâ sub-triangulari, posticè productâ et acutâ, anticè obliquè truncatâ, tenui, albidâ, diaphanâ, anticè inflatâ et costatâ; costis transversalibus, muricatis, magnis, crebris, posticè obsoletis; sulco uno longitudinali, a natibus decurrente; margine basali curvato; margine dorsali vix recto; natibus valde inflatis; laminâ dorsali parvâ; cochleâ ligulatâ, acutissimâ, incurvâ.

Shell sub-triangular, posteriorly produced and acute, obliquely truncate anteriorly, thin, whitish, diaphanous, anteriorly inflated and costate; ribs transverse, muricate, large, numerous, posteriorly obsolete; one longitudinal sulcus running from the beaks; basal margin curved; dorsal margin almost straight; beaks very much inflated; dorsal plate small; cochlea ligulate, very acute, incurved. Long. .17. Lat. .32. Diam. .16 poll.

Hab. South Carolina.

Remarks. The transverse ribs are rather large, very regular, and distant from each other about their own width. They are muricate, or covered with small, arched scales, from the anterior margin to the longitudinal sulcus, when they suddenly become smooth, and soon after disappear. The rest of the shell has a few small, transverse lines of growth scattered irregularly over its surface. The outline of the shell is somewhat that of an acute-angled triangle, having the anterior margin for the base, and the posterior end for the apex. The beaks are very much inflated and incurved; the dorsal plate is very small, and formed by the bending back of a portion of the dorsal margin, with no cells underneath. The cochlea is ligulate, with the axis perpendicular, appearing very acute when viewed from above. About one-half of the area of the shell, extending from the beak nearly to the basal margin, and from the anterior margin a little more than one-half to the posterior end, is somewhat incrassated, and raised above the surrounding surface. To this part are confined the costæ and sulcus, and it presents the appearance of a secondary shell. Anteriorly, its margin is sinuous, which causes a similar bending of the ribs. The rest of the shell is nearly smooth, very thin, and diaphanous.

This curious little species I found among some shells sent to my father many years since, from South Carolina. It has not the most distant relationship to any of its congeners as yet described in this country. Although it might seem to be an immature shell, from its small size and extreme thinness, yet, from the peculiarity of its growth, being centrally incrassated from the outside, I am inclined to think that it had reached its full period.

Bulla biplicata. Pl. XXVI. Fig. 2. *Proceed. Bost. Soc. Nat. Hist., l. c.*

B. testâ cylindricâ, sub-quadratâ, crassâ, albidâ, politâ, eburneâ; spirâ occultâ; anfractu ultimo supernè calloso, infernè striis transversis parvis; aperturâ supernè arctatâ, infernè ovatâ; columellâ plico magno et parvo.

Shell cylindrical, sub-quadrate, thick, whitish, polished, ivory-like; spire concealed; last whorl with a callus above, and small transverse striæ below; mouth narrow above, ovate below; columella with a large and a small fold. Long. .15. Lat. .07 poll.

Hab. Shore of New Jersey, near Cape May.

Remarks. The striæ on the base are small and insignificant. The columella has a large oblique fold, about one-fourth the length of the shell from the base; below this, it takes an undulation, scarcely deserving the name of a fold, and descends suddenly to join the outer lip. The columella is continuous posteriorly, and, above, it widens out into a callus at the region of the spire, where it turns round, and is produced into the outer lip. The substance of the shell is thick, smooth, and ivory-like.

There is no danger of confounding this little shell with any of the genus in the United States. The two folds at once distinguish it, and it is the only species with an occulted spire and plicate columella.

LITTORINA LUNATA. Pl. XXIV. Fig. 3. *Proceed. Bost. Soc. Nat. Hist., l. c.*

L. testâ quadrangulari, imperforatâ, crassâ, costatâ, lutescente vel brunneâ; spirâ elevatâ, conicâ, acutâ; suturis inconspicuis; anfractibus quatuor, planis, costis transversis magnis, crebris; anfractu ultimo angulato, usque ad basim costato; aperturâ obliquè ellipticâ; labio acuto, undulato; columellâ infernè latissimâ, planâ.

Shell quadrangular, imperforate, thick, costate, yellowish or brown; spire elevated, conical, acute; sutures small, inconspicuous; whorls four, flat, with numerous large, transverse costæ; last whorl angled, costate to the base; mouth obliquely elliptical; outer lip sharp, undulating; columella below very broad and flat. Long. .07. Lat. .05 poll.

Hab. Coast of New Jersey, near Cape May.

Remarks. The general outline of the shell is remarkably quadrilateral, almost rhomboidal. The whorls are flat, and covered with numerous revolving costæ, which are much smaller on the base of the last whorl. The outer lip is very sharp, and with a waved edge caused by the exterior costæ. For a short distance inside, there are sulci, corresponding to the ribs. The thickening of the columella commences about half way from the top of the mouth, and continues round the base towards the outer lip, forming a broad, crescent-shaped area, which is very remarkable. The substance of the shell is exceedingly thick. The color is mostly brown, turning to yellowish where the thinning of the outer lip commences.

I met with a number of these pretty little shells among the interstices of a stone overrun with *Serpulæ*, found at Cape May. I was at first tempted to suppose it the young of some other species; but it has all the characteristics of a mature shell, in the thickness of the substance, number of whorls, broad columella, &c. I know of no species with which it could be confounded.

Cingula robusta. Pl. XXIV. Fig. 4. *Proceed. Bost. Soc. Nat. Hist., l. c.*

C. testâ ovato-acuminatâ, perforatâ, lævi, crassâ, albâ ; spirâ brevi, subacutâ ; suturis impressis ; anfractibus quinque, ad suturam superiorem subangulatis ; anfractu ultimo rotundo ; basi lævi ; perforatione arctatâ, profundâ ; aperturâ ovatâ, magnâ.

Shell ovate acuminate, perforate, smooth, thick, white; spire short, sub-acute; suture impressed; whorls, five, somewhat angled at the superior suture; last whorl round; base smooth; perforation narrow, profound; mouth ovate, large. Long. .10. Lat. .07 poll.

Hab. Cape May, (N. J.)

Remarks. The substance of this little shell is quite thick and stout. The surface is occasionally slightly wrinkled by minute lines of growth. The whorls are five in number, increase rapidly in size, and have a small angle, or shoulder, immediately at the superior suture, which has thence the appearance of being deeper than it is in reality. The mouth is large, ovate, acute above, and rounded below, with a sharp outer lip, and continuous posteriorly. The inner lip, indeed, is almost separated from the last whorl by the umbilicus, which is long, narrow and profound.

This little shell I found on the beach at Cape May, and though I obtained but a single specimen, yet I feel no hesitation in pronouncing it distinct from any species hitherto described. In outline it is not unlike immature specimens of the C. *minuta,* (Turbo *minutus,* Totten) but differs from it entirely in the thicker substance, more robust form, and the separation of the columella from the preceding whorl. In color, too, they are essentially different.

C. modesta. Pl. XXIV. Fig. 5. *Proc. B. S. N. H., l. c.*

C. testâ ovatâ, imperforatâ, lævi, tenui, diaphanâ, virido-corneâ ; spirâ brevi, ovatâ, haud acutâ ; suturis parvis ; anfractibus quatuor, planulatis ; anfractu ultimo rotundato ; basi lævi ; aperturâ ovatâ, supernè acutâ, infernè rotundatâ.

Shell ovate, imperforate, smooth, thin, diaphanous, greenish horn-color; spire short, ovate, not acute; sutures small; whorls four, flattish; last whorl round; base smooth; mouth ovate; acute above, rounded below. Long. .10. Lat. .06 poll.

Hab. Long Island, near Brooklyn.

Remarks. The spire varies somewhat as to length in different specimens. The whole shell is of a uniform dark greenish horn-color. There is a slight depression about the umbilical region, but in no specimens that I have examined does it amount to a perforation. The whorls are but slightly convex, and the sutures small, which gives the shell a very regular appearance. The margins of the mouth are united over the last whorl by a very thin plate of calcareous matter, which in some specimens is almost obsolete.

This little shell appears to be quite common on the shores of Long Island, just below Brooklyn, where I found it clinging to the under surface of stones below high water mark. It approaches the C. *minuta,* but is easily distinguished by the absence of the umbilicus, and by its dark color, besides the flatter whorls and regular spire.

C. TURRICULUS. Pl. XXIV. Fig. 6. *Proc. B. S. N. H., l. c.*

C. testâ elevato-conicâ, perforatâ, lævi, crassâ, fulvâ; spirâ valdè exsertâ, conicâ, obtusâ; suturis parvis; anfractibus sex, convexis; anfractu ultimo sub-bullato; perforatione parvâ, arctatâ, lunatâ; aperturâ ovatâ; columellâ crassâ, anfractu ultimo pene disjunctâ.

Shell elevated, conic, perforate, smooth, thick, tawny; spire very much exserted, conical, obtuse; sutures small; whorls six, convex; last whorl slightly bullate; base smooth; perforation small, narrow, lunate; mouth ovate; columella thick, almost disjoined from the last whorl. Long. .12. Lat. .05 poll.

Hab. South Carolina.

Remarks. The substance of the shell is very thick and calcareous. Color, a light yellowish tawney, sometimes approaching to white. The surface is occasionally somewhat wrinkled with lines of growth. The spire is elevated, and composed of about six convex whorls. The columella is thick, and somewhat raised above the surface of the last whorl.

This shell I obtained, together with the *Pholas semicostata.* It differs essentially from all its congeners on this coast. Perhaps the *Cingula aculeus,* Gould, is its nearest analogue, but there can be no danger of their being confounded.

ART. XIX.—DESCRIPTIONS OF SHELLS FROM THE COAST OF AFRICA. By AUGUSTUS A. GOULD, M. D. Read April 23, 1845.

THE following shells, with many other fine specimens of rare species, were collected by Charles J. Bates, Esq., Assistant Surgeon, United States Navy, and by his permission I offer the following descriptions. The Pholas were found living, and imbedded in lime stone. The others, with two fine species of Tellina, a Cytherea probably new, and a Sigaretus were brought up, at one time, by the anchor; the precise locality I have failed to remember.

PHOLAS BRANCHIATA. Pl. XXIV. Fig. 7.

Testa oviformis, clausâ, posticè acuminatâ, areolis tribus triangularibus partitâ; areolâ anticâ plicis numerosis concentricis serratis: mediali transverse subtiliter striatâ; posticâ lamellis corneis flexilibus imbricatis instructâ: dorso scutis tribus obtecto, unico magno umbonali orbiculari; duobus marginalibus lanceolatis, duobus quoque ventralibus; apophysi exili, flexuoso-falciformi.

Long. $1\frac{1}{5}$; lat. $\frac{13}{20}$ poll.

Shell egg-shaped, posteriorly pointed, rather solid, of a dingy white color, its surface divided into three nearly equal triangular areas; the anterior one is largest, and its upper portion is sculptured by close, concentric, finely serrated striæ, while beneath it is smooth and polished; the middle area is marked by very fine transverse striæ; and the posterior one is remarkable for a series of concentric, horny, shining, flexible laminæ, resembling the branchiæ of some crustaceans. The back is protected by a very large, rounded, firm plate over the umbones, as broad as the shell, into which the marginal plates intrude posteriorly, nearly to its centre. These latter are slender and lanceolate, and may perhaps be more properly considered as one, so closely are they united. There are also two firmly united lanceolate plates along the basal margins. The apophysis is slender, compressed, falcate. The shell is entirely closed, except a small, vertically compressed, posterior opening, which was probably enclosed by a tubular appendix. Indeed the proper valves seem to terminate acutely, at a little distance within the present opening, which seems to be constructed by an accretion much like that formed on Lithodomi.

This Pholas belongs to the same group as P. *Californica*, Conrad, (P. *Janellii*, Desh.) and with others, which are in like manner closed anteriorly, and have supplementary ventral valves, have been separated as a subgenus from the gaping species under the name of Pholadidea.

Psammobia figlina. Pl. XXIV. Fig. 9.

Testâ crassâ, sub-ovali, sub-equilaterali, rufo-cinereâ; anticè rotundatâ; posticè hiante, sub-rostratâ, valdè flexuosâ, apice emarginatâ: valvis concentricè laminoso-striatis, radiatim lineolatis: natibus elevatis, attigentibus; dentibus cardinalibus divaricatis: intus albâ, punctis numerosis indentatâ.

Long. $3\frac{1}{5}$; alt. $2\frac{1}{5}$; lat. $1\frac{3}{5}$ poll.

Shell thick, nearly equilateral, suboval, acutely rounded before, posteriorly gaping, somewhat rostrate, very strongly waved or folded, and emarginate at apex. Color a reddish-ash. Surface marked with close and somewhat regular concentric lamellar striæ, which are crossed by fine and faint radiating lines. The beaks are elevated, and touch each other; margin behind the beaks straight and excavated. Hinge teeth divaricate, two in the right and one in the left valve. Within white, indented with numerous large punctures. Siphonal scar linguiform, narrowed at base, extending half the length of the shell.

NUCULA BICUSPIDATA. Pl. XXIV. Fig. 8.

Testâ albâ, transversâ elongato-ovatâ, sub-cylindricâ, anticè rotundatâ et triplicata, posticè productâ, tricarinatâ, bicuspidatâ ; valvis obliquè concinnè aratis, præter spatio excavato inter carinas serratas ; cardine dentibus anticis ad 12, posticis ad 26.

Long. $\frac{3}{5}$; alt. $\frac{1}{4}$ poll.

Shell milk-white, shining, elongate-ovate, sub-cylindrical; anterior extremity rounded, having three very distinct folds radiating from the beaks ; posteriorly produced, and rendered emarginate by a deep, smooth excavation running from the beaks between the acute, serrated keels, two of which are approximate and above it, near the upper margin ; the other running to the inferior posterior angle, and terminating in projecting points. The sides are obliquely and regularly grooved, with fine acute striæ. The serratures of the carinæ are produced by the striæ of growth, and there are two to each of the oblique furrows. Teeth of the hinge about 12 before, and 26 behind the beaks. Interior highly polished ; cavity of the beaks profound.

NASSA TURBINEA. Pl. XXIV. Fig. 10.

Testâ solidâ, ovatâ, apice productâ, albidâ ; anfr. 9 sub-tabulatis, plicis numerosis acutis et striis volventibus profundis ad 13 decussatis ; basi spiraliter striati ; aperturâ parvâ, strictâ, angulato-ovali ; labio acuto, crenulato, intus sulcato ; callo columellari erecto, granulato.

Long. $\frac{9}{10}$; lat. $\frac{1}{2}$ poll.

Shell solid, whitish, topshaped ; whorls nine, the last one very large, and sub-globose, the posterior whorls not conforming to the others, but prolonged into a slender apex, so that the profile outline of the shell is concave. Surface covered with regular and numerous sharp folds, which are crossed by deep and regular revolving striæ, about 4 on the posterior, and 13 on the large whorl, thereby producing a regularly granulated surface ; around the canal are fine spiral lines. Aperture small, narrow, elliptical, angular above ; lip sharp, somewhat inflected, deeply sulcated within ; columella with granular folds, and an erect callus ; canal broad and strongly reflected.

NASSA ELATA. Pl. XXIV. Fig. 11.

Testâ elongato-conicâ, cinereo-albidâ; anfract. 8 tabulatis, marginatis, posterioribus plicatis, penultimo glabro, ultimo anticè striato; aperturâ angustâ, ovali, albâ; labro acuto, anticè crenulato, intus striato.

Long. $\frac{13}{20}$; lat. $\frac{3}{10}$ poll.

A pretty, dingy-white shell, its slender, elongated form giving it somewhat the aspect of a Terebra. It is remarkable for its varied sculpture. There are 8 flattened, turreted whorls, with a marginal line near the suture. The six upper ones are marked with regular, somewhat distant, acute folds; the last but one and the upper half of the last are smooth, and the lower half is occupied by about half a dozen regular, deeply impressed, revolving striæ. Aperture small and narrow, less than half the length of the shell; lip sharp, somewhat sinuate near the front, and rendered serrate where the revolving striæ cut it; striate and white within; callus on the columella rather sparing.

ART. XX.—NOTE ON MELOCACTUS VIRIDESCENS, NUTT. (ECHINOCACTUS, TORR. & GR.) By J. E. TESCHEMACHER.

I BEG to communicate to the Society that I have just received from San Diego, California, a living specimen of *Melocactus viridescens* of Nuttall, MSS. communicated to Messrs. Torrey and Gray, and published by them in their invaluable work on the plants of North America, as an *Echinocactus*. This difference of opinion arose probably from Nuttall's description stating that the flowers proceeded from the upper clusters of spines, whereas the flowers of Melocactus proceed from the woolly head characteristic of this genus, in which they are usually imbedded. But Nuttall also states that the fruit is smooth; this is a character of Melocactus, the fruit of Echinocactus being generally more or less scaly from the remains of the sepals; Pfeiffer says *rarissime lævis.*

My specimen is about 5 inches high, and 9 inches diameter; the spines are radiating, very crowded, and transversely striate;

four of them (Nuttall says three) in each fascicle are larger than the rest, but the upper and lower spines are the largest. These spines are rather poisonous; wounds inflicted by them are almost certain to fester. In other respects, it agrees with Nuttall's description; but it has a distinct woolly head, which is, however, small, and depressed, in the centre of the plant. There are no flowers now on the specimen, but the scars left by them exist. On these scars several seeds remain, exactly as may be seen on other Melocacti, of which the fruit has dried off. The scars are behind the fascicles of spines, near the axis, and not in the centre of the fascicle as in Echinocactus, and, from their close proximity to the woolly head, were probably immersed in the edge of it. Nuttall observes that they are seldom laterally clustered; there were, however, two young plants laterally attached to my specimen, which I have removed; and, although they are very dry, I shall take every pains to revive them.

From this examination, it is clear that this plant will have to be restored to the genus Melocactus, in which Nuttall originally placed it. The native name of the plant is Choyas.

Boston, 14th April, 1845.

ART. XXI.—NOTICE OF TWO SPECIES OF LINGUATULA. By Jeffries Wyman, M. D. Communicated September 17, 1845.

The genus Linguatula, Froelich, is synonymous with that of Pentastoma of Rudolphi.—According to its organization it ranks among Nematoid entozoa, or Cœlelmintha of Owen. Lamarck, led into error doubtless, by the external resemblance of some of the species to *Tæniæ*, associates [1] them with his *Vers planulaires*, which are nearly synonymous with the Parenchymata of Cuvier, and Sterelmintha of Owen. Linguatulæ are met with in various parts of the animal economy,

[1] Animaux sans Verteb. Tome III. p. 592. Rudolphi gave the name of Pentastoma, supposing that the cavities for the lodgment of the hooks were so many mouths.

and in organs entirely dissimilar. Lamarck gives instances of individuals found in the lungs of the hare, the liver of the goat, urinary bladder of the frog, human ovary, anterior tibial vein of man, and frontal sinus of the dog and horse. They have also been found in the throat of the *Champsa sclerops*, lungs of *Crocodilus acutus*, and the intestines of various fishes. As regards their habitat the Linguatulæ are somewhat remarkable. For the most part the species of the different genera of Entozoa are confined to certain classes of organs or tissues. Tæniæ, Echinorynchi, Ascarides, and others, as a general rule, infest the intestinal canal; Cysticercus the aveolar tissue; Trichina, the muscular, &c. But rarely do we find the species of a genus so widely diffused, in such different tissues, as those belonging to that under consideration. The presence of hooks about the mouth would seem to indicate that a free surface was the habitat most congenial to their organization, and such is the fact as regards most of the species. The anatomy of Linguatula tænioides has been completely described and figured by Owen [1] and Diesing.[2]

LINGUATULA ARMILLATA. Pl. XV. Fig. 3. *Body cylindrical, slightly flattened on its inferior face, and surrounded by about twenty distinct rings, separated from each other by a wide interval.* The length of the different specimens, all of which were females, varied from three and a half to four inches; the greatest diameter being about four-tenths of an inch. The rings, which form the most striking peculiarity in the external conformation of this entozoon, approximate each other more closely at the anterior, and are most distant near the posterior extremity; the greatest interval between them being about two-tenths of an inch. Near the head they form only simple rugæ, and at the extreme portion are no longer visible. The head is somewhat compressed, and on the in-

[1] Trans. Zoolog. Soc. Vol. I. p. 235.

[2] Monographie du genre Pentastoma. Annales du Mus. de Vienne, Vol. I., sect. 1, p. 13.

ferior face is provided with four cavities, (Pl. XV. Fig. 4,) arranged in a curved line, each furnished with an acute pointed and strongly curved hook. (Pl. XV. Fig. 5.) In the middle of the quadrangular space between these hooks, is situated the mouth, a simple orifice. Posteriorly, the body terminates in a conical point, in the middle of the inferior surface of which is situated the anus. The intestine, a straight membranous canal, extends from one extremity of the abdominal cavity to the other, and is loosely attached to the dorsal parietes. The extremely long and convoluted oviduct occupies the larger portion of the abdominal cavity, but does not, except near the posterior extremity, invest the intestinal canal. The integuments are covered by a thin cuticle externally, and are provided with longitudinal muscular filaments.

The individuals of this species were all found by Dr. Thomas S. Savage, in the intestine of the *Python bivittata*, procured in West Africa, near Cape Palmas.

The second specimen, Pl. XV. Fig. 6, was taken from the lungs of a South American Boa, to the surface of which it was adherent, in company with three or four others of a smaller size. It is three and a half inches in length, and nearly cylindrical in shape, largest in its anterior fourth, gradually diminishing in size towards its posterior extremity, where it terminates in a slightly dilated extremity. The integument forms indistinct annuli, not imbricated, which are deficient at the two extremities. The cavities containing hooks are four in number, as in the preceding species, and between them, on the median line, is situated the oral aperture. The anus is terminal. The smaller specimens did not exceed an inch and a half in length, and proved, on dissection, to be males. The large specimen which was not dissected was supposed to be a female, and as in the other diœcious entozoa, it greatly exceeds the male in size.

This species may be identical with the *Linguatula subcylindrica* of Diesing, to whose monograph on the Linguatula I have not had access. If it should prove to be a new species I propose the name of *Linguatula clavata.*

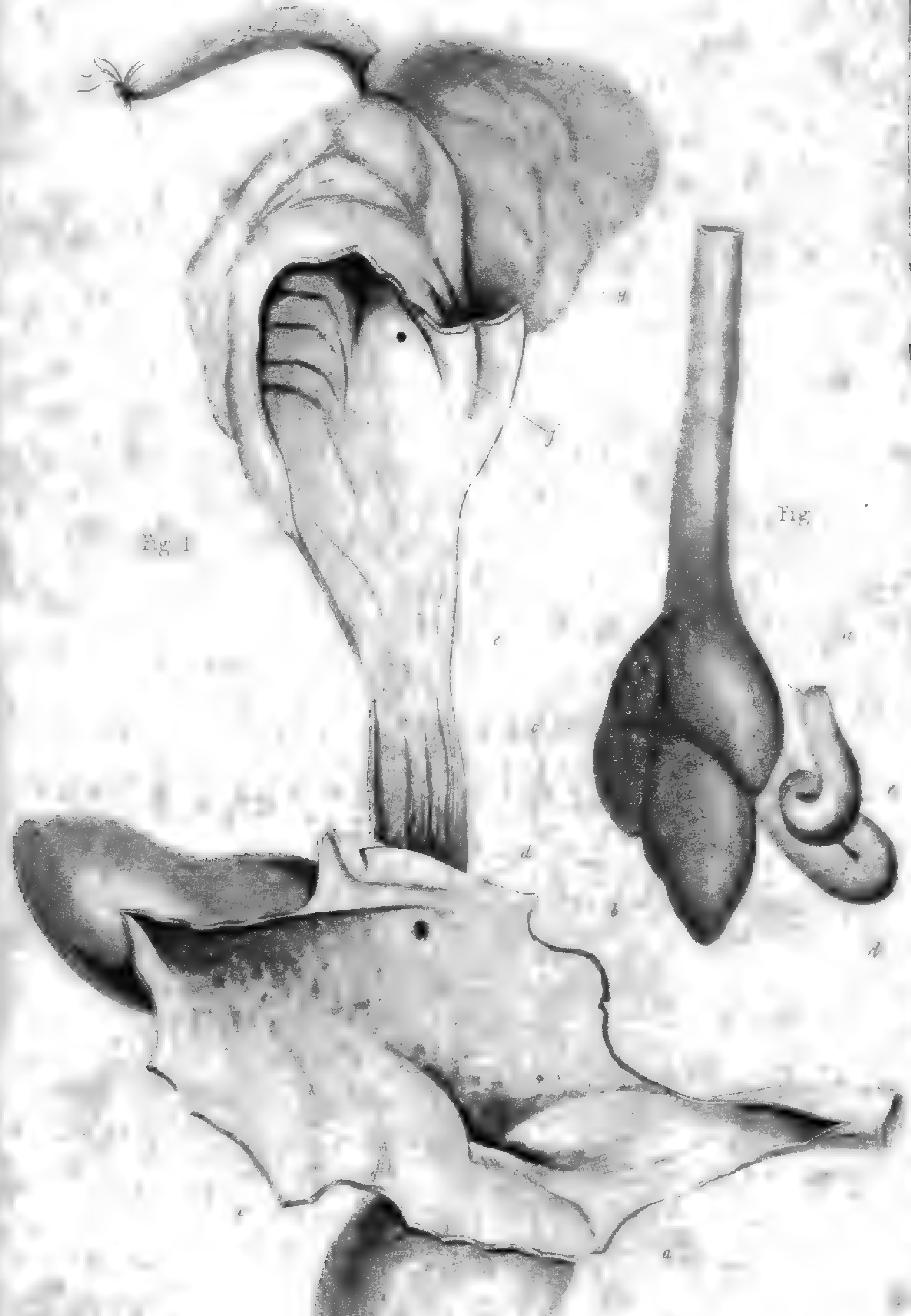
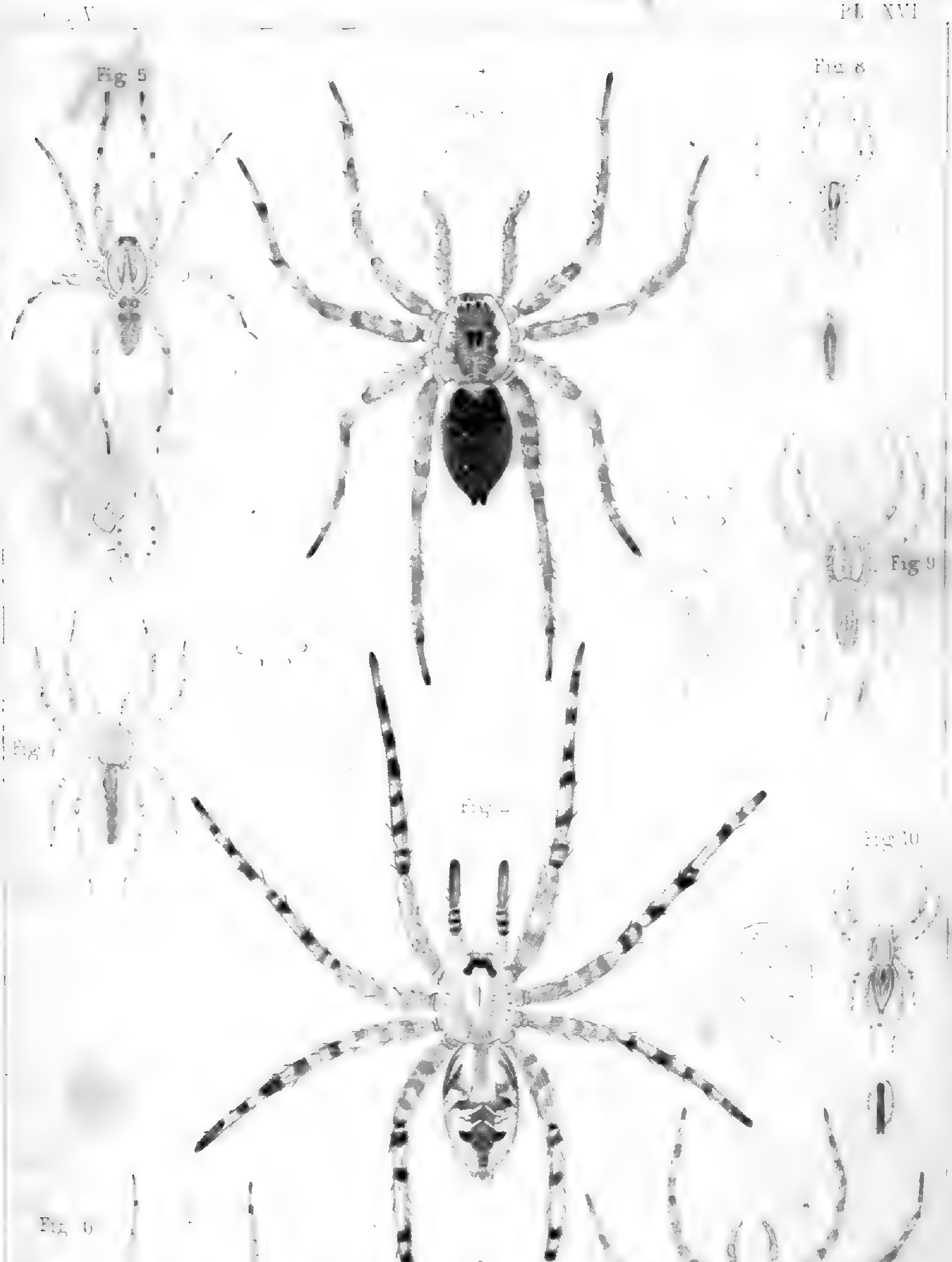


Fig. 1. Stomach of a Spermaceti Whale.
Fig. 2. Stomach of a Dolphin.

Fig. 1. Phocæna globiceps. Fig. 2. Stomach of P. globiceps. Fig. 3, 4, 5 & 6 Linguatulæ.

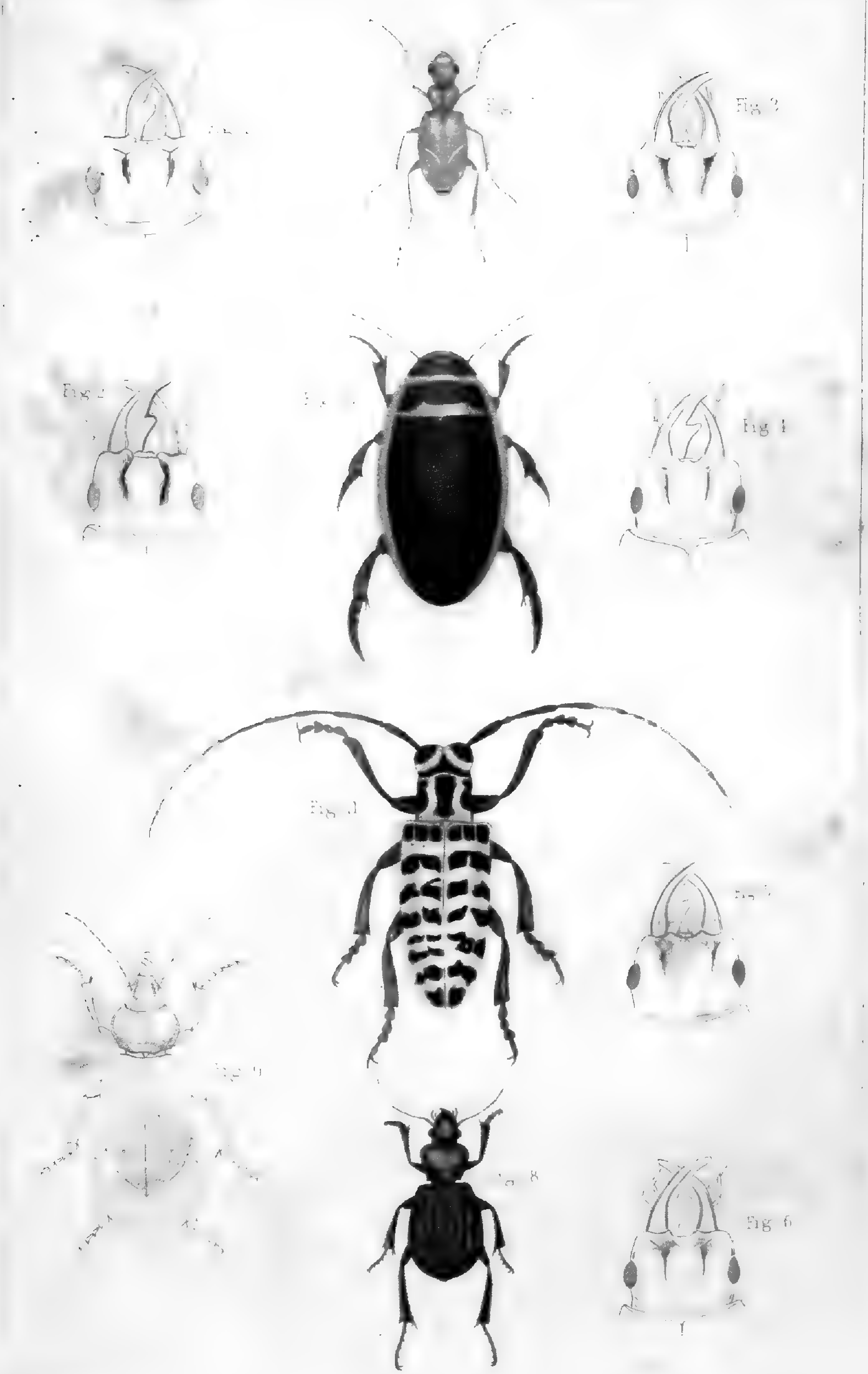


Hentz's Araneides of the U. States.

W. M. Hentz del.

W. H. Tappan Sc.

Hentz's Araneides of the U. States



W H Tappan sculp

Fig 1 Scarites substriatus Hald
Fig 2 Scarites ophonites Le C.
Fig 3 Scarites intermedius Le C.
Fig 4 Scarites subterraneus Aust.
Fig 5 Scarites affinis Le C.
Fig 6 Scarites patruelis Le C.
Fig 7 Cicindela Audubonii Le C.
Fig 8 Calosoma lepidum Le C.
Fig 9 Calosoma triste Le C.
Fig 10 Dytiscus marginicollis Le C.
Fig 11 Lamia scalator Fabr.

Fig. 1

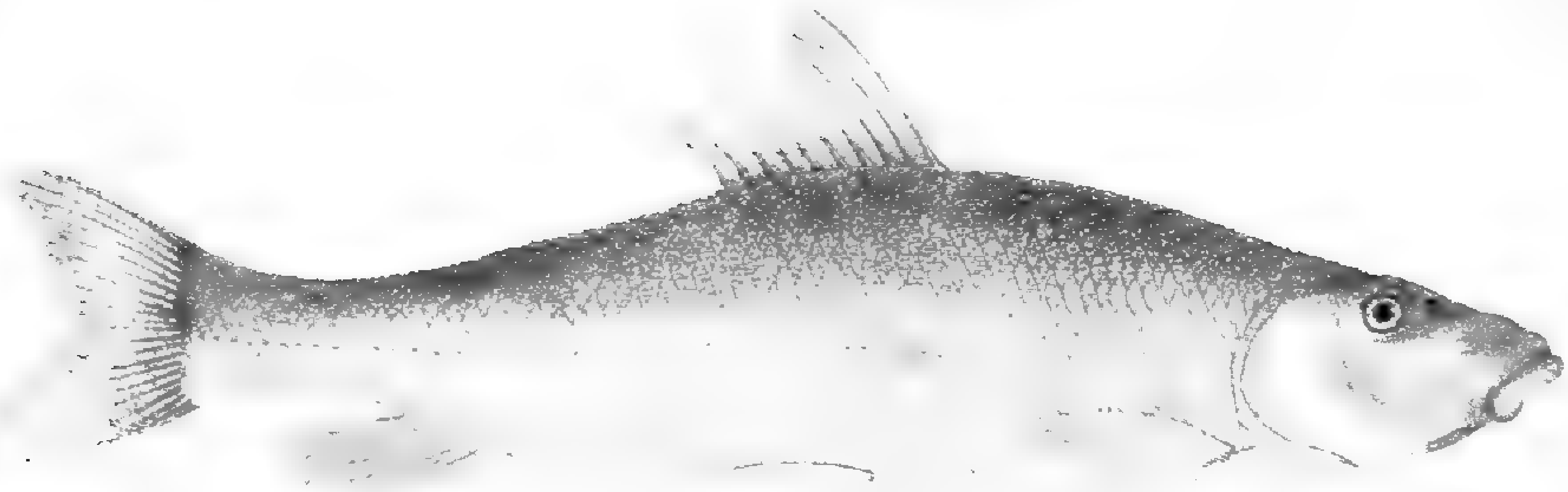


Fig. 2

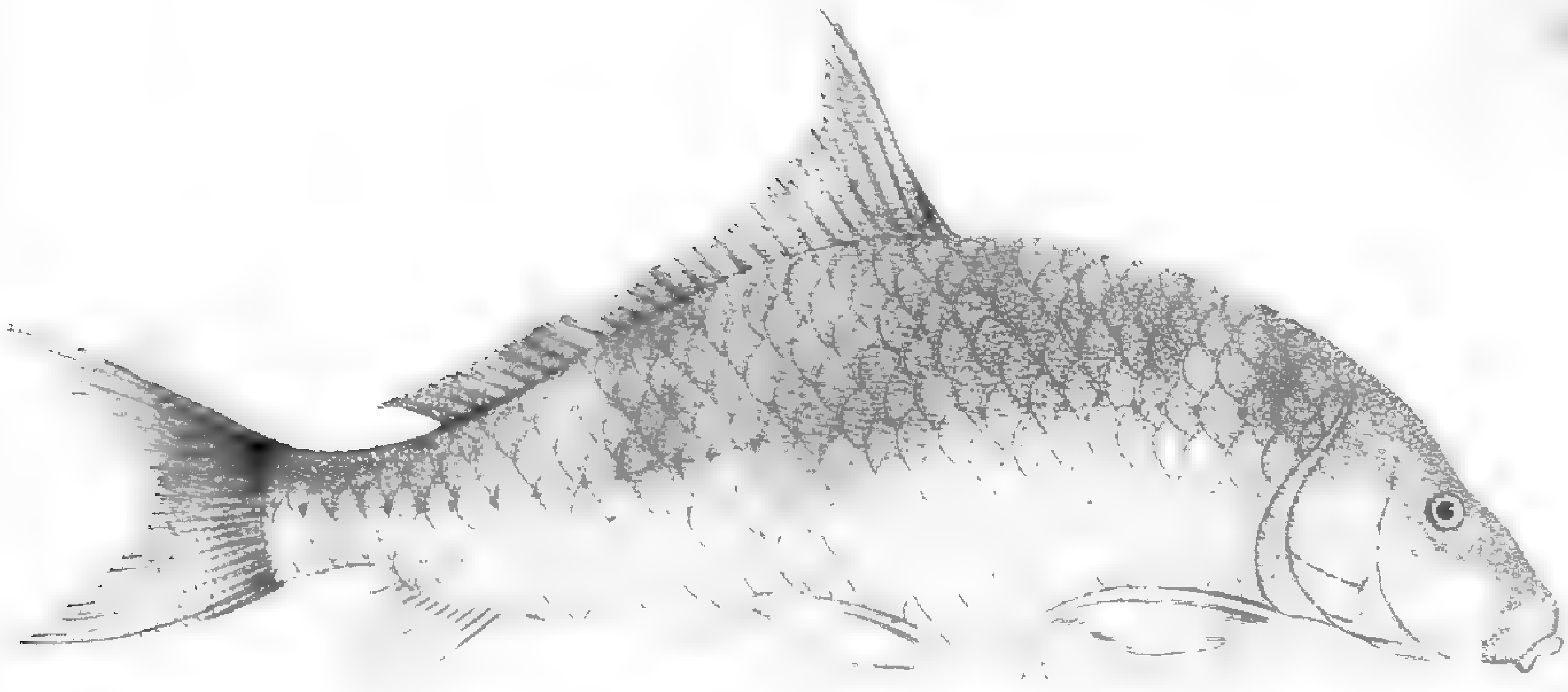
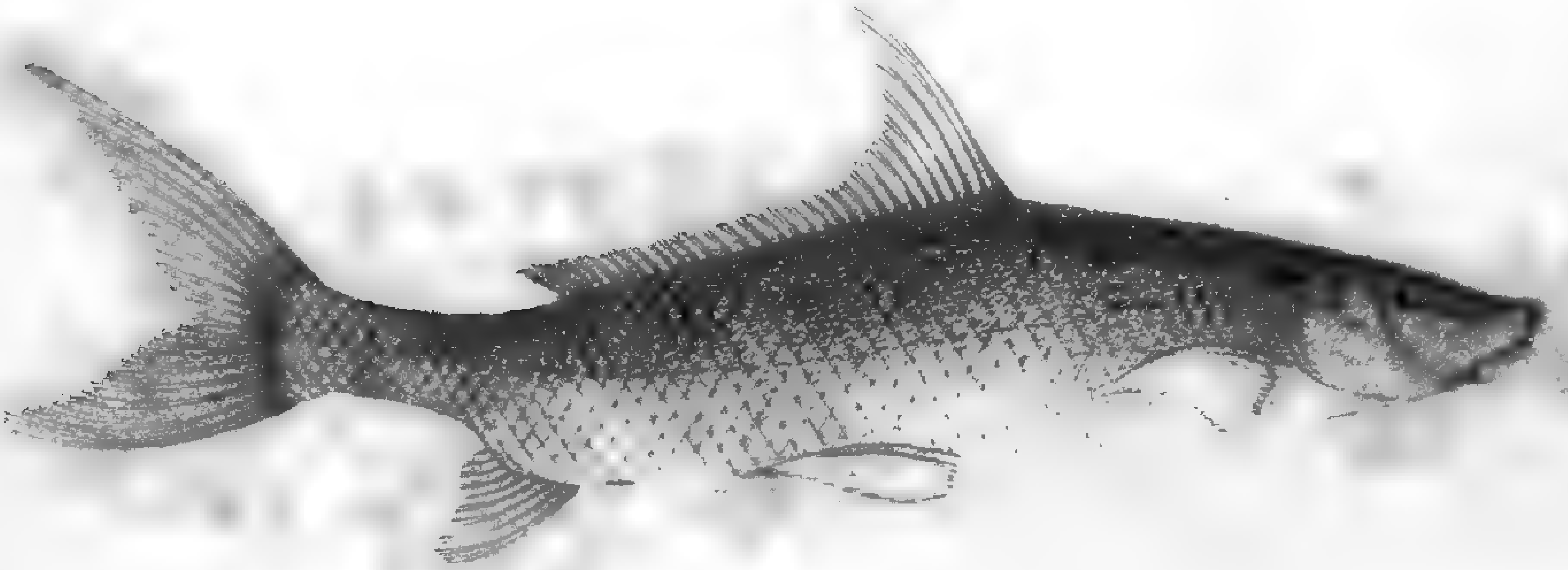


Fig. 3



Kirtland del. W. H. Lippan, Sc.

Fig. 1 - Catostomus communis Les. - Fig. 2 - Catostomus bubalus Raf.
Fig. 3 - Catostomus elongatus Les.

Fig. 1

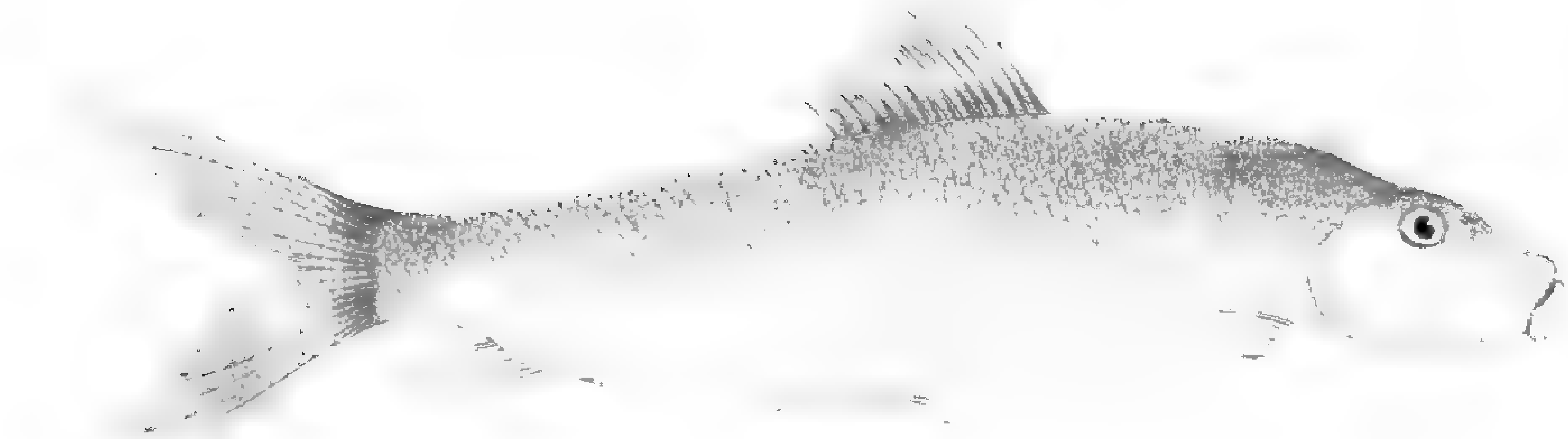


Fig. 2

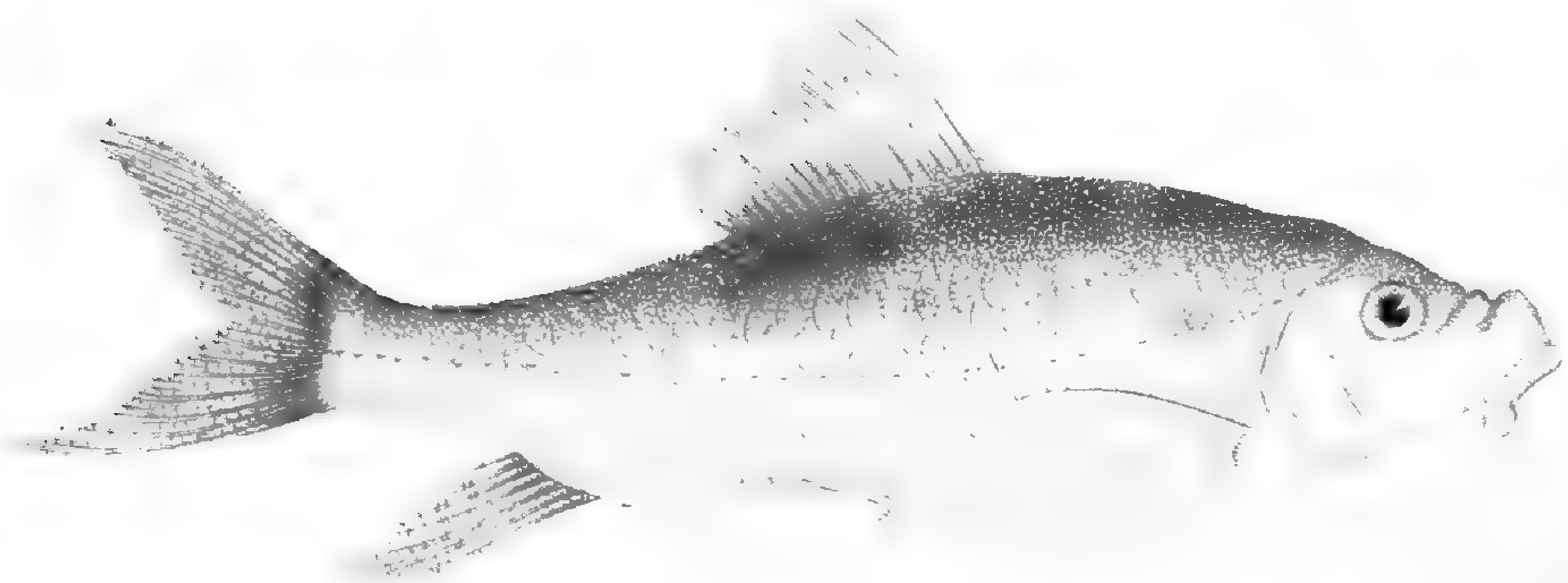


Fig. 3

W H Tappan Sc.

Fig. 1 Catostomus Duquesnii (Les. male) Fig. 2-Catostomus anisurus. Raf.
Fig. 3-Catostomus melanops. Raf

Fig 1

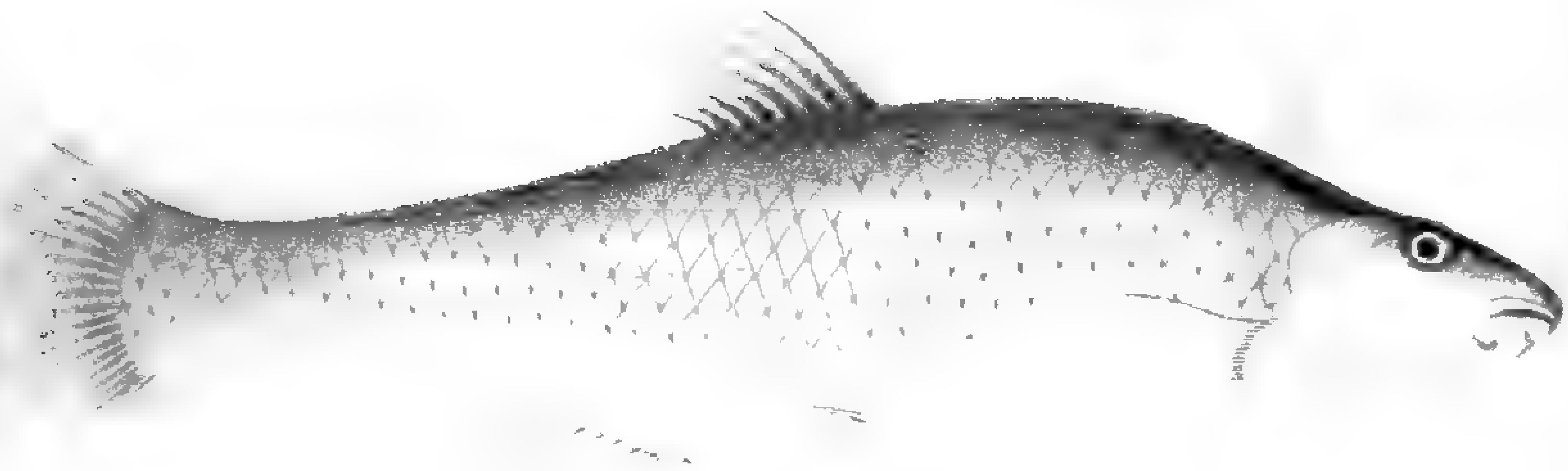
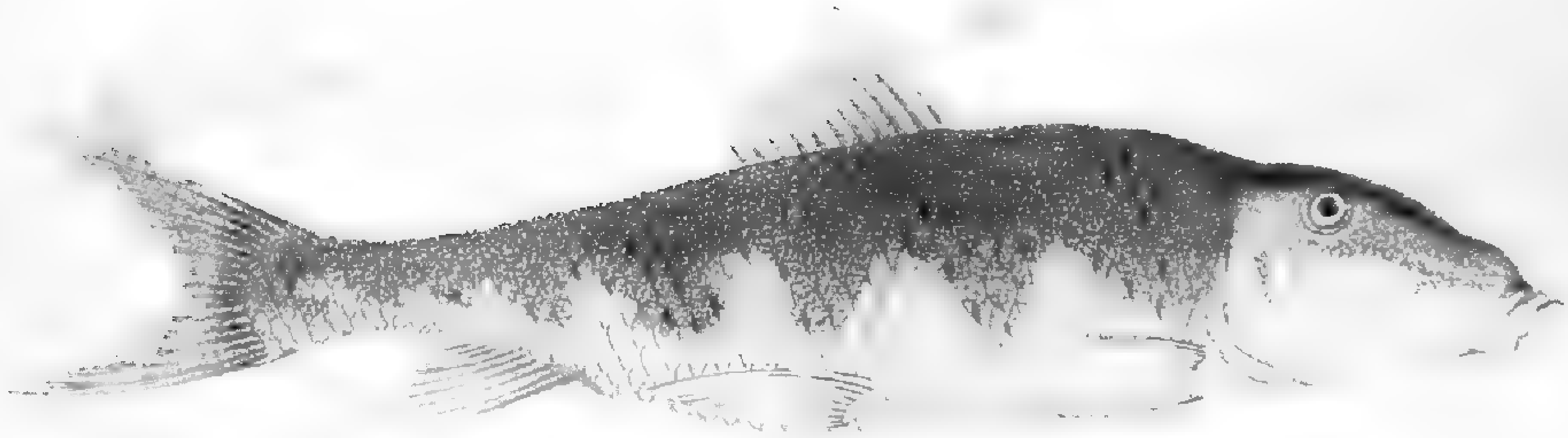


Fig 2

Fig 3



Kirtland del.

Fig.1 - Exoglossum dubium. Kirtland — Fig 2 - Catostomus Duquesnii Les. female.
Fig 3 Catostomus nigricans Les.

Kirtland del.

W.H. Tappan Sc.

Fig. 1.-Leuciscus dorsalis Raf. — Fig. 2.-Sclerognathus cyprinus Les.
Fig. 3.-Leuciscus diplemia Raf.

Fig. I

Fig. II

Fig. III

Fig. 1. Pholas semic[illegible] Lea. Fig 5 Cingula modesta. Lea. [illegible] Gould
Fig. 2. Bulla biplicata [illegible] Fig 6 Cingula turricta[illegible] [illegible] Gould
Fig. 3. Littorina luna[illegible] Lea. Fig 7 Pholas branchiata Gould [illegible] Mya [illegible] Gould
Fig. 4. Cingula rob[illegible] Lea. Fig 8 Nucula bicuspidata, Gould

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Art. XXII.—NOTICES OF NEW LOCALITIES OF RARE MINERALS, AND REASONS FOR UNITING SEVERAL SUPPOSED DISTINCT SPECIES. By Francis Alger. Read January 7th, 1846.

Phacolite *from New York.* This rare mineral, which comes to us principally from Bohemia and Ireland, I have discovered among a suite of specimens of various kinds found on New York Island, near Harlem, by Messrs. Mathews and Johnson, of New York city. The specimens, which eventually proved to be this mineral, were labelled Stilbite; but their appearance was so peculiar, that I questioned at the time whether they had been correctly designated, and determined to examine them carefully at my earliest convenience. I have since received two other specimens, better characterized than the first, from Mr. Johnson. The crystals are in a geode form, implanted on calcareous spar, and associated with silver-colored mica and a few scales of Oligisto-magnetic iron ore. They are of a wax or honey-yellow color, have a waxy lustre, and the smallest individuals are translucent. They are brittle, breaking with an uneven fracture, have none of the foliated structure of Stilbite, and afford no indications of cleavage. Hardness superior to that of Stilbite, and equal to that of Chabasite. Their surfaces are roughened or pitted, so as to reflect no image by which they could be subjected to measurement by the goniometer. Before the blowpipe, a fragment of the mineral swells and intumesces slightly, like the Bohemian and Ferroe Chabasite, and fuses into an opaline, blebby bead; at the moment of ignition, in the outer flame, it gives out a beautiful green phosphorescence, which I have also noticed, in a less degree, in the Phacolite from Ireland. It is soluble in hydrochloric acid. The crystals, at first sight, appear to be rounded, and to have no determinate form; but, on closer examination, some of the smaller and more isolated ones are found to be nearly perfect double six-sided pyramids, precisely similar to the Phacolite from Bohemia, differing from it only in color and lustre. I cannot doubt that, like that mineral, they are secondaries to a primary rhombohedron, probably of the same measurements, and are also identical with it in composition. The absence of well defined cleavage is unfortunate, but this is a defect which applies equally to the foreign mineral. Nor is the rhombohedral cleavage of ordinary Chabasite, of which Phacolite is by many supposed to be only a variety, by any means easily determined; in fact, Sir David Brewster has suggested, from optical investigations, whether the primary form of Chabasite be not a prism.

Is Phacolite a variety of Chabasite, or distinct from it? Tamnau, of Berlin, in his very complete little essay on Chabasites, has given very good reasons for uniting the two; while Breithaupt has maintained them to be distinct. The primary rhombohedron of Phacolite, according to Breithaupt, is P on P, 94°, that of Chabasite P on P, 94° 24′. Phillips makes the last 94° 46′. The analyses of Anderson and Rammelsberg would seem, at first, to show a marked difference in their composition, a difference which is also shown by the different analyses of common Chabasite, resulting in varieties having different formularic expressions. For example, Acadiolite contains three per cent. more of silicic acid than common Chabasite, and is a tersilicate of lime and the other isomorphous bases, instead of a bisilicate of the same bases. The mineralogical formula of Acadiolite is, $3\,Al\,Si^2 + (Cal, N, K,)\,Si^3 + 6\,Aq.$, while that of Chabasite is, $3\,Al\,Si^2 + (Cal, N, K,)\,Si^2 + 6\,Aq.$ Rammelsberg is inclined to regard Phacolite as a mixture of Acadiolite and Scolecite (lime mesotype,) the latter containing an additional atom of water.[1] By uniting the atoms of both, he thus states the chemical formula for Phacolite: $2\,\dot{R}\,\dddot{Si} + \dddot{Al}^2\,\dddot{Si}^3 + 10\,\dot{H}$. As the analyses stand, (compare Berzelius's and Thomson's with the two just referred to,) Phacolite differs from Chabasite in containing three per cent. less of silicic acid, and three atoms less of water. Now it is obvious that these differences are insufficient to authorize a separation of the two minerals, unless there be a want of agreement in crystallographical and other characters, greater than that as yet pointed out. An equally valid reason could be urged for the separation of Acadiolite from Chabasite, on the ground of a difference in their composition, had not the examinations of Prof. G. Rose proved an exact agreement in the angles of their primary crystals. So, also, of Levyne and Gmelinite, which are now admitted to be only varieties of Chabasite, their occurring forms all being secondaries to the same primary rhombohedron. The evidence of the identity of any two minerals is best shown by the incipient or intermediate passages of one into the other, in the same specimen. I am not aware that, in the case of the Irish or Bohemian Phacolite, such evidence has been adduced; no tendency of the sort is shown in the specimens I have examined, from those

[1] See First Suppl. to his *Handwörterbuch*, p. 112. It was on these grounds that Hoffman proposed to separate Acadiolite, as well as the Gustafsberg variety, from Chabasite. — *Poggendorf's Annalen*, xxv. 495.

countries. Now one of my specimens, from New York, has the distinct form of Chabasite (the perfect rhombohedron,) and of Phacolite (perfect double six-sided pyramids.) The first form, however, is rare; the incipient replacements are also shown; but these crystals have not the full perfection of waxy lustre reflected by the ultimate form of Phacolite,—a singular effect, attributable, probably, to the nature of the solvent in which the molecules were suspended.

Approach of twin-crystals to the Phacolite form. These, as they are sometimes presented, would, unless carefully examined, be mistaken for the true form of Phacolite. The most perfect specimens I have seen, are from Nova Scotia. They consist of two rhombohedrons united in the usual manner, each crystal turned half round, but having their superior edges and lateral angles deeply replaced. The approach to the form of Phacolite is thus produced: the edges and angles not standing out in relief, as they ordinarily do in these twin forms. The striæ, parallel with the edges of the two rhombohedrons, so intersect as to show the compound nature of the crystals. Dr. C. T. Jackson has a fine specimen of this variety from the Two Islands, in Nova Scotia, of a wine-yellow color; I have another pure white, from the same place.

Yttro-cerite. This rare mineral is found, associated with Brucite, in rolled masses of limestone, in the town of Amity, Orange county, New York. I have, as yet, seen but two specimens of it, which I found among some fragments of limestone containing Brucite and mica, in the duplicate collections belonging to the late Dr. Horton, of Edenville. It attracted my attention as being unlike fluor spar, which it was supposed to be at the time, and I have now satisfied myself that it is Yttro-cerite, though I have not gone so far as to detect the Yttria, the presence of which in the mineral cannot be indicated by mere blowpipe experiments alone. It has no crystalline structure, but appears in thin layers, or seams, which sometimes amount to scarcely anything more than peach-blossom, or purple stains, penetrating the seams of the limestone: precisely the character of this mineral in the specimens I have of it, from Finbo, in Sweden. With this it also agrees in hardness and color. When heated in a glass tube, it slightly decrepitates, shows no phosphorescence, gives out moisture, and becomes milk-white; at the same time, there is a perceptible burnt smell. When its powder, moistened with sulphuric acid, is placed in a platinum crucible, hydro-fluoric acid is given out by the application of heat, and the usual reaction on glass is produced. The pulverized mineral, heated with fused salt of phosphorus in an open glass tube, also shows the same reaction, the glass losing its polish where the moisture is deposited. In these experiments I was careful to separate the mineral entirely from the Brucite; but I have not been able to obtain fragments sufficiently free from carbonate of lime, to enable me to give its blowpipe characters in detail, or subject it to any other trials. I hope to be able to obtain better specimens at an early day, and then to complete its examination. The mineral is very characteristic, and, in the hand specimen, cannot be distinguished from the Finbo variety.

Ottrelite identical with Phyllite. The name of Phyllite, from φυλλον, a leaf, was given by Dr. Thomson to a mineral, which was discovered and sent to him for analysis by Prof. Nuttall. It comes from Sterling, Massachusetts, and is disseminated, in small, thin plates, through what appears to be an argillo-micaceous slate. Some of these plates are angular and others rounded, not appearing to have any regular crystalline form; yet, in a few instances, they present the distinct form of rhomboidal tables. Color, brownish-black, or grayish-black; lustre, shining and semi-metallic; opake; fracture, uneven. The knife makes a faint impression upon them. In strong transmitted light, the thinnest disks present a greenish color. Before the blowpipe, on charcoal, it becomes magnetic, but does not fuse even on the edges; with double its bulk of borax, it slowly dissolves into a dark iron-green glass. Its composition, as stated by Dr. Thomson, is as follows:

Silica,	38.40
Alumina,	23.68
Peroxide of iron,	17.52
Magnesia,	8.96
Potash,	6.80
Water,	4.80
	100.16.

Ottrelite was discovered by M. Desclozeaux, and analyzed by M. Damour, in 1842. A full description of it is given in the *Annales des Mines*, for that year, vol. ii. p. 357. It occurs in small disks or plates, of a grayish-black or greenish-black color, with considerable metallic lustre, disseminated through a gangue which appears like a greenish argillaceous slate. These disks present no distinct form in the specimens I have examined, their edges being rounded, as in the case of the Phyllite; but Desclozeaux has referred them to a hexagonal prism, or to an acute rhomboid deeply truncated by a plane perpendicular to the axis, or deeply compressed in that direction. He also obtained a cleavage parallel with that plane. Minute fragments are translucent, and show a greenish color by transmitted light. Before the blowpipe, it fuses, alone, with difficulty, *on the edges*, into a black, magnetic globule. It dissolves slowly in borax, giving the reaction of iron, and with carbonate of soda, shows the presence of manganese.

Its constituents are as follow:

		Oxygen.		Ratio.	Formulæ.
Silica,	43.34	22.51		4	
Alumina,	24.63	11.50		2	2 Al Si + ($\underline{Fe}$, $\underline{Mn}$.) Si^2 + Aq.
Protox. of iron,	16.72	3.80	5.63	1	
Protox. of manganese,	8.18	1.83			
Water,	5.66	5.03		1	2 $\dddot{Al}$ $\dddot{Si}$ + ($\dot{Fe}$, $\dot{Mn}^3$.) $\dddot{Si}^3$ + 3 $\dot{H}$.
	98.53				

Dr. Thomson's analysis affords a different formula, and, according to his method of determining the atomic proportions, Phyllite is a simple silicate, (the atoms of silica and bases being equal,) consisting of nine atoms silicate of alumina, three atoms silicate of peroxide of iron, three atoms silicate of manganese, and one atom silicate of potash.[1] The occurrence of so large a proportion of potash in the mineral is not a little remarkable, and I would suggest whether it may not have been derived from the gangue of slate, from which it is difficult to obtain the mineral entirely free. Its infusibility before the blowpipe would seem to show this. It has been suggested, also, that a part of the iron may have been in the state of protoxide. It seems impossible, without some such supposition, that substances, so closely resembling each other in all their physical characters, should differ so much in chemical composition. Now, if the potash be left out, and the peroxide of iron be changed into protoxide, the ratio between the atoms of acid and bases is nearly the same as in Ottrelite, if we unite the atoms of magnesia and iron, as isomorphous with each other. Ottrelite, also, is not easily separated from its matrix, but the larger size of its plates would seem to render it more easy to obtain pure specimens for analysis; and it is to be observed that Damour repeated his analysis, and obtained precisely the same result. It is remarkable that Rammelsberg has alphabetically inserted Phyllite, but has given no formula for its constitution. It seems proper that the name of Phyllite, on the ground of its priority, and because it expresses so well the ordinary appearance of the mineral, should stand, and that of Ottrelite be abandoned.[2]

Dysluite identical with Automalite. I am satisfied, from recent observations, that these two minerals, as they occur in New Jersey, should form but one species. The difference in

[1] Outlines of Mineralogy, &c., vol. i. p. 384. Dr. Thomson's atomic weights, founded upon the idea of Prout, that they are all multiples of the atomic weight of hydrogen, vary somewhat from Berzelius's.

[2] Brooke has supposed Phyllite to be identical with Gigantolite. If we compare the analysis of Gigantolite with Damour's analysis above, the evidence of their identity (supposing Ottrelite to be a purer variety of Phyllite) is much more marked, and the ratio between the atoms of acid and bases is nearly the same in each.

hardness, color, specific gravity and pyrognostic characters, can be accounted for by the well established fact of the isomorphous replacement among the constituents of certain minerals which do not differ in crystalline form. In Dysluite, we have but thirty per cent. of alumina, the acting acid principle in the mineral, while, in Automalite, we have sixty per cent. But the peroxide of iron, which is isomorphous with the alumina, amounts to nearly forty-two per cent. Now, if we suppose about thirty per cent., of this peroxide of iron, to have replaced the same number of atoms of alumina in Automalite, and the eight per cent. of protoxide of manganese to have replaced so much of the oxide of zinc, we make up, very nearly, the essential constituents as shown in the analyses of Automalite by Ekeberg and Abich. It is to be observed that the latter chemist puts down the iron as *protoxide* in the Franklin Automalite. If it should prove that the iron exists in Dysluite in both states of oxidation, the twelve per cent., remaining out of the forty-two, may be protoxide, replacing so much oxide of zinc. So that, in this view of the case, the 17 per cent. oxide of zinc + 11 per cent. protoxide of iron + 7 per cent. protoxide of manganese = 35 per cent. oxide of zinc, which is nearly the exact quantity found by Abich in the crystals from Franklin. We may then state the constituents as follow:

		Oxygen.		Ratio.
Alumina,	30.49	14.24	23.43	3
Peroxide of iron,	30.00	9.19		
Protoxide of iron,	11.93	2.72	7.76	1
Protoxide of manganese,	7.60	1.70		
Oxide of zinc,	16.80	3.34		

Here it is evident that the atoms of acid and bases are to each other as three to one, which is the case, also, with Automalite, taking Abich's analysis, and grouping the isomorphous bases, thus:

		Oxygen.		Ratio.
Alumina,	57.09	26.66		3
Oxide of zinc,	34.80	6.92	8.72	1
Magnesia,	2.22	.76		
Protoxide of iron,	4.55	1.04		

Dr. Thomson, the only chemist who has analyzed Dysluite, reckons all the iron as peroxide, and as the principal basic constituent of the mineral, which, in his view, consists of the aluminates of iron, zinc and manganese. Rammelsberg, in stating the analysis, has given both oxides, and the atoms of alumina and peroxide of iron, as put down by him, are 22.80, and those of the isomorphous bases — protoxide of iron, protoxide of manganese and oxide of zinc — are 7.83 (7.89 ?); thus giving the same ratio as that above stated.

But other reasons may be urged why Dysluite should be regarded only as a variety of Automalite. I have seen specimens on which there were crystals well claiming the name of Dysluite, as well as others equally entitled to the name of Automalite; while there were yet others, evidently passing from one into the other, — the bright and perfect crystals of Automalite gradually losing their lustre, becoming porous, comparatively brittle and soft. I think if these circumstances had been attended to in the early history of the mineral, the name Dysluite would long since have departed from the catalogue of mineral species.

Polyadelphite. As Dana, in the new edition of his mineralogy, has very properly included this mineral under the species garnet, I merely refer to it, to give further evidence of the correctness of his opinion from circumstances connected with its occurrence at the locality. It is evidently a granular, imperfectly crystallized yellow garnet, and the specimen which I received, ten years ago, from Prof. Nuttall, contains mechanical mixtures which it would be impossible to separate from it, so as to give us entire confidence in its analysis. To these, I believe, we may attribute its departure in composition from the common brown or yellow garnet, though it does not differ much from the brown garnet of Franklin, analyzed both by Dr. Thomson and Mr. Seybert.

Beaumontite of Levy, and *Lincolnite* of Hitchcock. In a paper read before the Boston Society of Natural History, and since published in their Journal, and in the American

Journal of Science, (vol. xlvi. p. 235,) I gave my reasons for classing these two minerals with Heulandite. That Beaumontite is Heulandite, I believe, is no longer doubted in this country or Europe. An analysis of the mineral, by M. Delesse, has appeared since the publication of my paper,[1] and it agrees with all the other analysès of Heulandite, excepting in the slight excess of silicic acid. In this respect, it offers an example analogous to that of the variety of Chabasite called Acadiolite, in which the silicic acid forms a larger atomic proportion of the mineral, without causing any appreciable variation in the angles of the crystals. As to Lincolnite, I must think that the various papers, that have been called forth in relation to it since my first communication appeared, have established its indisputable identity with Heulandite.

Peculiarities in the modifying planes,[2] have given rise to a secondary form, rarely observed in Heulandite. These consist in the enlargement of the planes *f* (Phillips,) or *ĕ* (Dana,) so as nearly to obliterate the primary planes *M*; being, in fact, the reverse of what we usually observe in Heulandite from other localities. In the measurements by Prof. Hitchcock and Prof. Shepard, the angle of *f* on *T* was mistaken for that of *M* on *T*, and in the figure given by Prof. Hitchcock, it is evident that the planes lettered *M* should be *f*. The true value of *f* on *T* is 115° 10′ (Dana); Prof. Shepard's last measurements made it 116° 17′.

Ledererite. I am compelled, at last, to declare my conviction that the specific nature of this mineral can no longer be maintained. Connell's analysis of an Irish Gmelinite, which agrees with Lédererite in all its physical and crystallographical characters, has shown also an identity in chemical composition. The phosphoric acid, detected by Mr. Hayes, must be viewed as an accidental constituent, varying probably in different

[1] *Ann. de Chim. et de Phys.* for 1843, t. ix. p. 395. Phillips's Min. p. 627.

[2] For the figures see Am. Jour. of Science. vol. xlvi. p. 234, and vol. xlvii. p. 416. Corroborative evidence of the correctness of my opinions, by the editors of the Am. Jour. of Science, may be seen at the pages here referred to.

crystals, or, in some of them, not existing at all. Some of the Zeolites, in the Nova Scotia trap, have been found associated with small crystals of phosphate of lime, and it is not impossible that some of the minutest of these may have intercrystallized with the Ledererite. We regret that we have not been able to obtain other specimens to enable Mr. Hayes to give it a reëxamination. For comparison, I subjoin the analyses of Ledererite and Gmelinite.

	Ledererite.		Gmelinite.
Silica,	49.47		48.56
Alumina,	21.48		18.05
Lime,	11.48		6.13
Soda,	3.94		3.85
Phosphoric acid,	3.48	Potash,	0.39
Protoxide of iron,	0.14		0.11
Water,	8.58		21.66
	98.56, Hayes.		98.75, Connell.

Now, if the phosphoric acid, in Ledererite, is united with lime as an accidental mixture, $2\frac{1}{2}$ per cent. of the lime should be taken from the 11.48 per cent found in the mineral: this brings the proportion down nearly to that obtained by Connell. Mr. Hayes was not able to determine the weight of the water with accuracy, owing to the small quantity of the mineral operated upon. As the loss (1.44 per cent.) was mostly water, we may suppose, with Rammelsberg, that Ledererite is Gmelinite containing $\frac{1}{3}$ ($\frac{1}{2}$?) its quantity of water. The chemical formula for Gmelinite and Chabasite is thus:

$$(\dot{Ca}, \dot{Na}, \dot{K}^3)\ \dddot{Si}^2 + 3\ \dddot{Al}\ \dddot{Si}^2 + 18\ \dot{H}.$$ [1]

Excepting the absence of striæ, and the shorter dimensions of the prismatic planes of its crystals, the Irish Gmelinite precisely

[1] *Handwörterbuch*, i. 150. Rammelsberg unites Chabasite and Gmelinite, the first as soda Chabasite, the last as lime Chabasite. This is in accordance with Tamnau, who has established their identity on crystallographical grounds. The close relation of the two minerals was, however, first shown by Prof. Mohs. See his Mineralogy, vol. ii. p. 105.

resembles Ledererite; their hardness, lustre, color and blowpipe characters are the same. The appearance of hexahedral cleavage, on which Dr. Jackson originally founded the chief claim of the latter to the character of a new species, was only imperfectly produced by heating the crystals, and not by ordinary mechanical cleavage. This could not be effected, the mineral breaking, in all directions, with a vitreous fracture. Dr. Jackson agrees, with me, that it can no longer be retained as a distinct species.

While preparing my edition of Phillips's Mineralogy, I requested Mr. Hayes and Dr. Jackson to make several analyses for me with particular reference to that work. As some of these have not appeared in any other form, I wish now to make a permanent record of them, in order that they may be seen where they might not otherwise reach. The first are of the Nova Scotia Chabasite (Acadiolite,) which Hoffmann has distinguished from common Chabasite, by its containing 3 per cent. more silica, and for which Rammelsberg has given a formula differing somewhat from that of Chabasite. (See first part of this article.)

Silica,	52.02	52.20
Alumina,	17.88	18.27
Lime,	4.24	6.58
Potash,	3.03	} 2.12
Soda,	4.07	
Water,	18.30	20.52
	99.60, Hayes.	99.69, Hayes.

These results agree with those obtained by Hoffmann,[1] in his analysis of the same mineral, the specimens of which were presented to him by Charles Cramer, Esq., of St. Petersburg.

Washingtonite of Shepard, analyzed by Mr. J. S. Kendall, under the direction of Dr. Jackson, gave these results:

[1] Amer. Jour. of Sc. vol. xxx. p. 366.

		Oxygen.	Ratio.
Titanic acid,	25.28	4.82	1
Peroxide of iron,	51.84	10.36	2
Protoxide of iron,	22.86	5.08	1
	99.98		

The atomic proportions are thus, nearly one atom titanic acid, two atoms peroxide of iron, one atom protoxide of iron; or, a trititaniate of iron, consisting of two atoms trititaniated peroxide and one atom trititaniated protoxide. If we unite the magnesia and lime with protoxide of iron, in the following analysis of an Ilmenite from Arendal,[1] by Mosander, we obtain precisely the same result. The crystalline form of the two varieties is also the same, and there can be no donbt of their identity as one species.[2]

Titanic acid,		24.19
Peroxide of iron,		53.01
Protoxide of iron,	19.91	20.92
Magnesia and Lime,	1.01	

By referring to the analyses of Ilmenite from other localities, it will be seen that the essential constituents, titanic acid and the two oxides of iron, so interchange with each as to produce different varieties, but all having the same crystalline form.

[1] The Hystatite of Breithaupt.

[2] An acute rhombohedron, P on P 86° 10′, for the Ilmenite. Shepard, employing varnished planes of the Washingtonite, makes P on P 86°. Prof. Shepard founds the distinction on other than crystallographical characters; for, he says, it is not thus "shown to be distinct, in any essential manner, from the axotomous iron-ore of Mohs, or from Crichtonite (including Ilmenite): indeed, it appears most probable that all these minerals are not only identical in their angles, but are isomorphous with specular iron." Am. Jour. vol. xliii. p. 365. The analysis, now, would seem to destroy the groundwork for any distinction.

Art. XXIII.—AN ACCOUNT OF TWO REMARKABLE TRAINS OF ANGULAR ERRATIC BLOCKS, IN BERKSHIRE, MASSACHUSETTS, WITH AN ATTEMPT AT AN EXPLANATION OF THE PHENOMENA. By Prof. Henry D. Rogers and Prof. William B. Rogers. Read Dec. 3, 1845.

The origin of the drift or diluvium, that extensive, superficial stratum of loose, fragmentary, rocky materials, which covers, in one unbroken sheet, the northern portions of both continents, from the highest latitudes explored to the parallel of the Alps, in Europe, and to 40° or 41°, in North America, has, for many years past, been one of the most interesting questions in geological dynamics.

In the recent discussion, which it has received from some of the most eminent of the cultivators of science, on both sides of the Atlantic, this question has been shown to involve an inquiry into the nature and mode of action of nearly all the great physical agents concerned in the revolutions of the earth's surface, the transportation of soil by icebergs, the pushing forward of moraines by glaciers, and the more rapid strewing of débris by violent continental inundations.

It connects itself, therefore, with investigations into the former climates of the world, and into the changes in the distribution of its lands and waters, and it, consequently, requires a knowledge of the great secular and paroxysmal disturbances in the earth's crust, from whence these and all the other surface revolutions have proceeded.

The object of the present brief paper is not so much to present our views of the whole train of causes explanatory of the origin of the drift,—a discussion which would lead to a wide investigation into the efficacy of nearly all the physical agents and changes above referred to,—but it is simply to test, by certain unexplained phenomena, the relative merits of the several hypotheses of drift-action, most in favor with geologists.

The phenomena, to which we here allude, are those of certain long and narrow trains of large and angular blocks, seen, in the mountainous districts of New England, resting upon the surface of the more rounded materials of the ordinary drift. There are many conspicuous trains of this description in New Hampshire, Vermont and Massachusetts. One striking example, to be met with in Berkshire County, Massachusetts, has been already the subject of instructive notices by Dr. S. Reid, of Richmond, who resides in its immediate neighborhood, and Dr. Hitchcock, of Amherst College. The earliest account of this very curious train was given by Dr. Reid, in 1842, in the Berkshire Farmer, a newspaper printed at Lenox; that by Dr. Hitchcock was read to the American Association of Geologists and Naturalists, in May, 1844; and a still more detailed description, by Dr. Reid, was submitted to the same society, at their meeting in May, 1845.

Neither Dr. Reid nor Dr. Hitchcock has ventured upon any hypothesis to account for this and other similar lines of boulders; but the latter observer, on the other hand, influenced by a spirit of philosophic caution, confesses that he finds so many difficulties on any supposition which he can make, that he "prefers to leave the case unexplained, till more analogous facts shall have been observed." Having, in the month of August last, while engaged in some observations on the geology of the Taconic chain and the Green Mountains, been permitted, through the kindness of Dr. Reid, who guided us along this enormous stream of stones, to trace it to its source, and study with sufficient care its instructive features, we feel a desire to add to the descriptions already published a notice of a few omitted points, which appear to us to deserve a record from their theoretical importance. Believing that all the phenomena of the drift stratum, as seen in Berkshire, and, indeed, throughout the continent, do admit of intelligible explanation, upon the views we entertain of paroxysmal action, we propose to submit these doctrines to the ordeal of the facts observed by Dr. Reid, Dr. Hitchcock and ourselves.

Standing on the most westerly elevated spur of the Taconic chain, in Canaan, New York, a little west of the Massachusetts line, and about four miles south of the Lebanon Springs, we may perceive two remarkable trains of thinly scattered erratic blocks, stretching, for many miles, in a south-easterly direction, across the valleys, and up and over the parallel intervening mountain barriers of Berkshire. These trains are of extraordinary length; the most northerly of the two extending, according to the observations of Dr. Reid, who has traced them over the fields, and through tracts of forest, a distance of nearly twenty miles. They are only approximately straight and parallel, for they bend sensibly at several points, and diverge a little as they recede from their place of origin. Their average width is about three or four hundred feet, and the distance between them is from one third to one half of a mile.

The blocks composing these trains are, for the most part, of enormous size; the smaller ones being generally several feet in diameter, while others are ten or twenty feet, and a few are even thirty feet or more. One of the largest lies not far from the residence of Dr. Reid, in the neighborhood of Richmond meeting-house, and therefore nearly four miles from its source. It has been ascertained by him to be nearly fifty feet long, forty feet wide, and about fifteen feet thick, five feet of its thickness being imbedded in the gravelly drift. Its weight probably exceeds two thousand tons. The fragments, in both trains, are rather thinly scattered, the distances between them being generally several times their own dimensions; but there are localities where they lie almost in contact.

While these erratics are of various sizes in the same neighborhood, there is a perceptible, though, of course, very gradual, diminution in their average bulk, as we follow them to the south-east. It is true, blocks of very great magnitude, like the one just referred to, are met with, even several miles remote from their parent stratum; but, when we compare the mean size of the fragments, at any given locality, with that at another spot, a mile or two further on, we discover an obvious diminution. This declension in size must be regarded, in connection with theory, as a *crucial* fact, wholly inexplicable upon the iceberg theory, which supplies no reason for such gradation. The masses which have travelled furthest seem to be no more worn at their edges than the others, a circumstance in strict accordance with the theory we shall here advocate.

The blocks have been described as presenting no evidence of attrition. It is true, their corners and edges are not rounded off, nor are their surfaces smoothed and furrowed, like those of the true boulders of the general drift which supports them. Their angles are, however, perceptibly blunted and worn, and their surfaces all indicate a certain amount of erosion. Nevertheless the boulders and pebbles of the true drift, below them, have a very different aspect, being entirely covered with the traces of a long-continued and violent rubbing.

Another very curious and significant fact, already noticed by Dr. Reid and Dr. Hitchcock, is, that these blocks do not mingle with the general drift, but merely rest upon it. In a somewhat deep excavation on the Western Railroad, and at other places, the worn and furrowed fragments of the drift are seen to support these angular erratics, but to contain none below the level of the soil. The greater number of these angular blocks are, it is true, imbedded to a trivial depth, usually an unimportant portion of their thickness. Many of them appear to have been suddenly split, as if by impinging violently upon the spots where they repose; the broken halves lie near each other, sometimes almost in contact, sometimes several feet asunder, but always with their fractured surfaces unworn and rough, as if the pieces came to rest very soon after bursting.

It is another circumstance worthy of observation, that these erratics differ from the drift below them, as much in their mineral nature, as in their shape, size and situation. While the general drift, in any neighborhood, is composed of fragments torn from the outcrop of all the strata, especially the less easily destructible, which occur for many miles north-west of it, smoothed and rounded by their mutual attrition, and mingled in the most heterogeneous manner, these trains consist of one special kind of rock, readily distinguishable from every other in the region both by its composition and external aspect. It has a distinct greenish color, is excessively tough, and is partially, and in some masses almost entirely, crystalline. The fracture and composition plainly show it to be a rock altered by igneous action, and in that intermediate state towards full crystalline development, in which a determination of its component minerals is attended with some uncertainty. It contains much glassy felspar in apparently incipient formation, a green mineral like Nephrite, and perhaps Picrosmene. So well marked are all its external features, that the observer finds no difficulty in recognizing any isolated fragment of it; he perceives, at a glance, that the blocks do not belong to any of the zones of argillaceous or talco-argillaceous slates, vitreous sandstones, and semi-crystalline limestones, which the trains cross, but he identifies them at once with a particular hard and massive stratum found nowhere but in the very summit of the high ridge in Canaan, where it projects, as a narrow rib, along the sharp and somewhat broken crest. After tracing either of the two long and narrow belts of angular stones, north-westward, for many miles, across successive valleys and their intervening ranges of hills, and finding, as it were, no parentage in any of the strata beneath for these far-strewn surface blocks, the geological traveller feels extreme amazement when, upon clambering to the torn and narrow crest of the Canaan ridge, he sees at last the separate source of each of these immense streams of stones. There each train suddenly terminates, and there, in the very crest of the mountain, is the material from which the whole collection of fragments must have been derived. As observed by Dr. Hitchcock, the very places whence the fragments were ruptured, are still visible. The observer is surprised to notice that each train originates in a distinct depression in the crest of the mountain, each of the depressions being at the head of a very steep and rugged ravine, on its easterly flank, the longest train beginning in the largest depression. The knob, which fills the space between the two indentations, is not, as supposed by Dr. Reid, the starting place of either of these trains. Gazing westward from the crest, we look in vain, down the declivity on that side, or upon any of the lower ranges of hills towards the Hudson valley, for a single block like those which so thickly sprinkle its eastern slope. Turning, however, to the eastward, and tracing the longest and most conspicuous stream of fragments, we notice that, while all the principal ridges and valleys of the district range about 20° west of south, the train takes a course which varies, in different parts, from 50° to 35° east of south; and here it is essential to remark that this is the general direction of the diluvial furrows and scratches upon the strata of the district, and coincides with the direction taken by the rounded drift. It will be instructive to notice a little in detail some of the changes which this gigantic pathway of stones exhibits. Descending the eastern flank, the blocks, which are here of huge dimensions, are thickly crowded along the great gutter or ravine. They do not stream directly down the mountain, as if they had merely rolled to the foot by their gravity, but they take an oblique line, and cross the valley in a direction of about 45° east of south. At a point about three quarters of a mile from its commencement, and near a small Shaker village, the train inclines perceptibly (about 10°) more to the southward, and, in this course, it climbs the slope of the next mountain barrier, the Richmond range. On the brow of the mountain it resumes its first direction, crossing, for a mile or more, its broad summit exactly over the highest point of one of its most conspicuous knobs, elevated nearly one hundred feet above the point in the Canaan ridge whence the train started. It then descends the eastern slope, in a line about 5° more towards the east, and here contains an unusual number of the larger class of fragments, there being, according to Dr. Reid, in a length of three quarters of a mile, more than fifty boulders of the capacity of from one to two thousand cubic feet, the belt in this part being only two hundred and fifty feet wide. Entering the Richmond valley, it presently deflects as much as 20° to the south, altering its course from S. 50° E. to S. 30° E. The belt is now hardly two hundred feet in breadth. From this last elbow, which is near the Richmond meeting-house, the train, having a breadth of from two hundred and fifty to three hundred feet, extends, in a line approximately straight, across the Richmond valley, a distance of about four miles. It then ascends the mountain west of Lenox, which it passes at an elevation about as great as where it traverses the knob of the Richmond ridge. On the eastern declivity of the Lenox mountain, the larger boulders measure from eight hundred to one thousand cubic feet. Gaining the Lenox and Stockbridge valley, which is about one hundred feet lower than the Richmond valley to the west, the blocks become less numerous, and there are portions of the belt where they are almost absent, while, in intermediate sections, they occur thickly crowded. The train ranges on, crossing the southern corner of Lenox, and the whole of Lee, in which it passes the Housatonic river. It afterwards enters Tyringham, where it climbs the broad and rather lofty belt of hills called the Beartown Mountains. Beyond the Lenox ridge, its average direction is S. 35° E. Dr. Reid, from whom these measurements are principally derived, has followed it a distance of more than twenty miles, and thinks that he did not reach its termination.

The other parallel train he has traced, from its adjacent source in the Canaan mountain, through a length of about ten miles, but is not sure that he reached the end. The blocks in this train are rather more sparsely and less uniformly scattered. Between these two trains, very few detached blocks are found. [See Plate XXV.]

The two conspicuous trains, here described, are not the only ones in the district, though the rest have not as yet been traced in detail. Dr. Reid, in his communication to the Association, speaks of having met with several others farther to the south, and originating, probably, in the same mountain crest.

When the observer turns his attention to the relative abundance of the rocks, he is surprised to notice that they are both more numerous and larger on the eastern than on the western slopes of the ridges, a condition of things apparently incompatible with their transit along the surface of the ground, as, in that case, each barrier of hills would check their eastward speed, and cause a greater accumulation upon the western declivities. We shall endeavor presently to explain the cause of this greater abundance upon the eastern sides of the ridges.

The height of the Canaan ridge, above the valley on the east, is nearly seven hundred feet, while that of the knob, where the train passes the Richmond mountain, is perhaps as much as eight hundred feet, and the next or Lenox mountain is but little lower.

Other long and narrow lines of huge erratic fragments are seen elsewhere in Berkshire, and abound, we think, in nearly all the mountainous districts of New England. One such train, originating apparently in the Lenox ridge, about two miles to the south of Pittsfield, crosses the Housatonic valley, south-eastwardly, as far at least as the foot of the broad chain of hills in Washington. Some very extensive ones are to be seen on the western side of the White Mountains, in journeying from the Notch towards Littleton. Every train observed by us has exhibited essentially the same phenomena as those we found to characterize the trains of the Canaan mountain; and whatever explanation will apply to the latter, must involve a cause general and energetic enough to reach the others.

We shall now proceed to suggest a possible origin for these remarkable streams of surface blocks, aiming to confine ourselves to a strict induction from the foregoing facts, and the known laws of action of the great physical agents concerned in geological revolutions.

We entirely concur with Dr. Hitchcock in rejecting Mr. Lyell's explanation of the drift, which would make slowly-floating icebergs the agents in the dispersion of these erratics. He justly asks, By what agency could the blocks be raised upon the backs of the icebergs? How could one large iceberg have loaded itself with enough of these huge fragments to strew the ground, as thickly as we see, for so many miles; and who will believe that successive icebergs could tear off and bear away successive blocks in precisely the same direction, so as to lengthen out the train? But there are other difficulties besides these which here suggest themselves. If we suppose, with Mr. Lyell, the surface of all the land now covered with the drift to have been submerged below the sea, it is obvious that only the advanced edge of the base of a drifting iceberg, striking the summit of the Canaan ridge, could load itself with any fragments. But, in this case, even if it could gather a sufficient freight, there seems to be no adequate cause proposed for the linear and uniform scattering of the blocks, beginning with the very spot where they were just caught up. The dropping or spilling of boulders and soil from the surfaces of icebergs, is due, we know, to a gradual melting, chiefly, of the portions not immersed, while, in this imaginary case, the parts sustaining the boulders, being low in the water, would, certainly, not melt fast enough to cause so copious a deposition as we see. But there is another difficulty. The top of the Taconic range is higher, as we have seen, than the source of the blocks in the Canaan ridge, and any iceberg, sunk deep enough to impinge upon the latter, would have found its progress to the south-east effectually arrested by this higher barrier. To this latter objection it is not sufficient to reply, that the main Taconic ridge may have gained its present superior elevation, since the dispersion of the erratics, during a supposed subsequent slow rising from the sea of all this drift-covered region. Such answer would be equivalent to the assumption of an anticlinal bulging of the crust, under not only the Richmond and Lenox ridges, but beneath the still loftier Beartown chain; whereas the uniformity in the dip of the folded strata, in the two first ridges and their included valleys, shows that no such local lifting of the region has taken place. The entire absence of any evidence, in the position of the drift itself, of an alteration in the configuration of the surface since its deposition, produced either by secular or paroxysmal actions, is a sufficient demonstration that, whatever change of level may have occurred, has been a general continental rising, as in the case of Sweden, shared alike by the valleys and mountains. The total absence of any undulations in the level of the marine clay beds of the river valleys, from the coast of Maine to the Hudson and St. Lawrence, is a conclusive proof that this uplifting has not been local, but general.

But a more comprehensive refutation of this hypothesis of the origin of the drift from wandering icebergs, during an era of general permanent submersion of the land, and comparatively tranquil currents, is presented by the undeniable fact that the bed of every quiet sea must inevitably become the receptacle of fine-grained sediments, of some depth at least, entombing forms of animal and vegetable life, and which no subsequent denudation of its bed can altogether obliterate. But in connection with this great stratum of the drift, there is not to be discovered a solitary oceanic fossiliferous deposit to show that the land was then stationary below the level of the sea. That the drift-dispersing waters were above the land we do believe; but their presence there was transient, in the condition of a vast inundation, and while the level of the continent was nearly what it is and has been since the appearance of the human race.

According to another hypothesis, that which imputes the transport of boulders and erratics to the agency of *glaciers*, these trains would be regarded as so many great moraines. But the well-known absence in the United States of lofty mountains penetrating the atmospheric level of perpetual snow, and acting as centres of dispersion for alpine glaciers, and the proof afforded by the universal north and south direction of the strewn materials, and the furrows on their rocky floor, that no such centres of dispersion existed, make the application, to our continent at least, of this favorite theory of the Swiss geologists altogether inadmissible. And, moreover, Dr. Hitchcock has already exhibited the absurdity, in the special case before us, of supposing a glacier to be capable of conveying a *moraine*, from the ridge in Canaan, across another ridge higher than the one from which it started. Since it has been beautifully demonstrated, by Prof. Forbes, of Edinburgh, that every glacier is partially plastic, and actually flows onward, though very tardily, in a species of semi-fluid current, floating its moraines along with it, we see that it can no more ascend a barrier higher than its snow-fed source, than can running water.

But turning from these speculations, as too unsatisfactory, we now proceed to inquire whether there is not another possible mode of transport of fragmentary rocky matter, by an agency in the economy of our globe much more widely active, and more in harmony with the facts to be explained. This agency, to which we are disposed to attribute the phenomena we have described, is the paroxysmal, or sudden and violent, disturbance of the slightly flexible crust of the earth, causing, in the period of the northern drift, a partial elevation and displacement of the bed of the great frozen sea which occupies the arctic latitudes, and sending its waters, with all their ice, in a sudden inundation, over all the northern lands of the two continents. Before undertaking to account, by this cause, for the special phenomena of the boulder trains of Berkshire, we crave permission of the reader to explain our views of the nature of continental inundation, as they are expressed in an address, delivered by one of us, in May, 1844, to the Association of American Geologists and Naturalists.

"The paroxysmal theory, I cannot but think, will be found, on careful examination, to be more in agreement with the admitted laws of physical dynamics than either of the more popular hypotheses of the day. This doctrine, appealing to the proofs which our science furnishes of the sudden disturbances of the level of the different tracts of the earth's surface, at all periods of geological time, merely supposes that, at the epoch of the drift, the polar half of the northern hemisphere was the theatre of violent, and perhaps frequently repeated, movements of the earth's crust, each particular disturbance emanating, probably, from a different local region. These disturbances, which are conceived, by Von Buch, De Beaumont, Hopkins, De la Beche, Sedgwick, Phillips, and other distinguished geologists, to have been of the nature of simple *paroxysmal elevations*, and by ourselves, to have consisted in an energetic and extensive *undulation* of the crust of the earth accompanying each sudden rise, are deemed sufficient to have caused a rush of the northern waters over all the higher latitudes of Europe and North America, covering the surface with an almost continuous sheet of gravel and boulders, and polishing and scoring the whole rocky floor.

"The chief cause of hesitation, with many minds, in embracing a theory so much in harmony with the general physical history of our globe, has arisen from their not recognizing a force sufficient to dislodge and sweep onward blocks of the huge size which we sometimes encounter, or to drive the detrital matter up and over the high mountain barriers, across which, by some process, it had travelled. So long as no definite estimate had been made of the velocity of the current which would result from a given amount of paroxysmal elevation, such a distrust of the energy of diluvial waters was natural and prudent; but we are in possession of facts and generalizations calculated greatly to exalt our conceptions of this power.

"It has been shown, by Mr. Hopkins, of Cambridge, reasoning from the experimental deductions of Mr. Scott Russell upon the properties of waves, that "there is no difficulty in accounting for a current twenty-five or thirty miles an hour, if we allow of *paroxysmal elevation* of from one hundred to two hundred feet;" and he further proves that a current of twenty miles an hour ought to move a block of three hundred and twenty tons, and since the force of the current increases in the ratio of the square of the velocity, a very moderate addition to this speed is compatible with the transportation of the very largest erratics anywhere to be met with, either in America or Europe.

"Holding in view these demonstrable conclusions, let us consider the far *more* enormous velocity which a broad, general current would derive from that mode of paroxysmal action, *earthquake undulation*, which constitutes, as we have endeavored to show, an essential feature in all movements of elevation. Regarding such disturbances as a true billowy pulsation of the flexible crust of the globe, we have deduced, from data connected with some of the best authenticated earthquakes, the extraordinary progressive velocity of the undulations of the ground, and have shown that, when the pulsation has been imparted to the sea, the vast waves engendered have moved at the amazing speed of five miles or more per minute. Making every abatement for resistance from the comparative shallowness of a continental inundation, the phenomena of earthquakes fully justify us in the belief that the broad and rapid onward undulations of the ground would be propagated to an uplifted sea above, and the gigantic billows be propelled, across the surface of the heaving land, with a velocity, and a propulsive energy, approached by no other possible terrestrial current.

"If we will conceive, then, a wide expanse of waters, less, perhaps, than one thousand feet in depth, dislodged from some high northern or circumpolar basin, by a general lifting, of that region, of perhaps a few hundred feet, and an equal subsidence of the country south, and imagine this whole mass converted by earthquake pulsations, of the breadth which such undulations have, into a series of stupendous and rapid-moving waves of translation, helped on by the still more rapid flexures of the floor over which they move, and then advert to the shattering and loosening power of the tremendous jar of the earthquake, we shall have an agent adequate, in every way, to produce the results we see,—to float the northern ice from its moorings, to rip off, assisted with its aid, the outcrops of the hardest strata, to grind up and strew wide their fragments, to scour down the whole rocky floor, and, gathering energy with resistance, to sweep up the slopes and over the highest mountains."

Let us endeavor to dilate our thoughts to a just conception of the scene here feebly hinted at; let us picture an ocean freighted with its ponderous bergs and fields of ice, rushing across the tops of the mountains, and thrown, by the earthquake undulations of its temporary bed, into a series of enormous billows, each of which would possess a breadth, as it can be shown, of several *miles*, and a velocity of from five to ten miles per minute; and then advert to what would happen as the vast masses of solid ice, rivalling in magnitude the hills themselves, and borne forward with almost the velocity of a cataract, impinged with full momentum against the summits of the higher ridges. While a wide, diffused sheet of fragmentary matter, the mingled wreck of all the strata, would be driven along at the bottom of the rapidly moving flood, scouring the rocky floor, and grinding itself into rounded forms by its rolling motion and tremendous attrition, the summits of the yet submerged hills would be shot away as it were by the striking of the rushing ice, and an enormous speed imparted to the broken pieces. As this speed would be sustained by the swift motion of the general current, and the yet greater velocity of the vast billows or waves of translation, the projectile distances of the blocks, or their course through the water, before they came to final rest, might be even as much as several miles.[1] That the fragments might be conveyed thus

[1] The suggestion here made, that the crest of the ridge was scooped off at each of the depressions by a violent stroke of a large mass of floating ice, is strikingly confirmed, we think, by the interesting fact already observed by Dr. Hitchcock, that "we can see the places where the ragged fragments were torn off, and the fracture has yet a considerable degree of freshness." Had water alone, or water sweeping with it a quantity of the common rounded drift, been the instrument in forming these indentations in the backbone of the ridge, we should look for a smooth and regularly curving surface in the shallow notch, whereas we really see a broken outline, exposing the ragged edges of the strata, indicating that the top of the moun-

far will seem more than probable if we pause and consider the conditions of their motion. The suspended blocks, losing, as we know, more than two-fifths of their weight from the buoyancy imparted by the fluid, would be carried onward a great distance before they could descend through several hundred feet of water; and after they had struck, it is very obvious that many of them would maintain a rapid progress for some distance further, bounding and rolling forward upon a floor of loose detrital matter moving in the same direction, and still impelled by the pressure of the onward current. Upon these considerations we may understand why the blocks, in retaining their original angular or fragmentary shape, should exhibit partial traces of abrasion at their edges, and why they should rest imbedded in the rounded drift to so small a depth.

But there is a much more efficient power exerted by currents, and precisely such as would be exercised by a great and rapid inundation sweeping over an irregular surface of plain and mountain. We here refer to the lifting or buoyant power of the great whirlpools or gyratory funnels, which the inequalities in the velocity of the current, produced by the local obstructions in its bed, would infallibly engender. When the true nature and stupendous energy of this mode of fluid motion are duly contemplated, and its special agency in the general inundation fitly considered, it will account, we think for all the previously unexplained features of the boulder trains, including the perplexing phenomena of their great length and extreme narrowness.

We cannot in this paper assign ourselves sufficient space to discuss critically the dynamics of gyratory fluid motion; but the attentive reader will be satisfied, from the close analogy of such vortices in rushing water, to those terrific whirls which arise in the more attenuated fluid of the atmosphere, under the forms of the tornado and the waterspout, that their functions are strictly identical. Nothing in the natural history of

tain has been violently ploughed off; precisely as if by the concussion of some huge solid body moving with irresistible momentum.

the atmosphere is more notorious than that the uprooting and far-scattering tempest of the tropics has an excessive gyratory momentum at its centre; by which it actually lifts and bears away the most ponderous and bulky objects, even trees, beams, animals, and houses. It is equally well known that its path is linear and very narrow, the upborne fragments being strewn along, dropped out, as it were, from the apex of the whirling funnel. Precisely the same lifting and carrying action is seen in the mimic funnels which we make experimentally in a shallow sheet of water, or behold in almost any rapid brook. That the particles in the whirlwind or waterspout, and, by analogy, in the whirlpool, rotate, round the axis of the vortex, in ascending and widening spirals, is a fact expressly mentioned by all who have been presented with opportunities for observation. This spiral motion in a waterspout was perceived by Captain Beechey near Clermont-Tonnerre, and was distinctly seen, in another near Bermuda, by Governor Reid, who, in his valuable Treatise on the Law of Storms, speaks of his having beheld the phenomenon through a telescope. It has been established beyond all controversy by Mr. Redfield, who has cited some very interesting details to show that a rapid ascending whirl is producible artificially, when a large mass of combustible matter, such as brushwood, is set blazing, in a calm day, in an open field. The upward whirling column, thus caused, extended, in one instance, to a prodigious height, and had a swiftness which the beholder describes as exceeding all his previous conceptions of the velocity of wind. Nearly every reader of travels is familiar with Bruce's glowing description of the tall pillars of sand which he encountered in his traverse of the Nubian Desert—their tops reaching to the very clouds, while their diameters, at the ground, scarcely exceeded a few feet, and stalking over the vast plain with majestic slowness, or chasing each other with the speed of the swiftest horse. These were evidently the same phenomenon as the waterspout, possessing the same enormous upward gyratory power. The elevating and transporting energy of the waterspout, or whirlwind, is manifested, also, in those instances of the sudden showers of fishes from the upper air, of the occurrence of which, in India and elsewhere, we have the most incontestable evidence ; and it is strikingly exemplified in the results of one at Christiansöe, which so nearly emptied the harbor that the greater part of the bottom was uncovered. The learned Professor Œrsted, of Copenhagen, who states this latter fact in a paper in Jameson's Edinburgh Journal, adduces several instances to prove the great distances to which waterspouts have transported the largest objects. He attributes the upward tendency of the air, in the interior of the whirl, to the resistance which the rotating particles encounter at the circumference, forcing them into the only direction in which they can yield to the pressure, namely, upwards.[1]

Keeping in view, then, the true mode of action, and prodigious power of the whirling current, and the enormous momentum of the impinging ice, we may arrive, we think, at a satisfactory solution of all the phenomena of these boulder trains. In the first place, the velocity of that portion of the northern flood which swept across the Berkshire hills must have been excessively great. Coming from the north-west, from the elevated region of the Adirondack, the current must have been greatly accelerated by pouring down from a height

[1] A more accurate explanation of the lifting action of the whirl would be that, we think, which would ascribe it to the *diminished molecular tension* in the vicinity of the axis of motion, caused by the continual effort of the particles to press away *from that line*, or, in other words, by the centrifugal force due to their rotation. This diminished tension, though not productive of a *sensible rarefaction* of the liquid, such as would happen were the whirling column *air*, will still, as it would in that case, have the effect of *reducing the pressure* of the central revolving mass *upon the liquid beneath*, since this must, in part at least, be determined by the tension propagated from above. The subjacent fluid, urged upwards by the undiminished, and therefore predominating, pressure of the remoter and comparatively quiescent mass, will be constrained to rise along the axis of the whirl, very much as air ascends along the heated flue of a chimney, but, uniting to this upward motion the acquired revolving one, it will, necessarily, move in a regular ascending spiral. By virtue, moreover, of the progressive reduction of the lateral pressure towards the axis, as the particles of liquid *rise*, their gyrations will continually *widen*, so as to trace a conical, or more nearly a parabolical, figure ; and if the rotatory velocity is great, this path of the particles will be shown in the dimple or funnel-shaped depression which will form at the surface.

of several thousand feet, in a course of fifty miles, into the low, broad valley of the Hudson. Few persons are aware of the enormous speed which such a declivity would, of itself, impart to a deep and wide-spread stratum of water. The only currents we can actually observe are the confined and shallow ones of rivers, and of the tide in certain obstructed straits, and, in these, the velocity is kept down by the very trivial declivity of the channel, and by the disproportionate friction and resistance produced by the proximity of the shores and the bottom. Yet, notwithstanding this retardation, we may notice how rapidly the current of any river is accelerated when a freshet deepens its stream by only a few feet or fathoms. When the waters of the Ohio are swollen, they have a mean velocity of several miles an hour; yet the slope of its bed does not exceed eight or ten inches per mile. And the Gulf Stream, that stupendous river in the Atlantic, possesses, from the mere fact of its great depth and breadth, and its exemption from friction, a velocity of more than three miles an hour, although its actual descent is almost inappreciable. How terrific, then, must have been the speed of a continental inundation, unconfined by any shores, and deep enough to overtop the summits of our highest mountains, and moving, in some portions of its progress, down the long-inclined planes of the surface, with a slope even more than fifty times as great as that of the most impetuous rivers. In the case before us, the waters, hurrying thus along the Adirondack slope, would sweep, unresisted, across the wide valley of the Hudson, and rush, with incalculable violence, against the western crests of the Green Mountains and the Taconic chain. At a certain stage, early in the dispersion of the flood, the ice, which, until then, had rushed unchecked across the highest peaks and ridges, would, necessarily, subside to their level, and would, here and there, strike with a force which no imagination can conceive. Standing on the Canaan Mountain, it is easy to see, as we look north-westward, towards the lower plain of the Hudson, and discern no barrier, in all that quarter, that could break the fury of the inundation, that this sharp and narrow ridge stood exactly in the place to receive the brunt of the impinging ice; whose vast momentum would be derived, not merely from the force of the general current, but from the still more tremendous impulse of the great waves of translation, generated in the rocking crust, and launched, in successive surges, ahead of the current itself, full against the opposing barrier.

For the production of either of the boulder trains, we have only to conceive, then, that a large island or berg of ice, driven forward at the extremely rapid rate we have endeavored to picture, suddenly struck the top of the ridge a little below the actual crest. A broad, shallow, and ragged notch, or depression in the summit of the mountain, would be the inevitable consequence of the tremendous collision. That part of the solid strata which received the blow would be broken into huge angular fragments; but no sooner would the blocks thus dislodged be sent forward into the current, than they would be gathered in and prevented from dispersing by the immense vortex or whirlpool which would naturally form as the waters moved in their rapid course past the prodigious stationary block of ice thus made to impede their progress. The whirlpool would form just over the top of the mountain. It would possess an excessive gyratory force commensurate with the check received by the swiftly-moving current; and, in virtue of this, it would exert in a high degree that lifting or upward-floating power, which we have seen to belong so conspicuously to every vortex. Winding the broken blocks within its narrow, whirling column, and advancing in the direction and with the progressive speed of the general current in which it was rapidly spinning, it would float pendant from the surface of the water, indifferent, in a great measure, to the inequalities of the land beneath. Conforming to the onward course of the inundation, it would only deviate with the changes in the path of the general current itself; and, hanging from the surface to the bottom, it would rise and fall with every great undulation on the bosom of the flood. Wherever the apex of this slender, watery funnel touched the ground, the gyratory and sustaining velocity being checked, it would spill a portion of its ponderous burden, and thus strew in its march the long, narrow, and gigantic pathway of stones which we behold. So long as its apex dragged the bottom, this discharge would proceed, and there would be produced a continuous line of fragments; but whenever its level undulated, either from varying depth or vast swells at the surface, it would touch the bottom only intermittingly; and thus it would alternately strew and miss, precisely as the whirlwind of the tropics moves in bounds or long undulating skips, now uprooting the earth, and now moving high above the tops of the trees and houses. In this way we may explain the interruptions visible in especially the shorter and less regular of the trains.

Whenever the vortex passed either of the mountain barriers lying across its path we can see that its containing apex might have its velocity of gyration somewhat disturbed and retarded; and to this cause perhaps is attributable the increased abundance of the boulders on the south-eastern slope of the Richmond mountain.

In relation to the alternations in the course of the train where it climbs the Richmond Ridge, and again where it reaches the broad valley beyond, it is not difficult to perceive how the last or main elbow at least might be occasioned. We have only to reflect that the general current would naturally change to a somewhat more southerly direction, as it met, in this deep, wide and unobstructed valley, with other portions of the flood coming in more nearly from the north, rushing longitudinally along the mountain chain. The extreme violence with which the blocks would be occasionally hurled from the apex of the revolving column, against the ground and against each other, will sufficiently account for several of them being split, with their fragments still contiguous to each other, as if the force which impelled them was from above, and not that of the onward horizontal current.

While we believe that the vortices or gyratory currents here described, have been necessary and most potent agents in the dispersion of erratic blocks, particularly such as lie in long and narrow surface trains, we wish equally to advocate the efficiency of that other gigantic force of transport which water possesses when it moves in the manner of those enormous waves of translation, whose origin, functions and energy we have endeavored to exhibit to the reader. The boulders of New England give evidence of having been conveyed by both these agencies, the more angular and narrow trains by the lifting power of vortices ; the more worn, imbedded, and irregularly scattered blocks, by the propelling action of the general current and its mighty waves.

ART. XXIV.—DESCRIPTIONS OF THE FISHES OF LAKE ERIE, THE OHIO RIVER, AND THEIR TRIBUTARIES. By JARED P. KIRTLAND, M. D.

(Concluded from page 276.)

PIMELODUS. Cuv.

P. catus. Lin. Bull-head.

Cat-fish.		Catesby, Hist. Carol. vol. ii. p. 23, pl. XXIII.
Silurus catus.		Lin. Sys. Nat.
" "	*Common Freshwater Cat-fish.*	Mitchill, Trans. Lit. and Phil. Soc. N. Y. vol. i. p. 433.
Pimelodus nebulosus.		Lesueur, Mémoires du Muséum ,vol. v. p. 149.
" "	*Horned Pout.*	Storer's Rep. p. 102.
Le Pimélode chat.	*Pimelodus catus.*	Cuv. et Val. xv. p. 124.
Le Pimélode nebuleux.	*Pimelodus nebulosus.*	" " xv. p. 132.
Pimelodus catus.	*Common Cat-fish.*	Dekay's Rep. p. 182, pl. XXXVII. fig. 119.

Plate XXVI. Fig. 1.

Head flattened above and beneath, widest at its base, full behind the eyes. ***Jaws*** equal. ***Cirrhi*** eight, arranged, two on the upper jaw, four on the lower, and one at each angle of the mouth. These lateral cirrhi as long as the head. *Eyes* small. *Iris* dusky, with a narrow golden circle next the pupil.

Body gibbous before the dorsal fin, rounded and fleshy on the back, somewhat compressed laterally, especially behind the ventral fin. *Abdomen* full, and pendulous behind the pectoral fins. *Lateral line* curves above the tip of the operculum.

Dorsal fin commences behind the pectoral.

Adipose fin approximate nearly to the tail.

Caudal fin truncate.

Anal fin attains to the base of the caudal, with its tip extends beyond the adipose.

Ventral fins ovate and horizontal, extending at their extremities to the anal.

Pectoral fins serrated on the posterior edge of the spinous ray, situated beneath the extremity of the operculum.

Color. Head, back, and superior portions of the sides, fuliginous; coppery beneath the throat; whitish on the abdomen. Fins livid, and cirrhi dusky at their tips.

Length from six to twelve inches.

Habitat. Most of the ponds, lakes and still waters in the United States.

D. 1—6; C. 19; A. 21; V. 8; P. 1—7 rays.

Observations. I am indebted to my brother, George Kirtland, for the drawing of the species. It was taken from a specimen obtained in the Mahoning river. Griffith, the translator of Cuvier's Règne Animal, in speaking of fish, asserts that "the inhabitant of the waters knows no attachment, has no language, no affection; feelings of conjugality and paternity are not acknowledged by him." Had that author seen, as I have done, on several occasions, the old of this species of fish, leading about her brood of dusky fry with the most maternal care, and defending them, with the greatest vigilance and activity, against the approach of a frog, tortoise, or any voracious fish, he would have qualified his assertion.

A person desirous of witnessing this fact may have repeated opportunities, by placing himself in a convenient position, along the "old river bed," near Cleveland, in the month of June, when he may see the old of this species of fish, moving cautiously about with her brood, and watching them with as much care as a hen does her young flock in a farmer's yard.

P. cærulescens. Raf. Blue, Brown, or Silvery Catfish.

Pimelodus	*cærulescens.*	*Blue*	*Cat-fish.*	Rafinesque, Ichthyol. Ohiensis, p. 63.
"	"	"	"	Kirtland's Rep. pp. 169, 194.
"	*maculatus.*	*Spotted*	"	Raf. Ichth. Ohien. p. 62. (Young.)
"	*pallidus.*	*White*	"	" " " p. 63. (Middle aged.)
"	"	"	"	Kirtland's Rep. pp. 169, 194.
"	*argyrus.*	*Silvery*	"	Raf. Ichth. Ohien. p. 64. Variety from locality.

Plate XXVII. Fig. 1.

Plate XXIX. Fig. 1. (Young.)

Head flattened above the eyes, convex and full beneath the throat, more than one fifth of the total length. ***Eyes*** sub-oval, with the ***iris*** of a golden yellow. The two lateral ***barbels*** extend beyond the pectoral fins, their extremities black; with the advancement of age they become relatively shorter; of the inferior barbels, the two external are the longest. *Jaws* furnished with numerous clustered teeth. *Operculum* indistinct, margined with a membrane.

Body oval, broad; *back* slightly elevated, the dorsal fin on the summit; *abdomen* full.

Dorsal fin ovate, more elongated in the young.

Adipose fin broad, oblong-oval.

Caudal fin merely lunate in the old specimens, deeply and acutely forked in the young.

Anal fin wide and rounded in the old, acute posteriorly in the young.

Ventral fins sub-circular, attain with their tips to the base of the anal.

Pectoral fins oval, the spinous ray is serrated on the posterior edge, the serratures sometimes are obliterated by age.

Color. Back, head, and sides of the body, dusky or lead-colored; forehead dark brown; sides of the head yellowish; belly and throat white.

Length. The specimen from which I made the sketch was twenty-two inches long; the breadth, perhaps, was greater than usual for specimens of that size. It is frequently seen, in the Cincinnati market, four or five feet long, and weighing sixty to eighty pounds, and sometimes even one hundred and twenty pounds.

Hab. Lake Erie and the Ohio River.

D. 1—6; C. 20; A. 30; V. 8; P. 1—7 rays.

Observations. This species is becoming popular as an article of food. It bites readily at a baited hook, and is often taken upon "set lines," as well as in seines.

The young specimen represented was five and a half inches in length.

The young is, almost universally, considered as a distinct species by the fishermen, and was described, as such, by Rafinesque, under the name of *P. maculatus.* In the Cincinnati market, at this age, it is known under the name of "channel-cat." The body is of a faint lead-color, and beautifully maculated.

P. cupreus. Raf. Yellow Catfish.

Pimelodus cupreus.	*Yellow Cat-fish.*	Rafinesque, Ichth. Ohien. p. 65.
" "	" "	Kirtland's Report, pp. 169, 194; catalogued, not described.
" "	" "	Dekay's Report; catalogued, not described.

Plate XXIX. Fig. 2.

Head equal to one quarter of the total length, depressed and flattened above, gibbous behind the eyes, wider than the body. *Mouth* medium size; *jaws* furnished with numerous minute teeth; upper jaw projecting. *Eyes* circular, situated above and behind the angles of the mouth.

Body smooth, compressed laterally behind the ventrals.

Lateral line nearly straight.

Dorsal fin short and little elevated.

Adipose fin small and narrow, and does not reach as far behind as the termination of the base of the anal fin.

Caudal fin entire, truncate.

Anal fin rounded on its anterior angle, acute at its posterior termination.

Ventral fins sub-circular, short.

Pectoral fins short, serrated on the posterior and superior edge of the spinous ray, the serratures pointing obliquely upwards, inwards and backwards.

Length. I have seen them four feet long, weighing from seventy to eighty pounds; but they frequently grow much larger. Rafinesque says that they sometimes weigh two hundred pounds.

Color. The upper surface of the head and back is olivaceous; the sides and beneath, coppery-yellow; and the fins often orange or reddish.

Hab. Lake Erie, Ohio River, and their tributaries.

D. 1—7; C. $24\frac{4}{4}$; V. 1—7; P. 1—7; A. 24 rays. Rafinesque says the anal fin has only 15 rays; in my specimen, 24 can be distinctly seen.

Observations. This is the handsomest and most gracefully formed of any of the western cat-fish. The yellow copper-color seems to be a permanent character, in all localities, and under all circumstances. The general contour of the fish, as well as the color, will distinguish it from every other species. Its lateral barbs are usually short, and reach only half the length of the head.

It readily bites at a hook, and is also taken in seines. The young are valued as an article of food.

P. limosus. Raf. Mud-Cat.

Pimelodus limosus.	*Mud Cat-fish.*	Rafinesque, Ichth. Ohien. p. 66.
" *nebulosus.*	" "	" " " p. 64. (A variety from age.)
" "	" "	Kirtland's Report, pp. 169, 194 ; catalogued, not described.
" "	" "	Dekay's Report, p. 187 ; not described.

Plate XXIX. Fig. 3.

Head flat, compressed above and beneath, not as wide as the body, but exceeding its perpendicular diameter, one quarter of the total length. The extremity of the lateral *barb* attains to the pectoral fin ; the two middle of the four inferior barbs stand forward of the line of the two exterior ; the two superior are anterior and superior to the eyes. Lower *jaw* the longer, projecting. *Eyes* small, circular.

Body declivous and depressed before the dorsal fin, compressed laterally behind it ; *abdomen* protuberant laterally, flattish beneath.

Dorsal fin equal to the pectoral, the spinous ray invested with a membrane.

Caudal fin flat, truncate, entire.

Anal fin rounded, its tip extends near to the commencement of the dorsal and beyond the adipose.

Ventral fins situated in a sulcation formed by the sudden contraction of the abdomen.

Pectoral fins falcated, the posterior edge of the spinous ray serrated.

Color dusky, clouded with irregular muddy spots on the head and back, and lighter gray on the abdomen and throat.

Length eighteen inches.

Hab. Ohio River.

D. 1—7 ; C. 20 ; A. 15 ; V. 9 ; P. 1—10 rays.

Observations. The muddy clouded color, and the flattened and elongated form, distinguish it at once from every species, except one that is occasionally exposed for sale, in the Cincinnati market, under the name of "mud-cat," and which Rafinesque has described as the *P. nebulosus.* I, however, consider it as merely the old of the present species. It is much larger, and proportionately shorter and broader, than the one figured. I have never seen the young, unless our present species be considered as such.

The skins of both look as though they had recently recovered from some extensive eruptive disorder. They are not much esteemed for food; but, I believe, it is owing solely to their forbidding complexion.

Noturus. Raf.

N. flavus. Raf. Yellow Backtail.

Noturus flavus.	*Yellow Backtail.*	Rafinesque, Ichthyologia Ohiensis, p. 68.
" "	" "	Kirtland, Rep. on Zool. of Ohio, pp. 169, 195.
Pimelodus flavus.	*Young Cat-fish.*	Dekay's Rep. p. 187.

Plate XXVI. Fig. 2.

Head much flattened above and below, wide behind the eyes, more than one fifth the total length of the fish. *Eyes* circular, small, prominent; *pupil* black; *iris* yellow. *Nose* elongate, covering the tip of the lower jaw. Lateral *barbels* two, not as long as the head; superior barbels on a line between the eyes and nostrils, nearer the latter, extending beyond the tip of the snout; inferior barbels four, the two exterior more remote from the lower lip than the two interior, and double their length. *Teeth* numerous in both jaws. *Body* broad, and convex anterior to the ventral fins, back and belly flattened, compressed laterally from the ventrals to the base of the tail. *Lateral line* flexuous at its base.

Anterior *dorsal fin* low, the soft rays more elevated than the spinous ray; posterior dorsal soft, commences over the anal fin, and gradually expanding as it progresses backwards, is continuous with the caudal, which terminates a little behind the anal. The decurrent posterior dorsal involves in its course the rudiments of an immature adipose fin, which is not, however, discoverable in every specimen. *Tail* truncate.

Anal fin elongate and widened behind.

Ventral fins ovate, small and horizontal.

Pectoral fins short, rounded and horizontal.

Color. Back and head yellowish olive; sides yellow; nose, throat and abdomen, white; fins diaphanous, slightly dusky.

Length from four to twelve inches.

Hab. Mahoning River and Lake Erie.

A. D. 1—7; A. 17; V. 8; P. 1—7 rays.

Observations. The decurrent form of the adipose dorsal and caudal fins induced M. Rafinesque to separate it from the genus Pimelodus and constitute a new genus. The propriety of his course may, perhaps, be questioned, though I have followed it in preference to making a new synonyme.

This species is occasionally taken, in seines and with hooks, near Cleveland, and, during low stages of water, I have frequently discovered it, beneath flat stones and logs, on the ripples in the Mahoning River, where it is called the *young cat-fish* by the fisherman. In that stream, it is, invariably, of a delicate bronzy-yellow, and of a less size than in Lake Erie. It might, perhaps, with propriety, be considered a distinct species.

Perca. Lin.

P. flavescens. Mitchill. Yellow Perch.

Bodianus flavescens.	*Yellow Perch.*	Mitchill, Trans. Lit. and Phil. Soc. N. Y. i. p. 421.
Perca flavescens.		Cuv. et Val. ii. p. 46.
" "	*American Perch.*	Rich. Faun. Boreal. Amer. iii. p. 1. pl. LXXIV.
" "	*Common Perch of Ms.*	Storer's Rep. p. 5.
Bodianus flavescens.	*Yellow Perch.*	Kirtland's Rep. pp. 168, 190.
Perca flavescens.	*Amer. Yellow Perch.*	Dekay's Rep. p. 3, pl. I. fig. 1.
" "	" " "	Linsley's Cat. of Fishes of Conn.

Plate XXVII. Fig. 2.

Vide Storer's Report on the Fishes of Massachusetts, p. 5. Our specimen agrees, in every particular, with his description, except in the relative size of the two dorsal fins, which are correctly represented in the figure. The transverse bands were eight.

It is common in the waters of Lake Erie and its tributaries, but did not originally inhabit those of the Ohio. Since the constructing of our public works, it has found its way into the tributaries of that river.

Hyodon. Lesueur.

H. tergissus. Lesueur. Toothed Herring.

Hyodon tergissus.		Lesueur, Jour. Ac. Nat. Sc. i. p. 366.
" "	*Notched-fin Hyodon.*	" Rich. Faun. Boreal. Amer. iii. p. 235.
" "	*Moon-eyed Herring.*	Kirtland's Rep. p. 170.
" "	*River Moon-eye.*	Dekay's Rep. p. 265, pl. XLI. fig. 130.
Hyodon clodalus.		Lesueur, Jour. Ac. Nat. Sc. i. p. 367, pl. XIV.
" "	*Larger Herring.*	Kirtland's Rep. pp. 170, 195.
" "	*Lake Moon-eye.*	Dekay's Rep. p. 266, pl. LI. fig. 164.

Plate XXVIII. Fig. 1, 2.

a. male, *b.* female.

Head short, compressed laterally, one fifth of the total length. *Nose* short and rounded. *Eyes* large and circular; *iris* gilt. The *jaws* and *palate* furnished with numerous teeth; lower jaw shorter than the upper.

Body flat; the *back* nearly straight before the dorsal fin, from thence abruptly sloping to the base of the tail; *abdomen* of the male, straight or slightly incurved, of the female, rounded and more convex.

Dorsal fin quadrangular, elevated before, emarginate on its superior edge.

Caudal fin acutely bilobed ; lobes equal.

Anal fin of the male, rounded on the anterior angle, deeply emarginate in the middle ; of the female, acute on the anterior angle, with the edge falcated.

Ventral fins with a squamous appendage above their bases.

Pectoral fins arise beneath the operculum, falcate, and do not reach to the ventrals.

Color. The fins diaphanous and white ; the body and back bluish, silvery and iridescent ; head and operculum silvery and iridescent.

D. 14 ; C. 20 ; A. 31 or 32 ; V. 7 ; P. 13 rays.

Observations. This fish abounds both in Lake Erie and the Ohio River. It is not very highly valued for eating.

An inspection of the plate will convince any one that Lesueur made two species from a mere sexual variety. Fig. 1 is his *H. tergissus*, and fig. 2, *H. clodalus ;* the former is the male, the latter the female ; but it is due to him to say that he suggested that such might be the fact.

Rafinesque describes several other species, which I have not had an opportunity to obtain.

Esox. Lesueur.

E. estor. Lesueur. Muskallongé.

Esox estor.	*Pike, Pickerel, Maskallongé.*	Lesueur, Jour. Ac. Nat. Sc. i. p. 413.
" "		Griffith's Cuv. x. p. 390.
" "	*Maskinongé.*	Rich. Faun. Boreal. Amer. iii. p. 127.
" "	*Muskallongé.*	Kirtland's Report, pp. 169, 194.
" "	*Muskellunge.*	Dekay's Report, p. 222.

Plate XXVIII. Fig. 3.

Head gradually sloping from the base to the tip of the upper jaw, longitudinally depressed between the eyes, and transversely before them. *Nasal* openings twain, anterior oval and larger, posterior lunate, on a level with the upper edge of the pupil.

Lower *jaw* longer than the upper; *teeth,* on the anterior margin, numerous, inflected, and smaller than those on the sides.

Dorsal and *anal fins* sub-conical, former the larger.

Caudal fin bilobed; divisions acute.

Pectoral and *Ventral fins* small, falcate.

Color. Pupils black; irides golden. Upper surface of the head and back, greenish-slate, with the centre of each scale of a little lighter hue, throwing off a beautiful green and golden iridescence; sides of the head and gill covers, slate and silvery, blending. Sides of the body, with a golden and silvery groundwork, maculated with irregular, perpendicular rows of brownish oblong or round spots; fins yellowish, maculated in a similar manner, only more faintly; under surface of the body and head, white.

P. 16; V. 12; A. 20; D. 21; C. 20^{7}_{7}; B. 16.

Hab. Lake Erie.

Observations. Lesueur's description is indefinite and erroneous, and we can form no other conclusion, after much investigation of the matter, than that he must have had before him a specimen of the *E. reticulatus,* instead of the *E. estor,* while he was engaged in writing it. The two species, at first view, resemble each other so much, that their specific distinctions might be easily overlooked by one not familiar with them. These distinctions are, however, so permanent and invariable, that they are recognized by every experienced fisherman, as well as by men of science who have closely examined their characters.

Sex has been supposed, by some persons, to give origin to these differences; but we have repeatedly found them to be equally evident in both sexes of the two species.

The contour of the *E. estor* is more oval and graceful, that of *E. reticulatus* is more oblong. The lobes of the caudal fin are pointed and acute in the former, and rounded in the latter. The dorsal and anal fins of the one are subconical and acutish, and rounded and more obtuse in the other.

The coloring of the two affords a very evident distinction. The ground color, on the sides of the present species, is always light, a mixture of golden and silvery lustre, maculated with dark, oblong or roundish spots; while, on the other, the ground coloring consists of dark reticulations, relieved with irregular yellowish spots, not placed in rows. Our fishermen say that "the muskallonge is spotted with black, and the pike with yellow."

A comparison of the figures of the two will fully illustrate these specific distinctions. Others can be discovered in the form and size of the teeth, and bones of the head, particularly the jaws.

Lesueur's remarks, in regard to the emarginate scales, presenting the appearance of the letter V, are more applicable to the *E. reticulatus* than to this species. Is it not probable that he only knew the muskallonge by reputation, and that he made out his description from a pike, supposing it to be different from the species he had met with in the Atlantic States?

The muskallonge confines itself exclusively to the deep waters of the Lake, except for a few days in the spring, when it runs into the mouths of the rivers to spawn. The pike is common, at all seasons, in deep and still waters of the rivers and Lake.

Epicures consider it one of the best fishes of the west. Since the first settlements of the shores of Lake Erie, its numbers have very sensibly diminished, and it now is rather scarcer at its proper season. We saw one, taken near the Cleveland Harbor, in April last, that measured over five feet in length, and weighed more than sixty pounds. Specimens are occasionally affected with tænia, filiaria, and other parasitic worms.

Cottus. Linn.

C. gobio. Linn. River Bull-Head.

Cottus gobio.		Linnæi Syst. Nat. p. 452.
" *cognatus.*	*Bear-lake Bull-head.*	Rich. Faun. Boreal. Amer. iii. p. 40.
" *viscosus.*		Haldeman, Supplem. to an Account of a "Monograph of the Limniadæ," &c. p. 3.
Uranidea quiescens.	*Little Star-gazer.*	Dekay's Report, p. 61, pl. V. fig. 14.
Cottus cognatus; Cottus viscosus; Uranidea quiescens; Cottus gobio.		Ayres, Bost. Jour. Nat. Hist. v. p. 116, pl. II.

We have met with a few specimens of this species in the Mahoning, a tributary of the Ohio River, and have also received specimens, from the upper lakes, through the politeness of Elisha Staling, Jr., of Cleveland. As it is figured and described, by Mr. Ayres, in Vol. V. of this Journal, it is only necessary to allude to it as *one* of *The Fishes of Lake Erie and the Ohio River, and their Tributaries.*

The series of descriptions of the Fishes of the Ohio and its Tributaries being now brought to a close, the following synopsis of the families, genera and species is appended. Besides answering as a catalogue of these fishes, so far as at present known, it will serve as an index to the volume and page of the Journal, where the description of each may be found; thus abridging the labors of the student who might otherwise be obliged to extend his search through eleven different numbers of the Journal.

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" biguttàtus, . . .	"	344.	V.	1.
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" plagyrus, . .	V.	26.	VIII.	2.
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" commùnis, . .	V.	265.	XIX.	1.
" bùbalus, . .	"	266.	"	2.
" elongàtus, . .	"	267.	"	3.
" Duquésnii, . .	"	268.	XX.	1.
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Exoglóssum dùbium, . . .	V.	272.	XXI.	1.
Hydràrgira limi, . . .	III.	277.	II.	4.

ESOCIDÆ.				
Esox reticulàtus,	IV.	233.	X.	2.
" estor,	V.	339.	XXVIII.	3.
SALMONIDÆ.				
Salmo fontinàlis,	IV.	305.	XIV.	2.
" namycush,	"	25.	III.	2.
Corégonus albus,	III.	477.	XXVIII.	3.
" Artedi,	IV.	231.	IX.	1.
CLUPEIDÆ.				
[1] Pomólobus chrysochlòris,	IV.	307.	XV.	3.
Amia calva,	III.	479.	XXIX.	1.
Chatöéssus ellípticus,	IV.	235.	X.	1.
Hyodon tergissus,	V.	338.	XXVIII.	1, 2.
SAURIDÆ.				
Lepisósteus oxyúrus,	IV.	16.	I.	1.
" ferox,	"	18.	"	2.
" platóstomus,	"	20.	"	3.
GADIDÆ.				
Lota maculòsa,	IV.	24.	III.	1.
ANGUILLIDÆ.				
Anguílla lùtea,	IV.	234.	XI.	2.
PETROMYZONIDÆ.				
Petromyzon argénteus,	III.	342.	IV.	3.
Ammocœtes cóncolor,	"	473.	XXVII.	1.
STURIONIDÆ.				
Acipénser rubicúndus,	IV.	303.	XIV.	1.
" platorynchus,	V.	25.	VIII.	1.
Polyodon fòlium,	IV.	21.	II.	1.
Platiróstra edéntula,	V.	22.	VII.	2.

Art. XXV.—ANATOMICAL DESCRIPTION OF THE ANIMAL OF LITTORINA ANGULIFERA, LAM. By Joseph Leidy, M. D. Communicated July 16, 1845.

After removing the shell of the animal, two parts are observable: Plate XX. fig. 1,—one (1), corresponding to the shell

[1] In revising the descriptions of the western fishes for the pages of the Journal, I placed this species under the genus *Alosa*. I had, however, never seen a recent specimen, and being therefore not quite satisfied of my correctness, I have preferred to follow Rafinesque's arrangement in my Synopsis. D. H. S.

by its turbinated form, composed of a mass of viscera contained in a sac and the branchial cavity; the other (2), placed below the former, the foot, surmounted, in front, by the head.

Upon examining the animal more closely, we find, protruding from the head, two non-retractile tentacula (3), at the outer part of the base of each of which, placed upon a small prominence, is the eye (4). Between the tentacula, the head is elongated into a sort of rostrum (5), at the extremity of which is the mouth. On the right side of the head, in the male, projects a body (6), terminated by a disk or sucker (7), probably useful in retaining a hold of the female during procreation; from its posterior face protrudes the penis (8), which is capable of elongation. During repose, the penis is bent back against the side of the visceral sac, within the branchial cavity.

The foot itself (9) has the same general appearance and composition as in all Gasteropoda. It is excavated, above, for the reception of several viscera; has a large retractor muscle (10), which originates from the columella of the shell, inserted into it; and has, placed upon its upper part behind, an operculum (11).

Upon the lower whorl of the turbinated mass of the animal, on the outside of the visceral mass, and extending as far back as the second whorl, is placed the branchial cavity. Its entrance, situated just above the head, is a large opening, extending from side to side, and corresponds with the orifice of the shell of the animal, when the foot and head are extended. The branchia (12) is stretched into a membranous expanse forming the outer wall of the cavity; its anterior, thickened edge is the collar (13); and it is laterally attached to the outside of the junction formed by the visceral sac with the margin of the excavation of the foot. A distinct branchia does not project from one side of the branchial chamber, as is usual in other pectinibranchiate gasteropods, but the outer wall of the cavity has a branchial arrangement on its internal surface, or the branchia forms the outer wall. It appears to be intermediate to the lung of the pulmonated gasteropods and the distinct branchia of the order to which the animal under description properly belongs. From the branchia, on the left side, courses the branchial vein (14) to the heart, situated at the posterior part of the cavity. The heart (15) is systemic, composed of an auricle and ventricle, and is enclosed within a pericardium. From it pass off two aortic branches; one of which (16) is seen, in the figure, in its course to the head; the other goes to the liver.

On the right of the heart, and separated from the respiratory chamber by a membrane, is the renal organ (17); its duct passes along the outside of the rectum.

The visceral sac (18) is musculo-membranous, and has its origin from the lateral edges of the retractor muscle of the foot and the margin of the excavation of the foot. It extends to the very point of the turbinated mass of the animal, and encloses the greater part of the digestive and generative apparatus.

The mouth opens into the cavity of a muscular organ, the buccal mass (19); this contains a cartilaginous body, considered as the tongue, upon the surface of which is placed part of a lamina having a very complex arrangement of hooklets upon it. This lamina is about one and a half inches in length; it protrudes from the buccal mass behind, and forms a coil (20), which is terminated by a small glandular body. A portion of this lamina, highly magnified, is represented in fig. 2.

From the upper part of the buccal mass proceeds a short œsophagus to the stomach. The stomach (21) passes upwards, forms a duodenal pouch (22) for the reception of the hepatic duct from the liver, and terminates in the small intestine (23), which, after a turn in the liver, joins the rectum, upon the right side of the animal. The rectum (24) courses along the right side of the pulmonary cavity, and terminates by a contracted, unattached and projecting extremity (25), immediately beneath the collar, on the right side of the animal.

The salivary glands (26) are small, situated on each side of the œsophagus; they empty, by two ducts, into the cavity of the buccal mass.

The liver (27), conjoined with the testicle (28), in the male, or the ovary of the female, forms the superior portion of the turbinated mass of the animal. From the testicle, in the male, proceeds the vas deferens (29), on the outside of the rectum, to join the penis. In the female, from the ovary, proceeds the oviduct, having nearly the same appearance and the course of the vas deferens of the male; it terminates by a projecting extremity, just on the outside of the projecting extremity of the rectum. The nervous centres consist of the supraœsophageal ganglia (30), the stomatogastric ganglia, a small ganglion on each side of the œsophagus, and the subœsophageal ganglia, all connected by the appropriate commissures, and giving off nerves. To the subœsophageal mass, composed of two apparent ganglia, is attached the auditory apparatus, which consists of two vesicles, each containing two large otoconites. The otoconites are translucent, and composed of concentric lamellæ; this is evident from their appearance under the microscope, after having been submitted to pressure, as represented in fig. 3.

REFERENCE TO THE FIGURES.

Fig. 1. 1. The part which forms the turbinated mass of the animal; 2. The part which is composed of the head and foot; 3. Tentacula; 4. The eye; 5. The rostrum; 6. An organ having a sucker (7) at its extremity; 8. The penis; 9. The foot; 10. Retractor muscle of the foot; 11. The operculum; 12. The branchia; 13. The collar; 14. Branchial vein; 15. Heart; 16. Aortic branch to the head; 17. The renal organ; 17*. Its duct; 18. The visceral sac, laid open; 19. The buccal mass; 20. The coiled palatal lamina; 21. Stomach; 22. Duodenal pouch; 23. Small intestine; 24. Rectum; 25. Extremity of the rectum; 26. Salivary glands; 27, 28. The liver and testicle conjoined; 29. The vas deferens; 29*. Cut extremity of the vas deferens (its connection to the penis is destroyed); 30. Supraœsophageal ganglia.

Fig. 2 represents a portion of the uncinated palatal surface, highly magnified.

Fig. 3 represents the organ of hearing, highly magnified.

Art. XXVI.—NOTICE OF A NEW GENUS OF PLANTS OF THE ORDER SANTALACEÆ. By Asa Gray. Read before the Boston Society of Natural History, March 18, 1846.

The incomplete characters of the plant which is the subject of the present communication are now published mainly in the hope, that by directing the attention of local botanists towards it, the information which is still needed may be the sooner obtained.

My earliest knowledge of the plant in question was derived from some specimens in the herbarium of the late Zaccheus Collins, Esq., now belonging to that zealous botanist, Mr. Elias Durand. The specimens were ticketed "Milledgeville, Georgia; from Dr. Boykin." If they were communicated to Mr. Collins himself, as appears to have been the case, Dr. Boykin was, so far as I can learn, the discoverer of the plant; though, perhaps, not aware of its interest; since it has not again occurred in the collections of the plants of Georgia, which he has so liberally distributed among northern botanists. It was in the spring of the year 1842 that these specimens fell under my observation, through the favor of Mr. Durand, who obligingly furnished me with a portion of them. They are leafy branches of a shrub, with staminate flowers only.

My next information was received from my friend and correspondent, the Rev. M. A. Curtis, of North Carolina, who, in the summer of 1839, near Lincolnton in that State, noticed a shrub quite new to him, but destitute of any vestiges either of flowers or fruit. Having seen a leafy specimen, I have no doubt of its identity with the plant above mentioned. Mr. Curtis revisited the locality last summer, for the special purpose of ascertaining what this unknown shrub could be. He was disappointed, however, being unable to find a single plant of the kind over the whole ground, where it was quite abundant six years ago.

It was with great pleasure that I met with a specimen of this plant, for the third time, in February last, in a small but interesting collection made around Macon, Georgia, by Professor J. Darby, the author of a good elementary treatise on "Southern Botany," and the former principal of a seminary of high character at that place, but who has recently accepted the mathematical chair in Williams College, Massachusetts. The unticketed specimen is finely in blossom, but, much to my disappointment, the flowers all proved to be staminate. Still the materials in my possession, imperfect as they are, suffice to show that the shrub in question belongs to the small and highly interesting order of *Santalaceæ,* and that it is nearly allied to the genus *Comandra* of Nuttall. With my present information, I know of no other genus with which it may be immediately compared.

In inflorescence it agrees with Comandra, except that the peduncles are axillary, and the short pedicels strictly umbellate. The calyx, disk, and stamens are quite similar, and, above all, the anthers are connected with the lobes of the perigonium by the same singular tufts of cobwebby hairs. The observed points of difference are, first, that this new plant is apparently diœcious. The staminate flowers do not exhibit the slightest trace of a gynæcium. The turbinate calyx-tube is accordingly hollow to the very base, and is lined with the thin disk throughout. In the second place, the present plant is a shrub, attaining the height of several feet, if I correctly remember Mr. Curtis's verbal account, and presenting somewhat the aspect of a Viburnum; while the two species of Comandra are low herbs, with at most a suffrutescent base. And thirdly, what is of more importance, the leaves, which are alternate in Comandra, are uniformly opposite in our plant. They may perhaps be compared with those of *Nemopanthes,* Raf. (Ilex Canadensis, *Michx.*), except that they are mostly acute at both ends.

On applying to Professor Darby for further information, I learn that this shrub has been to him an object of special interest for the last ten years, although he has never found it except upon one spot, only a few rods square, where it is abundant, forming bushy shrubs, two or three feet in height.

The pistillate flowers appear to be very scarce. In August, 1841, however, Mr. Darby obtained the unripe fruit, which, he remarks, is "baccate, one-celled, one-seeded, apparently inferior, but there is no cohesion of the ovary with the calyx; style one." Mr. Darby had regarded the plant as probably a new genus, but, on account of its free calyx (and having also apparently overlooked the tuft of hairs, &c. in the staminate flowers, which indicate its close relationship to Comandra) he had referred it to the wrong natural order. Indeed, if the calyx-tube does not cohere with the ovary, an unexpected anomaly in the character of the order Santalaceæ is here presented. We are at present unable to verify this point; Mr. Darby's fruiting specimens having recently been lost by shipwreck, along with many other invaluable specimens and notes, on their way from Georgia.[1]

In directing the attention of the botanists of Upper Carolina and Georgia to this interesting shrub, I would specially request that the pistillate flowers and young fruits may be preserved in spirits, in order not only that the peculiarity already alluded to may be satisfactorily determined; but more particularly, that the structure of the ovula and the fecundation, so peculiar in this natural family, may be duly studied. For the same reason, specimens of the pistillate flowers of *Pyrularia*, Michx. (the *Hamiltonia* of Muhlenberg,) and also of *Buckleya* of Torrey, preserved in spirits, are especially desired by the writer.

As I have no doubt that this shrub adds another to our few genera of this interesting order, I am desirous that it should bear the name, and commemorate the botanical services and zeal, of Professor Darby, one of its discoverers, to whom a large part of our still incomplete knowledge of the plant is mainly

[1] In answer to a particular inquiry, Mr. Darby informs me, by letter, that his memory is not positive as to the want of cohesion between the calyx and the ovary, and that some notes, made with the plant before him, were unfortunately lost with the specimens. He remarks, also, that the mature fruit was not soft and pulpy, as he supposed from the earlier stage that it would prove to be. It is, therefore, probably similar in texture to that of Pyrularia or Buckleya, or perhaps even dry, like that of Comandra.

owing. I append, therefore, its technical characters, as at present known.

DARBYA, *gen. nov. ord. Santalacearum.*

Flores dioici. *Masc.* Perigonium simplex turbinatum, ad medium 4–5-dum; lobis ovatis patentibus. Discus crassiusculus, perigonii penitus tubo adnatus, margine 4–5-crenatus. Stamina 4–5, e sinubus disci, lobis perigonii opposita: filamenta brevia, subulata: antheræ biloculares; loculis fasciculo filarum araneosarum ad basin lobi perigonii annexis. *Fœm.* ignota. Fructus . . . ; stylo unico superatus, unilocularis, monospermus. Frutex in Georgia et Carolina superiori vigens, glaber, cortice griseo. Folia opposita, uncialia, membranacea, ovalia, margine integerrima, subundulata, breviter petiolata, venosa, subtus pallidiora. Pedunculi axillares, solitarii, folio breviores, ebracteolati, umbellam 3–8-floram gerentes; floribus parvis virescentibus, intus flavidis.

Darbya umbellulata. — *Hab.* near Milledgeville, Georgia, *Dr. Boykin,* and at Macon, *Professor Darby:* also at Lincolnton, North Carolina, *Rev. M. A. Curtis.*

I intended here to record some observations made last season, upon the ovula and fecundation of Comandra, which, although exhibiting the same general plan as in Thesium, according to the investigations of Decaisne, appear to differ considerably in some particulars. But as the season approaches when I may be able to repeat and extend my observations, these remarks are for the present deferred.

Art. XXVII.—DESCRIPTIONS AND FIGURES OF THE ARANEIDES OF THE UNITED STATES. By Nicholas Marcellus Hentz, Tuscaloosa, Alabama.

(Continued from vol. V. page 202.)

8. ATTUS FALCARIUS.

Plate XXI. Fig. 1.

Description. Cephalothorax and abdomen covered with yellowish gray hairs, hairs longer in front of the abdomen; feet, $\overbrace{1.\ 4.}$, very stout, $\overbrace{2.\ 3.}$

Observations. Very distinct from any other by the form of its abdomen.

Habitat. Alabama.

9. ATTUS BINUS.

Plate XXI. Fig. 2.

Description. Blackish; abdomen pale bluish gray; with two parallel, longitudinal, blackish lines above; feet, $\overbrace{1.\ 4.}\ \overbrace{3.\ 2.}$

Observations. I never found but one specimen of this very distinct species. Its abdomen was very much distended, and it moved very slowly.

Habitat. Found on Sullivan's Island, South Carolina.

Tribe II. Luctatoriæ; *fourth pair of legs longest, the first next and largest.*

10. ATTUS NUTTALLII.

Plate XXI. Fig. 3.

Description. Piceous; abdomen pale gray above, with an oblong scolloped, black, longitudinal band surrounding a small white spot; feet, $\overbrace{4.\ 1.}\ \overbrace{2.\ 3.}$

Observations. This probably very rare species was found in the hot-house of the botanic garden at Cambridge, in the presence of the distinguished botanist and ornithologist Thomas Nuttall.

Habitat. Massachusetts.

11. ATTUS CASTANEUS.

Plate XXI. Fig. 4.

Description. Black or piceous, with some long black hairs, and short, thick, yellowish down, particularly distinct on the abdomen, which has a whitish line at base, continued on the sides to near the middle; sides of the abdomen, with oblique lines, whitish; venter with four white lines, all the lines being formed by whitish hairs; dorsum with four or six obsolete dots; feet rufous, with blackish rings, 4. 1. $\widehat{2.\ 3.}$, the fourth longest and slender, the first next, very stout.

Observations. This spider is perfectly distinct from any other yet observed. It must be rare, having occurred only once, under a stone, in March.

Habitat. North Carolina.

12. ATTUS TÆNIOLA.

Plate XXI. Fig. 5.

Description. Black; cephalothorax with a white fillet on each side, continued to near the base; abdomen with two longitudinal, narrow lines, composed of white dots or abbreviated lines; tarsi dark rufous or blackish. 4. 1. 2. 3.

Observations. This is not a rare species, and shows only a moderate degree of activity.

Habitat. North Carolina, Alabama.

13. ATTUS ELEGANS.

Plate XXI. Fig. 6.

Description. Pale rufous; cephalothorax with eyes nearer the apex than the base, second joint of palpi piceous; abdomen metallic green with yellow and red reflections, a white band, widest in front and continued on the sides, but not reaching the eyes; feet, $\overbrace{4.\ 1.}\ \overbrace{3.\ 2.}$, with a slender black edge externally, thighs of first pair black, knee pale.

Observations. This graceful species is readily distinguished from any other, and is not very rare.

Habitat. Southern States.

Tribe III. Insidiosæ; ***legs equal in thickness, the fourth longest, then the fifth.***

14. ATTUS FAMILIARIS.

Plate XXI. Fig. 7.

Description. Pale gray, hairy; abdomen blackish, with a grayish, angular band, edged with whitish; feet, $\overbrace{4.\ 1.}\ \overbrace{2.\ 3.}$

Observations. This very common spider, almost domesticated in our houses, by its habits, deserves a longer notice than others. It dwells in cracks around sashes, doors, between clapboards, &c., and may be seen on the sunny side of the house, and in the hottest places, wandering in search of prey. It moves with agility and ease, but usually with a certain leaping gait. The moment, however, it has discovered a fly, all its motions are altered; its cephalothorax, if the fly moves, turns to it, with the firm glance of an animal which can turn its head; it follows all the motions of its prey with the watchfulness of the falcon, hurrying its steps or slackening its pace, as the case may require. Gradually, as it draws near to the unsuspecting victim, its motions become more composed, until, when very near, its movements are entirely imperceptible to the closest observation, and, indeed, it would appear perfectly motionless, were it not for the fact that it gradually draws nearer to the insect. When sufficiently near, it very suddenly takes a leap, very seldom missing its aim. I saw one, however, make a mistake, for the object which it watched was only a portion of the wing of an hemipterous insect entangled in a loose web. It took its leap and grasped the wing, but relinquished it immediately, apparently very much ashamed of having made such a blunder. This proves that the sight of spiders, though acute, is not unerring. Before leaping, this Attus always fixes a thread on the point from which it departs; by this it is suspended in the air, if it miss its aim, and it is secure against falling far from its hunting grounds.

These spiders, and probably all other species, a day or two before they change their skin, make a tube of white silk, open at both ends; there they remain motionless till the moulting time arrives, and, even some days after, are seen there still, probably remaining in a secure place, for the purpose of regaining strength and activity.

Habitat. Throughout the United States.

15. ATTUS TRIPUNCTATUS.

Plate XXI. Fig. 8.

Description. Black; abdomen, with metallic reflections and white and orange-colored hairs, with a central spot and two short bands white, which are surrounded with deep black; cheliceres brassy green; feet, $\overbrace{4.\ 1.}\ \overbrace{3.\ 2.}$

Observations. This is perhaps the most common Attus in the United States. It is usually found on dead trees, under the bark of which it takes refuge, and also hibernates there, in tubes of strong white silk. The spots are often of an orange color, instead of being white.

Habitat. The United States.

16. ATTUS MYSTACEUS.

Plate XXI. Fig. 9.

Description. Gray; varied with whitish spots; cephalothorax with four tufts of bristles in the region of the eyes; feet, 4. 1. 2. 3.

Observations. This large and very distinct species is not rare on the eastern side of the Alleghany mountains, as far north as the 35° of latitude; but it has not been found by me in Alabama.

Habitat. North Carolina.

17. ATTUS OTIOSUS.

Plate XXI. Fig. 10.

Description. Blackish, mostly covered with white hairs; cephalothorax black at base and anteriorly, two tufts of hairs each side on the region of the eyes; abdomen with a band at base, and several angular spots, white, and with a longitudinal green band more or less covered with hairs and edged with a scolloped black line each side, beneath white with a black band very wide at base and tapering towards the apex where it branches out; feet varied with rufous and black, 1. 4. 2. 3., the fourth slightly longest when separated from the body. A large species.

Observations. This spider, related to A. *mystaceus*, was found in mid-winter, enclosed in silk tubes, under the bark of dead trees, where great numbers were hibernating.

Habitat. North Alabama.

18. ATTUS FASCIOLATUS.

Plate XXI. Fig. 11.

Description. Black; cephalothorax with three grayish spots; abdomen with three small spots, two abbreviated lateral lines, and an anterior one white; feet varied with rufous, 4. 1. 2. 3.

Observations. This spider seems to be quite distinct from A. *tri-punctatus*, but may prove only a variety of that species.

Habitat. South Carolina, Massachusetts.

19. ATTUS RUFUS.

Plate XXI. Fig. 12.

Description. Rufous; abdomen with a yellowish white band anteriorly which extends to the sides, on the disk four white dots, and four smaller grayish ones, the dots surrounded by black rings which usually unite in the form of a longitudinal band on each side, beneath pale, with three subobsolete longitudinal lines; feet, $\overbrace{4.\ 1.}\ \overbrace{2.\ 3.}$ or $\overbrace{3.\ 2.}$, in the male 1. 4. 2. 3.

Observations. This spider, which is not very common, is found on plants, and is not remarkably active. In the male, the abdomen is white around and between the bands.

Habitat. United States.

20. ATTUS PODAGROSUS.

Plate XXI. Fig. 13.

Description. Cephalothorax piceous black; abdomen pale brownish, white at base, with a scolloped dusky band; feet bright rufous, joints tipped with black, with some hairs, $\overbrace{4.\ 1.}\ \overbrace{2.\ 3.}$ A large species.

Observations. This may be readily distinguished from A. *rupicola*, to which it is closely related.

Habitat. Alabama. November.

21. ATTUS RUPICOLA.

Plate XXI. Fig. 14.

Description. Rufous, very hairy; abdomen brownish, with a paler band and two blackish dots; feet varied with blackish, in the female $\overbrace{4.\ 1.}$ 2. 3., in the male 1. $\overbrace{4.\ 2.}$ 3. A large species.

Observations. The male, which resembles the female, has invariably its first pair of legs longest and stoutest. This species was repeatedly found in cavities of limestone rocks on the margin of a river, moving cautiously and slowly on the surface of the stones, and retreating into crevices.

Habitat. Alabama. September.

22. ATTUS NUBILUS.

Plate XXI. Fig. 15.

Description. Pale gray; cephalothorax with a tinge of rufous at base, and many obscure markings; abdomen with obscure, waved bands; feet with blackish rings, $\overbrace{4.\ 1.}\ \overbrace{2.\ 3.}$ A somewhat small species.

Observations. This spider is common, usually found on the stems of plants.

Habitat. Alabama. May — July.

23. ATTUS HEBES.

Plate XXI. Fig. 16.

Description. Brownish; abdomen white, with a greenish spot surrounded with four black dots, near the base, and a black fascia near the apex; feet, 4. 1. 3. 2.

Observations. This probably rare species was found on the ground, having fallen from a tree.

Habitat. Massachusetts.

24. ATTUS PARVUS.

Plate XXI. Fig. 17.

Description. Grayish; abdomen with six or eight abbreviated transverse lines, white; feet varied with rufous and black, 4. 1. 2. 3.

Observations. A somewhat obscure species, which I believe I have seen in the North.

Habitat. North Carolina, Massachusetts?

25. ATTUS RARUS.

Plate XXI. Fig. 18.

Description. Blackish; cephalothorax with green scales, and some yellow ones anteriorly; abdomen with green scales, except on a black band which surrounds the disk, a yellow band at base, extending each side, but which does not reach the middle, one large yellow dot each side near the middle, two little dots on the disk, and four terminal abbreviated bands white; beneath blackish, abdomen with some yellowish hair which form two or four sub-obsolete, abbreviated, longitudinal lines; feet, $\overbrace{4.\ 1.}\ \overbrace{2.\ 3.}$

Observations. This very distinctly-marked species is probably very rare, as it occurred only once.

Habitat. North Carolina. June.

26. ATTUS NIGER.

Plate XXI. Fig. 19.

Description. Deep black; legs pale testaceous, $4.\ 1.\ \overbrace{3.\ 2.}$

Observations. This small species is remarkable on account of its activity in running and leaping.

Habitat. North Carolina.

27. ATTUS? GRACILIS.

Plate XXI. Fig. 20.

Description. Rufous; cephalothorax very prominent anteriorly, wider behind the middle; abdomen narrower, slender, fusiform, nipples long; feet long and slender, $\overbrace{4.\ 1.}\ \overbrace{3.\ 2.}$

Observations. This cannot be Synemosyna *scorpionia*; but may ultimately be referred to that division.

Habitat. Alabama. August.

Tribe IV. Metatoriæ; ***legs sub-equal in thickness, the fourth longest, then the third.***

28. ATTUS LEOPARDUS.

Plate XXI. Fig. 21.

Description. Cephalothorax black, rufous about the eyes, with a curved white line each side; abdomen with two opposed lenticular black bands surrounded with white, pale gray underneath, with two sub-obsolete longitudinal, whitish lines; feet rufous with many black rings, 4. 3. 2. 1.

Observations. This spider is common. The female is often found under stones with its cocoon, which is white.

Habitat. Alabama. May.

29. ATTUS PUERPERUS.

Plate XXI. Fig. 22.

Description. Testaceous or yellowish; intermediate small eyes, and the two last, borne on elevations; abdomen with about twelve black dots, underneath with a black spot near the apex; feet, 4. 3. or 3. 4. 1. 2.

Observations. Mr. Thomas R. Dutton, who brought this from Georgia, gave me another one, which was not, like this, replete with eggs. The abdomen not being distended, the dots appeared less regular and distinct.

Habitat. Georgia.

30. ATTUS VITTATUS.

Plate XXI. Fig. 23.

Description. Cephalothorax and trophi rufous varied with blackish; abdomen gray, with reddish curved bands; feet pale rufous or yellowish, 4. 3. 1. 2., in the male 4. 1. 2. 3. and speckled with black dots.

Observations. With some hesitation, I refer to the same species the drawings of a male, and that of a female, which I had considered as distinct, on account of the difference in the respective length of the legs. In the genus ATTUS that character is sometimes a sexual distinction.

Habitat. North Carolina, Alabama.

Tribe V. Saltatoriæ; *third pair of legs longest, then commonly the fourth.*

31. ATTUS CORONATUS.

Plate XXII. Fig. 1.

Description. Pale dusky; cephalothorax varied with black, a scarlet spot between the eyes and the cheliceres; abdomen with two curved bands and about three spots, white; pale beneath without distinct spots; legs, with first pair stoutest, black on the internal side, 3. $\overbrace{4.\ 1.}$ 2.

Observations. The bright scarlet spot on its front gives to this spider a whimsical air of fierceness, which is heightened by its attitudes and singular motions. The lighter spots on the cephalothorax are produced by yellowish hairs. It is not very rare. It is probably quite distinct from A. *cœcatus.*

Habitat. Alabama. May — July.

32. ATTUS CŒCATUS.

Plate XXII. Fig. 2.

Description. Brownish obscure; cephalothorax with a red spot under the eyes, and with a basal spot and large fascia black; abdomen varied with black and brownish obscure, pale bronzed beneath; feet, first pair stoutest, black with a line of yellowish scales above, antepenult joint with two long, black scales or spatulæ, thighs with thick tufts of black hairs, the other legs varied with black and brownish, 3. $\overbrace{4.\ 1.}$ 2. A small species.

Observations. This species, though very different in marking, is very closely related to A. *coronatus.*

Habitat. Alabama. September.

33. ATTUS PULEX.

Plate XXII. Fig. 3.

Description. Pale brownish; cephalothorax large, varied with piceous, edged widely with blackish towards the base; abdomen nearly orbicular, piceous, varied with whitish spots, and a band at base; feet varied with piceous, $3.\ 4.\ \overbrace{1.\ 2.}$ A small species. Male like the female.

Observations. This little spider is common near the ground, where it may be seen moving with sudden, rapid motions, and jumping, like a flea, to great distances. It is a well-characterized species.

Habitat. Alabama. April — May.

34. ATTUS ROSEUS.

Plate XXII. Fig. 4.

Description. Cephalothorax white, blackish at base; abdomen roseate, with a whitish base; feet pale yellow, $3.\ \overbrace{4.\ 1.}\ 2.$

Observations. This small species is not unfrequently found on grass, in May and June. *Habitat.* Massachusetts.

35. ATTUS VIRIDIPES.

Plate XXII. Fig. 5.

Description. Cephalothorax rufous, with black bands and spots; abdomen white, with two black angular bands; anterior feet greenish, the other feet varied with rufous, blackish and white, 3. 1. 4. 2.

Observations. This small spider is usually found on the ground, on sand or on grass, in constant activity. When any object approaches it, it lifts itself on its posterior limbs to reconnoitre the enemy or the prey. It never was seen large.

Habitat. South Carolina.

36. ATTUS AURATUS.

Plate XXII. Fig. 6.

Description. Black; palpi, sides of the cephalothorax, and four spots above, silvery white; abdomen with a cross and circular band, golden color; feet varied with rufous, $\overbrace{3.\ 4.}\ 1.\ 2.$

Observations. This beautiful species seems to fear the light; for I never found it except when inclosed in the old shells of the pupæ of some hymenopterous insect. It is rare.

Habitat. South Carolina.

37. ATTUS MULTIVAGUS.

Plate XXII. Fig. 7.

Description. Piceous; palpi pale; abdomen gray, with curved bands, dots and a spot white, pale underneath with a longitudinal darkish line and a pale one each side, all sub-obsolete; feet, 3. 4. 1. 2. A middle-size species.

Observations. This species in markings resembles *A. fasciolatus,* but is quite distinct from it.

Habitat. Alabama. April.

38. ATTUS CRISTATUS.

Plate XXII. Fig. 8.

Description. Pale brownish; cephalothorax with small dusky marks, palpi very small; abdomen with curved dusky lines, and a tuft of white hairs at base, pale underneath, with two sub-obsolete, approximate longitudinal paler lines; feet pale, 3. $\overbrace{4.\ 1.}$ 2.

Observations. The tuft of white hairs on the base of the abdomen, and projecting over the cephalothorax, is not peculiar to this species alone, but by other characters it is sufficiently distinguished.

Habitat. Alabama. July — August.

Tribe VI. AMBULATORIÆ; *legs usually slender, the first pair longest, the fourth next.*

39. ATTUS MITRATUS.

Plate XXII. Fig. 9.

Description. Pale above and beneath; cephalothorax with a broad pale brownish band; abdomen with a pale brownish band, interrupted with yellowish in about three places; feet, 1. 4. 2. 3. A small species.

Observations. This is not a rare species. It is usually found on plants, moving slowly on the stems.

Habitat. Alabama. April—May.

40. ATTUS SYLVANUS.

Plate XXII. Fig. 10.

Description. Piceous; cephalothorax reddish anteriorly, with a yellowish spot on the disk, and four oblique slender lines of the same color; abdomen with two parallel longitudinal yellowish lines; thighs rufous at base, except the first pair; feet, 1. 3. 2. 4.

Observations. This graceful species is found commonly on the trunks of trees, moving rather slowly, and walking backwards when threatened by an enemy. It moves its anterior feet like palpi, as if to feel its way in its progression.

Habitat. South Carolina.

41. ATTUS SUPERCILIOSUS.

Plate XXII. Fig. 11.

Description. Cephalothorax black between the eyes, deep ferruginous at base, covered anteriorly with golden or greenish scales, a tuft of hairs between the eyes; abdomen black, with the same kind of scales, the absence of which forms obsolete blackish lines on the disk, beneath with such scales also; pectus and thighs glabrous, ferruginous; feet with a black fillet externally, antepenult joint of first pair with a tuft of black hairs, 1. 4. 2. 3.

Observations. This singular species can be readily distinguished by the tuft of hairs placed above the lower row of eyes, and resembling eyebrows. It is probably rare.

Habitat. North Carolina.

42. ATTUS MORIGERUS.

Plate XXII. Fig. 12.

Description. Cephalothorax ferruginous, covered with silvery down, through which the color can be seen, particularly about the eyes; abdomen above dark brown, covered with silvery down, four spots and a band glabrous; beneath pale; feet pale yellowish, with some hairs, 1. 4. 2. 3.

Observations. This little spider may be seen usually on leaves, where it frequently makes its tubes. It has been seen on the hickory and the mulberry trees.

Habitat. North Carolina, Alabama. April, May.

43. ATTUS CYANEUS.

Plate XXII. Fig. 13.

Description. Brassy green; body short; feet, 1. 4. 3. 2. Small.

Observations. This small but brilliant spider is found on plants, during all the warm season.

Habitat. North Carolina, Alabama.

44. ATTUS CANONICUS.

Plate XXII. Fig. 14.

Description. Rufous, or deep orange; abdomen with a longitudinal row of black dots, seven or eight on each side above; feet with black rings; cephalothorax and anterior part of the abdomen covered with dense yellowish rufous hair. Feet, 1. 4. 2. 3.

Observations. Found in Cambridge, Massachusetts, in August.

Habitat. Massachusetts.

45. ATTUS OCTAVUS.

Plate XXII. Fig. 15.

Description. Grayish brown; abdomen above with eight large black dots, two green spots, and some white marks, gray beneath ; feet rufous, $\overbrace{1.\ 4.}\ 2.\ 3.$

Observations. This is a common species in the south. A specimen was found with legs $4.\ 1.\ \overbrace{3.\ 2.}$, shorter, and with blackish rings. Is it a different species? It is not probable that this can be referred to A. *hebes*.

Habitat. Alabama. July — August.

Genus Epiblemum. Mihi.

Characters. *Cheliceres very long, slender, horizontal, in both sexes, fang nearly as long ; maxillæ parallel, wide at base, narrowed above the insertion of the palpi, cut obliquely on both sides towards the point ; lip conical ; eyes eight, unequal, in three rows, the first composed of four, the two middle ones somewhat larger, the second composed of two very small ones placed nearer the third row, which is composed of two larger ones ; feet, first pair longest, then the fourth, the third or second shortest.*

Habits. Araneïdes wandering after prey, making no web, cocoon.

Remarks. The characters of this subgenus are quite sufficient to separate and distinguish the species composing it from Attus. Even allowing that the character derived from the extreme length of the cheliceres were limited to the males, the great number of species contained in Attus would authorize naturalists to separate such as have that character under a separate denomination. But it seems that this peculiarity may be confined to the females in some species ; as, a male of E. *palmarum* was found with short cheliceres ; but these were nevertheless horizontal.

1. EPIBLEMUM PALMARUM.

Plate XXII. Fig. 16.

Description. Rufous or dark brown ; cephalothorax and abdomen with a whitish band on each side above ; feet whitish, except the first pair which are rufous, 1. 4. 2. 3.

Observations. Cuvier, in his Règne Animal, IV. p. 264, says that some males of Attus have elongated cheliceres. But this was a female ; and a male was found in North Carolina, corresponding to this in every particular, except that the cheliceres were not elongated, but *they were horizontal.* The subgenus Attus is so large that some good subdivision is required. Like Tetragnatha, this spider extends its legs in one line along the twig or blade on which it rests.

Habitat. South and North Carolina.

A male was found in Alabama, corresponding with this in every respect. He was bold, and moved with a ludicrous motion of his first pair of legs, which he waved to and fro, in advancing towards the body which was extended against him.

2. EPIBLEMUM FAUSTUM.

Plate XXII. Fig. 17.

Description. Piceous ; cephalothorax with the margin and two spots white ; abdomen with the base and four short lines white ; feet, 1. 4. 3. 2.

Observations. This species was found common in Cambridge, Massachusetts, on walls, on the south side.

Habitat. Massachusetts.

Genus Synemosyna. Mihi.

Characters. *Cheliceres short in the females ; maxillæ slightly inclined toward the tip, truncated at tip ; lip short, rounded ; eyes eight, unequal, in three rows, the first composed of four eyes, the two middle ones largest, the second composed of two small ones placed nearer the first than the third, which is composed of two larger eyes ; feet slender,* *the fourth pair longest, the other three variable; body elongated, nodose, abdomen contracted near the middle.*

Habits. Araneïdes wandering after prey, making no web, but silk tubes, for hibernation, running on plants like ants, which they resemble; cocoon.

Remarks. This differs in many points from MYRMECIA, Latr., Ann. des Sc. Nat. IV. p. 261, and yet seems to be closely related to it. That subdivision is not known to me, though it is said in that work that some species are found in Georgia. In MYRMECIA the cheliceres are large, in this, they are small, at least in the females; in that subgenus the maxillæ are rounded and hairy, the abdomen is much shorter than the cephalothorax, and they have other characters which do not belong to this.

I have already pointed out the features, and proposed a name for this singular subdivision, in a paper published in Silliman's Journal. I have, since writing that article, discovered one species, in addition to the three mentioned there. They are all anomalous, and differ from each other in many points; while they agree in the characters which I have assigned. They hibernate in silk tubes, under the bark of trees.

1. SYNEMOSYNA FORMICA.

Plate XXII. Fig. 18.

Description. Rufous; cephalothorax very long, contracted in the middle, tapering towards the base, and with two lateral yellowish spots; abdomen contracted in the middle, also with two lateral yellow spots, each where the contraction appears; feet slender, varied with yellowish and black, 4. 3. 1. 2., tibiæ of the first pair and part of the tarsus black underneath. Male with very large cheliceres; legs, 4. 1. 3. 2.

Observations. This spider cannot be placed in the subgenus MYRMECIA, of Latreille, as described in the fourth vol. of the An. des Sc. Nat., or in vol. IV. p. 261 of the Règne Animal, for the following reasons: the eyes are very unequal in size, and not placed in the manner described; the cheliceres are large only in the males; and the length of the feet is not the same. It is possible, however, that the insects drawn by Abbot belong to this division; for, being very small, probably the situation of the eyes may not have been correctly observed. Be this as it may, the subgenus MYRMECIA, or Myrmecium, is closely related to this.

I had seen individuals of this species running on the blades of grass and stems of weeds, long before I distinguished them from ants. They move with agility and can leap, but their habitus is totally different from ATTUS. They move by a regular progression or regular walk, very different from the halting gait of that subgenus.

Habitat. North Carolina, Alabama.

2. SYNEMOSYNA SCORPIONIA.

Plate XXII. Fig. 19.

Description. Piceous; cephalothorax with two sub-obsolete, pale spots; posterior eyes placed near the base, and remote from the rest; abdomen slightly contracted near the middle, with a yellowish indented spot; feet rufous, 4. 1. 2. 3., first pair very stout; sexes alike, the cheliceres not being enlarged in the male.

Observations. This small spider is somewhat rare, and was found in the winter months.

Habitat. North Carolina.

3. SYNEMOSYNA EPHIPPIATA.

Plate XXII. Fig. 20.

Description. Rufous; cephalothorax wide in the region of the eyes, tapering towards the base; abdomen depressed before the middle, widest beyond the middle, a transverse paler band near the middle, piceous towards the apex; feet, with the interior edge, black, two last joints of second pair black, penult and antepenult joints of the leg of the fourth pair dusky, 4. 2. $\widehat{3.\ 1.}$

Observations. This is a very distinct species, found hibernating in silk tubes under bark, making such tubes when confined. The male, with cheliceres not enlarged, was found agreeing with the above description in the minutest particular. This shows beyond any doubt that the species is distinct from S. *formica.*

Habitat. Alabama. December.

4. SYNEMOSYNA PICATA.

Plate XXII. Fig. 21.

Description. Black; legs varied with rufous and black, second pair black beneath, fourth black except the knee which is pale beneath; palpi pale, basal joint piceous; feet, 4. $\widehat{3.\ 2.}$ 1.

Observations. This is evidently distinct from the other species, particularly by its form. I once enclosed a male and a female of this species in a glass tube. They very soon formed separate habitations of silk; but on the third or fourth day, the male was dead near the tent of the female, and she had made a lenticular white cocoon, containing four eggs as large as those of large Araneïdes. That female had a white streak on each side of the abdomen.

Habitat. North Carolina, Alabama.

Art. XXVIII.—ON THE FOSSIL VEGETATION OF AMERICA. By J. E. Teschemacher.

From the labors recently bestowed on fossil vegetation, and the renewed attention it has attracted from men of science, it seems highly probable that this department is about to share largely in the general advance of natural history, and, in consequence, to shed light on many abstruse and doubtful points of geology.

That the nutritious vegetation of the present day is chiefly a fuel which, by a process of combustion, builds up man and other animals, and that the portion of this vegetation not formed for nutrition is still but fuel to be burnt during its decay by the oxygen of the atmosphere, are well-founded doctrines lately promulgated by Liebig, by Dumas, and Boussingault. From the "Balance of Organic Power," of the two last authors, I make the following short extracts:

"Light arrives, and, with the concurrence of carbonic acid and nitrate of ammonia, the vegetable world, the grand producer of organic matter, is developed. Plants further absorb the chemical force, which reaches them from the sun, and enables them to decompose carbonic acid, water and ammonia; plants are embodiments of a reducing power of greater virtue than any other that is known, for no other will decompose carbonic acid in the cold."

Again. "In our eyes, therefore, the vegetable world constitutes an immense magazine of combustible matter, destined to be consumed by the animal world, and in which this last finds the source of the heat and locomotive power, which it turns to account."

But as, with the exception of a few mollusks, which might have fed on fuci abundant in a fossil state, animals did not exist during the growth of the vegetation of which the coal is formed, the mind is inevitably led to the following reflection. That the vegetables of this period, not being intended for conversion into the higher state of animal organization, would probably consist of such as were least fitted for this purpose. Accordingly, we find them akin to our present families of Lycopodiaceæ, Equisetaceæ, none of which are nutritious, of Filices, the root of only one of which is edible (*Pteris esculenta,*) of Coniferæ, of which the kernels of the seed alone are used. The character of the so-called Gramineæ, of this period, is very doubtful; the recent fern Vittaria, and some others, when without fructification, being scarcely distinguishable from them. The same may also be premised of what are called the Cycadeæ, or Cycadites, of the Coal formation. It would be strange, if animals existed in quantity (which they did, if at all) on the quiet estuaries where the coal vegetation is supposed to have grown, and been entombed, that their remains should not be found in abundance, in deposits where the finest lineaments and texture of the vegetable forms have been so well preserved. Indeed, the very existence of the coal beds themselves seems to prove that the vegetation of that day was not consumed by air or animals. On the other hand, if the vegetation of the subsequent periods had not been consumed by the atmosphere or by animals, there seems no valid reason why they should not also have existed in the state of coal.

It is quite probable that a vegetation with so little nutriment could never have supported the enormous animals which filled the earth immediately afterwards. I will here offer one more quotation from the same work as the previous one.

"Then come animals, consumers of matter and producers of heat and force—true instruments of combustion. It is in them, unquestionably, that organized matter acquires what may be called its highest expression. In this new capacity, organized matter is burnt, and, in giving out the heat or electricity which constitutes and is a measure of our force, it is destroyed, and returned to the atmosphere from whence it had originally come. The atmosphere, therefore, is the mysterious link that connects the animal with the vegetable, the vegetable with the animal kingdom."

But, as there were no animals, this link was not then required, and the reflection hence arising is, that an atmosphere more appropriate then prevailed. These recent developments of science render highly probable the philosophical theory of Brongniart, of the existence of an atmosphere, at that time, highly charged with carbonic acid gas. As this is a point of very great importance to the study of fossil vegetation, let us remark how it agrees with other phenomena observed.

The copper ore recently brought from New Jersey, consists of the blue and green carbonates and the sulphuret. This latter forms a kind of nucleus imbedded in the carbonates. From every appearance, the whole was originally sulphuret, the exterior of which, to a considerable depth, has been decomposed, and converted into these carbonates. The most probable cause of this conversion is the contact of the sulphuret, after its ejection from below, with carbonic acid dissolved in liquid: precisely such a liquid as might be expected to be formed from a surface of water with a superincumbent atmosphere of carbonic acid. According to all appearance, this decomposition, and conversion of sulphuret into carbonates, is not now proceeding; the action was probably arrested when the nature of the atmosphere was changed. It is not uncommon to find sulphuret of lead converted into carbonate, but I have never seen any instance so clear and striking as that of the copper ore from New Jersey.

Crystals of carbonate of lime are often found in a state of decomposition, and I have several specimens on which fresh crystals are deposited on the half-decomposed crystal. Chemists are well aware that, although carbonate of lime is insoluble in water, it is soluble in water charged with carbonic acid; on the supposition of an atmosphere of carbonic acid gas with which the immense extent of surface water would be impregnated, these phenomena are easily explicable.

Nor should it be forgotten that, the density of carbonic acid gas being 1524, the present atmosphere 1000, the increased pressure of the column would countervail a high temperature, and permit the water to retain a considerable quantity of the first gas in solution.

From these considerations arise others of much importance. Plants growing under conditions of heat, humidity and atmosphere specially appointed for them, without reference to any other class of animate beings, although of an organization resembling that of the vegetables of the present day, may possibly have varied considerably in the time and the manner of their growth; and, although we have yet no data on which to found calculations, there is no reason why the growth and development of the vegetable might not have then been as extensive in one year as it is now in many. While several reflections on the little we know concerning the internal organization of fossil plants seem to favor the idea of a rapid growth, I am not aware of any which militate directly against it; but a lengthened discussion thereon, in the present state of our knowledge, would perhaps be premature; I shall, therefore, pass it over until a future opportunity.

Professor Pictet, in his lately circulated discussion on the distribution of animal fossils, propounds several generalizations, or laws. The fourth of these is as follows:

"The species which have lived in ancient epochs have had a more extensive geographical distribution than those which exist in our days."

The study and comparison of fossil vegetables seems, even at this early stage, to point to an almost universal distribution of the same genera and species during the period of the coal formation; and as the opinion seems generally to prevail that the plants of which the coal is composed grew where they are now deposited, the same conditions, climate and atmosphere, under which they vegetated, must have existed throughout the whole area, wherever coal-fields are found.

If, by means of the study of fossil vegetation, we can arrive at conclusions favorable to the existence of an extensive uniformity of climate, and an atmosphere differing in density as well as in temperature from the present, points of much interest are gained in the important geological question of the intensities of action during the early epochs of the globe,—a question on the discussion of which probably hangs the fate of most of the theories of the day.

In establishing a nearly universal (tropical) climate by the discovery, in large and distant areas, of the same genera and species of plants which formed the coal, coupled with the law of Professor Pictet, we also establish a gradual diminution of the extent of this climate at the more recent date of the prevalence of animal life, this gradual diminution continuing, at still more recent periods, until the present epoch; — a fact of great value in comparing the ancient and the present conditions of the crust of the globe. Some difficulty has been felt with regard to the idea of an extensive area of uniform climate, from the supposition that the short period of light of an arctic region would not be sufficient for the growth of plants of so much luxuriance as those of the Coal formation. But it appears to me that this difficulty vanishes under the following considerations.

Plants have their times of alternate growth and hybernation, or rest; the latter might take place during the period of darkness, and their growth during the period of light. This, in an atmosphere of carbonic acid, with great heat and humidity, might be very rapid. The time of hybernation might be thought long; but be it remembered that a plant is but a modification of a seed, and the period of rest of a seed, until its vegetation is called forth by favorable circumstances, is by no means definite. Fern seeds have been known to vegetate after having been for many years at rest in the herbarium; and although there are no experiments on record contrasting the length of the vitality of seeds with the length of rest which the same plant will endure, yet enough is known to prevent this length of hybernation from being an insuperable objection. I have a bulb, *Stenomesson,* which was two years in the pocket of one of the officers of the Exploring Expedition; it grew and has flowered several times. To this may be added that the darkness near the poles is never very intense; and this might not have been without influence on the vegetation, particularly of the lycopodiaceous and fern tribes, many of which naturally flourish best, now, when constantly in the densest shade.

Hence, the importance of working up carefully the details of this branch of geological knowledge becomes manifest. It is, therefore, with the greatest satisfaction I observe that Messrs. Brongniart, Göppert, Unger, and others, whose talents and industry have already conferred such invaluable benefit on this study, appear resolved to renew and extend their labors.

I have examined the few specimens which chance has thrown in my way, and these are chiefly fossil Filices; but, even in this already well-labored field, there is considerable that is new, still to be gleaned, particularly as regards the extensive coal-fields of the American continent. The only difficulty that exists is in obtaining specimens to study.

The comparison and identity, then, of the fossil flora of this continent with that of the European and the Asiatic continents, and more particularly of the flora which prevailed during the formation of the coal, may be assumed to be points of much interest.

I will take this opportunity to observe that, I feel certain, future developments will show highly resinous plants to have largely participated in the formation of coal, (these plants being also the least nutritious for animals and best adapted to the formation of coal,) and also to express my doubt of the usually received doctrine that anthracite is a bituminous coal altered by heat, notwithstanding the instances adduced. The experiments and observations of Prof. Bailey, of West Point, are calculated to throw light on this subject; it is on similar observations, made during the last three or four years, that this doubt is partially founded.

The number of fossil ferns described by Brongniart, in his *Histoire des Vegetaux Fossiles*, is about two hundred. Of these, only twelve are from localities in America, and of these twelve, three have not yet been described as found in Europe. Nor has Unger, in his Synopsis published 1845, increased the number. Mr. Lyell, in his Travels in North America, has made several additions, and Dr. C. T. Jackson, in his Report on the Geology of Rhode Island, has figured several from the black shale above the coal at Portsmouth, in that State; but it is evident much remains to be done, both in the discovery of new species and in deciding on synonyms.

The late acute and very philosophical investigations by Presl, and by J. Smith, of Kew Garden, of the ferns of the present day, and the consequent arrangement of them by these gentlemen into divisions, dependent on the combination and position of the veins, as well as on the mode of fructification, will render great assistance to the student of this portion of the fossil flora ; for, as yet, the venation must hold the first place in deciding on its arrangement. The outlines of these characters have been beautifully developed by Brongniart in his above work, and although Göppert has delineated many instances of fossil fructifications, and, with Unger, introduced several judicious modifications of Brongniart's views, the venation must still retain its weight. Sternberg's great work on this subject I have not seen. The fern recently brought by Mr. Cuming from the Island of Luzon, *Dryostachyum* (J. Smith,) resembles, in the venation of its sterile frond, the fossil genus *Clathropteris* of Brongniart, while its fertile frond may almost be identified, in outline, with the fossil *Phlebopteris propinqua*, of the same author ; rendering nearly certain the probability, which he suggested, that these two fossils are the sterile and fertile fronds of one species. *Clathropteris,* also, resembles, in venation, the sterile frond of *Aglaomorpha* (*Psygmium,* Presl,) a recent fern ; but the fertile frond differs somewhat from the form of *Phlebopteris.*

The figure of *Woodwardia floridana* (Schk.) given by Göppert, Syst., tab. XXI., does not contain the venation now considered characteristic of this fern ; his division Woodwardites, among fossils, will therefore probably not stand. His figures of these latter, also, exhibit the same deficiency.

The venation and position of the sori in Hemitelites, Göppert, does not agree with Hemitelia, as now restricted by Presl to *H. capensis.* The group of recent Cyatheaceæ, when properly arranged, so as to exhibit the full value of its venation, compared with the fluctuating character of its indusium, will no doubt admit, as strong resemblances, many of the fossil Pecopterideæ of Brongniart. This is very striking in his *P. punctulata*, which Göppert calls *Hemitelites giganteus* var. *punctulatus*. It now nearly resembles the Cnemidaria of Presl; and Göppert's *H. Brownii* (*Phlebopteris contigua*, Lind. & Hutt., vol. II. tab. CXLIV.) is, in venation, more like the sterile frond of Woodwardia, tab. XXXVIII, than any of the Cyatheaceæ. Nearly the same observation will apply to *H. polypodioides*, *Phlebopteris polypodioides*, Brongn.; but here the appearances of the fructification in the fossil differ from those of the recent fern.

These remarks might be extended if necessary, and they are of interest, as the venation is the chief character of the fossil fern. But my object, at present, is more to collate the fossil vegetables among themselves, than to institute a comparison between them and our present vegetation; this will be better pursued as a distinct branch of inquiry. It is, however, surprising that so much has already been effected in the arrangement of materials, the connecting links of which are in such a defective state.

There seems to be some confusion among the divisions into which fossil ferns have been arranged by authors.

Neuropteris, Odontopteris, Otopteris and Cyclopteris, which, with a few others, constitute Unger's order Neuropterides, exhibit several instances of this.

Neuropteris Dufresnoyi, of Brongn., tab. LXXIV., if the figure be correct, is certainly an Odontopteris, although still retained as Neuropteris by Unger.

Odontopteris crenulata, of Brongn., tab. LXXVIII *bis*, fig. 2, is the *Neuropteris serrata* of Sternberg: it has clearly a medial vein, although attached by its base to the rachis.

Several other instances might also be adduced; and even Sphenopteris appears to share in the confusion. For—

Sphenopteris palmetta, of Brongn., (*Asplenites palmetta*, of Göppert,) is clearly a Neuropteris, and is classed with this division by Schimper and Mougeot, and by Unger.

Sphenopteris dilatata, crassa and *obovata,* of Lindley and Hutton, are, I think, properly classed by Unger with Cyclopteris; and it is probable that several other Sphenopterides must share this fate.

Cyclopteris digitata, Brongn., tab. LXI *bis,* and tab. LXIV. of Lindley and Hutton, is certainly, as Brongniart well imagines, the leaf of a Conifer resembling Salisburia. The curving in of the margin of the petiole, previous to its expansion into the leaf, is a character which, in my mind, sets the question at rest. And, if so, other Cyclopterides may be the same, some even of the Odontopterides are liable to the like suspicions, and Brongniart has lately expressed an opinion that Noeggerathia is also a Conifer.

Beinertia, of Göppert, Gatt. Foss. Pfl., tab. XVI. fig. 5, of which many of the veins originate in the rachis, is, I think, wrongly placed by Unger among the Pecopterides. I have given a figure (*d,* plate XXXV.) of a fragment from Mansfield, Mass., which resembles Göppert's figure of this fossil in everything but the divisions of the pinnules, these being deeper in my specimen than in Göppert's. I think this belongs to Neuropterides.

The numerous family of Pecopteris, of Brongniart, dependant almost on a single character, is evidently susceptible of a much more lucid arrangement; and, although this has been effected to a considerable extent by Unger, in his Synopsis, it is yet capable of amelioration. Pecopteris, of Brongniart, is the most difficult division to identify: to do it successfully, requires numerous specimens, with much patience and laborious study.

List of Fossil Vegetation from American Localities.

CALAMARIÆ. *Unger, Syn. Pl. Foss.*

Of the orders Calamites and Equisetites I have several specimens from Nova Scotia and from Mansfield; they are, however, so small that I prefer to pass them over at present.

Of Asterophyllites I have,

A. *comosa,* Lindley & Hutton, from Nova Scotia, and
A. *equisetiformis,* Brongn., from Mansfield.

Of Hippurites, Lindley & Hutton,

H. *longifolia,* from Nova Scotia.

FILICES. *Unger, Syn. Plant. Foss.*

Pecopterides, Id.

Beinertia, ? Göpp. Syst., (plate XXXV. fig. *d.*) Although possessing but a few fragments, they so closely resemble Göppert's fig. 5, tab. XVI., that I have ventured to place it here, believing however, as I have before stated, that it should be classed with Neuropterides. From the anthracite coal beds at Mansfield, Massachusetts.

Diplazites longifolius, Göpp.
Pecopteris *longifolia,* Brongn.
Plate XXXVI. fig. *c.* From the shale overlying the coal, Portsmouth, Rhode Island.

Alethopteris lonchitides, Sternb.
P. *lonchitica,* Brongn.
From Pictou, Nova Scotia.

A. Serlii, Göpp.
P. *Serlii,* Brongn.
Plate XXXV. *a, a.* From Mansfield. From what I have seen, the two varieties of Brongniart, Europæa and Americana, I think, are not distinct enough for a division.

A. muricata, Göpp. ? From Mansfield.
P. *muricata,* Brongn. ?
It is with much doubt that I place this fragment with *A. muricata.* The impression on the stone is beautifully clear, and, if the leaves did not lap over, I should be rather inclined to refer it to *A. Ottonis,* Göpp., tab. XXXVII., fig. 3, 4,

found in large-grained sandstone of the coal formation at Wielun, Poland; perhaps in specimens laid down in nature's great and earliest herbarium, the distance between the leaves is not of specific importance.

A. Cistii, Göpp.
P. *Cistii*, Brongn.
From Mansfield. This is also found at Wilkesbarre, Pennsylvania.

P. *Loschii*, Göpp. and Brongn.
Plate XXXV. fig. *f*. Of this I have only the bilobed leaf; but the resemblance of the specimen to Brongniart's figure (Hist. Veg. Foss., tab. XCVI. fig. 6*A*) is so striking, that there is little doubt of its identity.

P. *borealis*, Göpp. and Brongn.
This has hitherto only been found in the aluminous schist in Greenland. My specimens, which very closely resemble those in Brongn., Hist. Veg. Foss., tab. CXIX. fig. 1 and 2, are from Mansfield. I do not question the identity.

P. *abbreviata*, Göpp. and Brongn. Sydney coal mines.

P. ? Mansfield.

Hemitelites Trevirani, Göpp.
H. giganteus, id.
P. *gigantea*, Brongn.
From Mansfield and from Nova Scotia. Although doubtful respecting these specimens, the tracing of the veins seems as clear as Göppert's fig. 4, tab. XXXVIII., and the outline quite resembles his fig. 3.

Cyatheites Schlotheimii, Göpp.
P. *cyathea*, Brongn.
Plate XXXVI. fig. *c*. From the black slate covering the coal, Portsmouth, Rhode Island. On plate XXXVI. fig. *b*, is a portion of a stem from the anthracite region, Mansfield, Massachusetts, which evidently belongs to this group. It is more spinous than appears on the plate.

Connected also with Cyatheites is the fig. *a*, on plate XXXVI. This has the foliage usually attributed to *C. arborescens* (the Pecopteris *arborescens* of Brongniart, tab. CIII. fig. 2 and 3) ; but it will be seen that the stem resembles that of a Lepidodendron. The figure is very correct. The only observation I shall venture at present is, that it appears to me rather to belong to Coniferæ than to Filices. This is from Pictou, Nova Scotia.

Neuropterides, Unger, Syn. Plant. Foss.

N. *flexuosa, cordata,* and *angustifolia.*

They are plentiful both in the anthracite region at Mansfield, Massachusetts, and in Nova Scotia ; but from the former locality I have several perfectly orbicular, detached leaves, which probably belong to N. *heterophylla.* Brongniart's idea of the fossil fructification of this fern is now known to be erroneous. On almost every specimen, from both the above localities, fine lines may be discovered, crossing the veins at an obtuse angle, and almost parallel with the midrib ; they are very clear under the microscope. Although these lines crossing the veins may hardly be supposed to be fructification ; yet, as they occur on no other fossil leaves, they are worthy of attention and consideration.

Odontopteris Brardii, Unger, Syn. Pl. Foss.
" " Brongn. Hist. Veg. Foss.

Plate XXXIII. From the black schist, Portsmouth, Rhode Island. This singular and beautiful fossil, hitherto only found in the coal mines of Lardin, near Terrasson, in France, cannot fail to be immediately identified. The figure here given is diminished about one-third. I have already stated my doubts as to many of the Neuropterides, and particularly of Cyclopteris, belonging to the Filices, suspecting them rather to be Conifers. The knots, or joints, on the stem, are so strongly marked in Brongniart's figure, as well as in the specimens from Rhode Island, that it is surprising he should have passed this circumstance over entirely without observation. Göppert does not mention this fossil; he, probably, had never seen it. He has described and figured two fossils, *Asplenites nodosus* and *Aspidites nodosus;* but in neither are the joints distinct enough to leave no doubt of their being such. There are but few recent ferns possessing joints. These I have not seen, and am therefore unable to compare them; but it is a character which adds to the probability of *Odontopteris Brardii* not belonging to the ferns.

On comparing the specimen from Rhode Island, it will be seen that the form of the termination of the pinnæ differs much from that given in Brongniart, tab. LXXV. The lower pinnule differs, also, in form, from the others; but I have seen none so regularly irregular as those in his tab. LXXVI.

There is a great peculiarity in this as well as in most of the other specimens from Portsmouth; the pinnules are of quite a different form on each side of the stem. The same will be observed in Cyatheites Schlotheimii, plate XXXVI., and it occurs also on other specimens. I think it can only be attributed to some variation in the pressure when entombed, but cannot make up my mind as to the mode. There is the same appearance in Brongniart's figure of *Neuropteris Villiersii*, tab. LXIV. fig. 1.

Neuropteris and *Odontopteris.*

Plate XXXIV. Of these I find no resemblance in the works to which I have access. I would observe that the petioles are not quite so distinct in the specimen as in the figure; still they doubtless exist. Were it not for this circumstance, one is more like *N. Villiersii*, Brongn., the other like *Cyclopteris orbiculatus* of the same author. I do not offer to name them for fear of adding to those pests of natural history — synonyms; but will rather wait until the group of Neuropterides shall undergo thorough revision. I would here state that the fossil figured (plate XXXV. *d*) as *Beinertia*, is probably the same as

Brongniart's N. *Dufresnoyii*, which is certainly an Odontopteris.

Neuropteris *gigantea*, Sternb., Brongn.

From Pictou, Nova Scotia. If the distance between the pinnules is a sufficient distinction, this specimen is clearly N. *gigantea*, and not N. *flexuosa*. The pinnules in this are $\frac{1}{2}$ to $\frac{5}{8}$ inch long; in Brongniart, and Lindley and Hutton, vol. I. tab. LII., they are from $\frac{1}{2}$ to 1 inch long.

Sphenopterides, Unger, Syn. Plant. Foss.

My fragments of this group, all from Mansfield, Massachusetts, are so small that I scarcely dare venture on description; yet the very existence of these fragments proves the existence of the species. With great doubt, therefore, I refer, fig. *b*, plate XXXV., to

S. *Dubuissonis*, Unger and Brongn.

Cheilanthites, Göpp.

Nor do I see any better appropriation of fig. *e*, on the same plate; although the dots on the specimen bear the regularity of fructification. Both are from Mansfield.

Fig. *g*, on the same plate, also from Mansfield, I refer, doubtingly, to

S. *Gravenhorstii*, Brongn. tab. LV. fig. 3.

Cheilanthites, Göpp.

HYDROPTERIDES. *Unger, Syn. Pl. Foss.*

Marsilæaceæ, Id.

Sphenophyllum emarginatum, Brong. Prod., from Mansfield.

" *truncatum*, " " " "

" *dentatum*, " " " " and Nova Scotia.

" *erosum*, " " " "

There are several specimens, on the nature of which I feel much indecision; they are chiefly from Mansfield. These I shall reserve for the present for more light.

Most of the vegetable impressions from Mansfield, when taken from the roof of the mine, were covered with a hard substance of a fresh olive-green color, which gave them the appearance of being yet alive. The color is now paler. This substance varies in thickness from $\frac{1}{32}$ to $\frac{1}{64}$ of an inch, is chiefly silex, and generally only covers the extent of the vegetable impression. It is thickest on the stem of Calamiteæ and Equisetaceæ. I have not yet subjected it to rigid analysis.

The new and extensive field, opened by the working of the vast coal formations of the American continent, and the general progress of science, will undoubtedly engage many in the interesting pursuits of the chemical, microscopical and botanical examination of vegetable fossils; from the knowledge acquired in these, added to renewed labors in the field, we may reasonably hope for developments of the greatest interest to geology.

Those who have studied the subject must have perceived that, although plates give an idea of the outline of form and venation of fossil plants, yet, unless the artist himself is well versed in their distinctive characters, the specimens themselves are indispensable to form correct opinions: by careful inspection of these, distinctions are much more readily apparent.

ART. XXIX.—NOTICE OF THE GEOLOGICAL POSITION OF THE CRANIUM OF THE CASTOROIDES OHIOENSIS. By JAMES HALL, Esq., one of the New York State Geologists. Also,
AN ANATOMICAL DESCRIPTION OF THE SAME. By JEFFRIES WYMAN, M. D., Prof. Anat. and Phys. in Med. Dep. of Hampden and Sidney College. With three Plates.

I. GEOLOGICAL POSITION.

THE cranium was received from Rev. Benjamin Hall, D. D., President of Geneva College, and was discovered in a swamp on the farm of Gen. W. H. Adams, of Clyde. The situation in which it was found is an elevated plateau or level tract of land, a portion only of which would be denominated a swamp, though the whole surface is covered with a peaty soil which supports a heavy growth of elm, hemlock and ash, with some maple and beech. This elevated ground is the summit level, from which the waters flow in opposite directions, into Lake Ontario on the north, and into the Clyde river, and thence into the Cayuga and Seneca lake outlets on the south. The precise locality of the fossil was near the termination of a shallow ravine, or the bed of a small stream, which flows into Lake Ontario, in a northeasterly direction.

The extent of this level tract is about five or six miles, while its width, in most parts, is much less. Along nearly its entire length a canal of eight or ten feet deep has been excavated, and in this excavation, about eight feet below the surface, the skull was found, the lower jaw separated some little distance from the cranium.

A section at this place, and at numerous others near the same spot, presents the following characters:

1. Muck, or vegetable soil, supporting a heavy growth of timber, two feet or more in thickness.

2. Fine sand, with occasional thin bands of clay, often consisting of alternating layers of sand, twigs, leaves and other fragments of vegetable matter, and much blackened thereby; two to three feet thick.

3. Muck or peaty soil, composed of decayed fragments of wood, bark, leaves, &c., enclosing trunks of trees of large size, about four feet thick.

SKULL OF CASTOROIDES OHIOENSIS.[1]

4. Fine sand, with shells of Planorbis, Valvata, Cyclas, &c., one to two or three feet thick.

5. Ancient drift, with northern bowlders and fragments of

[1] Among the fossil wood above mentioned, were plain marks of the teeth of the beaver, and but for the size of this skull I should have supposed it to be one of that race.

the sandstones and limestones, which occur in place a few miles farther north — depth unknown.

The thickness of 2, 3, and 4, is variable, though the bottom of No. 3 usually varies little from the depth of eight feet from the surface. A glance at the section reveals the true period of the deposit, showing conclusively that the whole is a lacustrine formation, made subsequent to the deposition of the ancient drift, (No. 5,) which is characterized by its foreign materials, while in the later deposit not a pebble of the size of a pea can be found.

The section of the bank of the Sodus canal presents the character here given, for the space of a quarter of a mile or more, in a north and south direction. To the southward the stratum No. 3, with trunks of trees, &c., gradually disappears, and the two layers of fine sand are united in one, which is still surmounted by the vegetable soil above, and rests upon the drift below. This sand is regularly stratified, the lines of division being almost perfectly horizontal, and very regular. Towards the north the sand generally gives place to clay, with the disappearance of the fossil wood, &c.

The direction of the fallen trees in No. 3 of the section, as well as of the branches and twigs in No. 2, indicate that during the deposition of these materials, the direction of the current was towards the north or north-east; and this is corroborated by the fact that the southern part of the deposit is wholly composed of sand, while the clay increases towards the north. From what I can learn of its elevation, it corresponds very nearly with the "ridge road" bordering Lake Ontario, which I have fully described in my Report on the Geology of New York. The portion of country now under consideration doubtless formed at that period an estuary through which a considerable body of water flowed into Lake Ontario, and upon the bed of which has been deposited the sand, fallen trees, &c., of this formation. Indeed it appears quite probable that this was a part of a great estuary, through which the waters of the Cayuga and Seneca lakes flowed into Lake Ontario; the existence of which I have shown to be probable at the time when the latter lake stood at the elevation of the "ridge road." This view has received additional proof from the excavation along the Sodus canal, which passes through the locality under consideration. From this excavation we can demonstrate that for five or six miles north of Clyde there is no barrier of solid rock rising to a height sufficient to prevent the water flowing from the outlet of Canandaigua lake, at Clyde, into Lake Ontario. Indeed the excavation already made to the surface of the drift, does actually drain the water from this outlet at Clyde, during high water in the streams, and were this channel excavated a few feet deeper, it could be made the outlet not only of the waters of Canandaigua lake, but also of the waters of Cayuga and Seneca lakes, which now pass into Lake Ontario by the Oswego river.[1]

I am informed by General Adams, that he has caused the whole distance along this line to Lake Ontario, to be probed, and there is no rock within twenty or thirty feet of the surface, proving the entire practicability of draining these marshes in that direction; — a project worthy of consideration.

The condition of the surface, at the time of the existence of this animal, is a matter of much interest; and admitting to be true what we consider as having been pretty well demonstrated, namely, that Lake Ontario was at an elevation of one hundred and fifty or two hundred feet above its present one, and having a direct communication with the smaller lakes on the south, we are able to show that extensive tracts would have been marshes and estuaries, with the more elevated

[1] To those unacquainted with the physical features of this part of the country, it may be necessary to state that the outlet of Canandaigua lake and the waters of Mud creek, a stream which drains the deep valley west of Canandaigua lake, form the Clyde river, which unites with the outlets of Cayuga and Seneca lakes, in the Cayuga marshes. The descent of this river from Clyde eastward is so little, that a strong south wind, pressing the water northward in these two lakes, elevates the water in the river at Clyde, from which place, as we have seen, a cutting of ten feet will furnish an outlet into Lake Ontario, or into the channels of streams flowing into that lake.

ridges of drift only raised above the level of the waters, giving a vastly greater proportion of this kind of surface than at present. Thus far the bones of the mastodon and elephant have all been found at a higher elevation than the relic under consideration, and this is precisely what we should expect, with the condition of surface we have described. The animal in question doubtless found the extensive marshes, with wooded margins and intervening higher grounds, well adapted to its wants and mode of life. That its remains have been so rarely met with, may be explained from the fact, that very few extensive excavations have been made in situations likely to contain them; while the smaller and more elevated marshes, where the bones of the mastodon have been found, are more accessible and oftener excavated. Therefore, from all we know at present, this animal may have abounded on the marshy borders of the former Lake Ontario, when the now fertile regions of Oswego, Wayne, Monroe, Orleans and Niagara counties, as well as the corresponding parts of Canada were mostly covered by water and marshes.

So far as the general features are concerned, and the relative age of the deposition, there cannot remain a doubt; and although as yet no other bones have been found with this cranium, we feel justified in referring its period to that of the great mastodon and other animals of our country, whose remains have been found in similar situations. The relative level of the surface of the country, at this place, varies very little from that of Rochester, where the bones of a mastodon were found some years since.[1] The bones found at Genesee, many years since, were proved to have occurred in the marl of a swamp, over which was deposited a layer of peaty matter.[2] All the other situations, where similar bones have been found, correspond to this one in general characters, with perhaps the partial exception of the tooth of a mastodon found

[1] See Geological Report of the Fourth District, N. Y., 1843, p. 363. Lyell.
[2] See as above.

at Niagara, in a modern alluvial, in which, however, were found fluviatile shells of existing species.

From all the facts adduced, it will not be questioned that the remains of the mastodon do occur in situations proving their existence upon the surface subsequent to the period when it has undergone any great change. Or, in other words, the surface of our globe had arrived at its present condition, essentially, at the period of the existence of the mastodon and other animals whose remains are associated with it. Now although the specimen in question was not found associated with remains of this kind, yet the deposit in which it occurs is of the same age, and the shells are of existing species. We might be willing to admit its existence without this attempt at proof, but it is still desirable to establish, beyond doubt, the fact. The only fossil bones of a similar animal before known, are the lower jaw, together with the upper incisor and the radius. These bones were found with those of the mastodon, in the bottom of a peat swamp in Ohio, at the depth of fourteen feet from the surface, resting on a bed of pebbles and gravel, and they are represented as considerably worn by attrition before their deposition. Their position being upon the surface of these drifted matters, even were that deposit the older drift, would not prove them coëval, since they are preserved in the "carbonaceous mud," which was evidently a quiet deposition in the shallow basin, made long after the coarser materials at the bottom had been deposited. At the same locality, (two miles north of Nashport, between the Muskingum and Licking valleys, on Wakitomika creek,) were found also the bones of a ruminant animal, at the depth of eight feet from the surface. This was in all probability coëxistent with the animal in question and the mastodon.

The discovery of this relic has added a very interesting species to the ancient Fauna of the state of New York, of which we before possessed only the remains of the mastodon, the elephant, and possibly a deer, a jawbone and teeth of this last animal having been found in a swamp, with the bones of the mastodon, in Greenville, Greene county, New York.

Although attaching little importance to the discovery of wood gnawed by beavers in these swamps, I may notice, in connection with the present example by General Adams, the following:

"Mr. Williams, one of the assistant engineers, has informed me, that at the summit level of the Genesee Valley Canal, at New Hudson, four miles from Cuba, several deers' horns and the horn of an elk, [*Elaphus canadensis,*] were found twelve feet below the surface, in a muck deposit. In the same situation, a piece of wood gnawed by beavers was also found. These are all the remains of existing animals, but their position is the same as that in which the remains of the mastodon are found."[1]

From the few facts which have come to our notice, we are induced to believe that the geographical distribution of this animal must have been very extended; for its remains have been discovered in New York, in Ohio, and, as we have been recently informed, in the neighborhood of Natchez.

II. ANATOMICAL DESCRIPTION OF THE CRANIUM.

Among the fossil remains of extinct Mammalia heretofore discovered, those of Rodents do not appear to have been abundant, nor remarkable for their size. In no instance, excepting that of the Castoroides, have they excelled or even equalled the bones of the existing Capybaras of South America, which are by far the most gigantic Rodents belonging to the actual condition of the globe. The largest fossil species referable to the order above mentioned, belong to the genera Castor,[2] *(C. Europæus,)* and Trogontherium,[3] *(T. Cuvieri,)*

[1] Geological Report, Fourth District, New York, p. 367, note.

[2] *C. Europæus*, Owen British Fossil Mam. and Birds, p. 190; *C. des Tourbières*, Cuv. Oss. Foss. 3d edit. T. V. Pt. I. p. 55; *C. fossilis*, *Goldfuss*, Nov. Act. Nat. Curios. T. XI. Pt. II. p. 488; *Trogonth. Werneri*, Fisch., Mem. de la Soc. des Nat. de Moscow, T. II. p. 250.

[3] *Trogonth. Cuvieri*, Fisch., Mem. de la Soc. des Nat. de Moscow, T. II. p. 250; *Castor trogonth.* Cuv., Oss. Foss. T. V. Pt. I. p. 59; *T. Cuvieri*, Owen, British Foss. Mam. and Birds, p. 184.

the first identical with the existing European species, and the second about one fifth larger.

Remains of the *Castoroides Ohioensis,* consisting of an imperfect half of a lower jaw, an incisor tooth of the upper, and a radius, were first brought to the notice of the scientific world by Mr. J. W. Foster, one of the assistants in the geological survey of the State of Ohio; they were exhumed in company with a cranium belonging to the genus *Ovis,* molar teeth and bones of Mastodons, elephants and other animals.[1]

The generic characters deduced from these remains, by Mr. Foster, are as follows: "Teeth — incisors, $\frac{1}{1}$ $\frac{1}{1}$, destitute of canines; molars, $\frac{4}{4}$ $\frac{4}{4}$; total, 20; incisors of the lower jaw, convex in front, and longitudinally striated; posterior surface angular, smooth, and slightly concave. The grinders are obliquely traversed by six ridges or folds of enamel." "The *Castoroides* was an animal closely allied to the beaver, but far surpassing it in magnitude; its life was probably aquatic, and its food consisted of vegetable substances, which it gnawed off with its powerful incisors."[2]

An accurate cast of the lower jaw above described,[3] was made, and now exists in many museums in the United States. On comparing this cast with the lower jaw of the cranium now under consideration, no question can exist as to their belonging to one and the same species; but on reviewing the generic characters given by Mr. Foster, as will be seen hereafter, they will be found insufficient to characterize the genus, and as regards the molar teeth, his description is not in accordance with the anatomical peculiarities of those organs.

[1] Second Report on the Geological Survey of the State of Ohio, p. 81, et seq.; Am. Journ. Science, Vol. XXXI. p. 80.

[2] From a notice of these remains in the American Journal of Science, Vol. XXXI. p. 80, it would appear that the radius was ten inches in length, two inches across the head, and one and a half inches across the carpal extremity. The upper incisor tooth found with the same remains, measured along its curve, eight inches; its two extremities, however, were mutilated. The lower incisor was much less curved than the upper, and has a length of nine inches: the lower jaw itself measured eight inches.

[3] Now in the Zanesville Athenæum.

Until the present time no description of an entire cranium has been published, and as far as can be learned, the present is the first instance of the discovery of one in a perfect condition. It is that of an adult, measures 10.5 inches in length, and 7.2 inches across the broadest part of the zygomatic arches; the transverse diameter of the occiput is 5.5 inches, and that of the narrowest part of the cranium, between the orbits, is 1.9 inch. In its general outline it resembles that of the Castors; but in its dentition it more closely resembles the Capybaras than any other Rodents, and among the Pachydermata, it presents close analogies to the elephants. To the structure of the pterygoid fossæ, analogies are found in the Ondatras.

On comparing the cerebral portion of the skull with that which lodges the nasal cavities, the former is relatively much smaller than in the Castors, Ondatras, and Capybaras. In Castoroides the longitudinal diameter of the cerebral cavity is less than two-fifths of the entire length of the skull; in the Castor the same cavity is one-half, and in the Ondatra more than half the length of the skull.

The upper surface of the cranium is much more flattened than in the Castors, and the interparietal crest extends the whole length of the sagittal suture — posteriorly this crest has an elevation of nearly half an inch, where it is crossed by another, which separates the occipital from the coronal region; anteriorly it terminates in two diverging ridges, which are lost on the upper edges of the orbits. A triquetrous bone relatively much smaller than in the Castor, exists at the union of the sagittal and lambdoidal sutures.

The occiput resembles that of the Castors but is more depressed, having a transverse diameter of 5.5 inches, and a vertical one of 2.6 inches; its plane inclines forwards so as to form an angle of about 80° with the base of the skull. The foramen magnum is very regularly oval, like that of Arctomys, its transverse diameter measuring 1.2 inches, and the vertical

0.6 inch — unlike the Castors, Ondatras, and Capybaras, it is destitute of an emargination on its upper border. The occipital condyles are semi-terminal, forming a gynglimoid articulation with the atlas, which allows a free vertical motion on the vertebral column, but precludes the possibility of any but a very slight one in a lateral direction. The basilar portion of the occiput has a slight ridge on the median line, and at its union with the sphenoid bone there exist two conical projections, united by a transverse ridge, and are coössified with the inner pterygoid processes, thus forming a part of one of the entrances to the posterior nares.

The tympanic portions of the temporal bones present very nearly the same conformation as in the Capybaras; at the inner extremity, however, there exists a broad plate or process having a concavity forwards, which enters into the formation of the posterior limit of the pterygoid fossa. The external auditory meatus, like that of the Castors, consists of a long tubular process, about an inch in length, and extending upwards and forwards in a curved direction; the external orifice of which scarcely exceeds that of the common beaver.

In the development and conformation of the pterygoid processes, the Castoroides differs from all the existing Rodentia. Both processes articulate with the tympanic bone, but the development of the external plate is by far the greatest; the internal, however, has the remarkable peculiarity of being curved inwards towards the median line, so that the most prominent part of its convex surface is brought in contact with that of the corresponding process of the opposite side. In consequence of this, the entrance to the posterior nares, or the meso-pterygoid fossa, is completely obstructed in its middle portion, and instead of one large quadrangular orifice, as in other Rodentia, we have two distinct orifices; one of these, superior, of a pyriform shape, the circumference of which is formed in part by the posterior extremities of the pterygoid processes, and in part by the anterior or basilar portion of the occipital bone; the second, inferior, is formed by the origins of the same processes and the posterior edges of the ossa palati.

The pterygoid fossa has a depth of about two inches, which, added to the great breadth of the outer process and the curvature of the inner, gives an extraordinary surface for the origin of the internal pterygoid muscle. The fossa serving for the origin of the external pterygoid muscle, involves the whole of the greater wing of the os sphenoides, and is more remarkably developed than in any of the allied genera.

The triangular-shaped palatine space comprised between the two ranges of molars has a length of two inches; posteriorly it is 1.8 inch in breadth, but anteriorly is so much contracted as to leave a space of 0.3 inch only between the first molars. The posterior palatine foramina are elongated elliptical openings, having a longitudinal diameter of 0.5 inch, and directed obliquely outwards.

The ossa palati terminate anteriorly, opposite the space between the first and second molars, at which point commences a ridge, at first not well defined, but afterwards becoming well marked, and extending as far forwards as the foramen incisivum; commencing in front of the first molar, on each side, is another ridge, less distinct, and terminating on the side of the same foramen. In the Castors the central ridge extends backwards quite to the posterior edge of the palatine bones.

The incisive foramen, which in the Castors, Ondatras, Marmots, Agoutis, &c., acquires so great a size, is in the Castoroides proportionally remarkably small, scarcely allowing the passage of an ordinary probe.

The anterior edge of the first molar is situated just in the middle of the base of the skull, but in the other genera above referred to, it is always in advance of the same point. The alveolar portion of the intermaxillary, situated just below the nasal orifice, presents a deeply indented and roughened surface, serving for the attachment of the upper lip, doubtless unusually developed in order to conceal the large incisor teeth. The nasal orifice is more quadrangular, but otherwise resembles that of the Castors.

The zygomatic arches project farther from the side of the cranium, but are much more slender than in the Castors, especially behind the post-orbitar process of the malar bone; the orbitar process of the frontal bone is small. The zygomatic process of the temporal is also more slender, and the groove or channel serving for the lodgment of the condyle of the lower jaw is destitute of the ridge on its outer border, which is so well marked in the Castors, Ondatras, and Capybaras. The infra-orbitar foramen presents nearly the same conformation as in the Castors, but is provided externally with only a very slight projection of bone.

The right inferior maxilla alone exists, and is in a perfect condition, excepting only the incisor tooth. Its length from the angle to the edge of the incisive alveolus is 7 inches, and its breadth from the top of the coronoid process vertically downwards, $3\frac{3}{4}$ inches; all the processes are remarkably developed, and indicate the existence of powerful masticatory muscles; inferiorly it is remarkably broad and almost flat, from 1.5 to 1.8 inch in breadth, and terminating posteriorly in a triangular surface, the apex of which is turned inwards; in these peculiarities it contrasts with the jaws of all existing Rodents. The condyloid and the coronoid processes are more nearly on the same level than in the Castors, the neck of the former being proportionally longer, and the plane of the whole of the ascending portion of the jaw forming an angle of about 45° with the shaft of the bone, the condyle being turned inwards. Immediately beneath the triangular notch, which separates the condyloid from the coronoid process, on the outer surface, there exists a deep fossa, which is limited inferiorly by the projection formed by the walls of the cavity lodging the base of the incisor teeth. The insertion of the masseter muscle is plainly indicated by a very deep triangular impression, the apex of which is directed forwards.

On the inner face of the bone, the fossa, serving for the insertion of the inner pterygoid muscle, occupies the whole of the angle of the jaw, the surface of which is much increased by the development, on its edge, of the thin plate of bone which exists in the Castors, but is very slight. A well-marked fossa is also noticeable at the base of the coronoid process, and a well-defined oval impression 2 inches long, and ½ inch broad, situated just below the molares, indicates the existence of a powerful mylo-hyoid muscle. The muscular depression at the symphysis indicates a corresponding power in the digastricus and genio-hyoideus.

From the above descriptions it will be seen that in its osteology the Castoroides has greater analogies to the Castors than to any other genus of Rodents, but differs materially from it, however, in the forms of those parts which serve as origins to the muscles of mastication. It now remains to examine the structure of the teeth, and to institute comparisons between them and those of the allied genera.

The incisors have been already described by Mr. Foster, in his notice of the lower jaw; they have a triangular form, one of the faces presenting forwards, and one of the angles backwards. The enamel on the two lateral or posterior faces is smooth and thin, while that on the anterior is much thicker, and deeply grooved or fluted, the grooves corresponding with others less distinctly marked on the surface of the dentine. The alveolus lodging the incisor of the lower jaw extends as far back as the angle, and the whole tooth has a length of between 10 and 11 inches. The superior incisors have curves of lesser radii, and are much shorter, but are similarly grooved on the anterior face, and are exposed for the distance of about three inches. In none of the existing genera are the grooves of the enamel so distinctly marked.

The molares form a continuous grinding surface in both jaws, that of the upper slightly convex, 2.5 inches in length, that of the lower concave having a length of 2¾ inches, and elevated anteriorly so as to form an angle of nearly 45° with the body of the bone. The molars of both jaws diminish in size from before backwards, in which respect they differ from those of the Capybara. In the lower jaw the first molar has two deep grooves on the inner and one on the outer lateral surface; the other three have a single groove on each side, so that the grinding surface of each tooth has something like an hour-glass contraction in the middle. In the upper jaw the reverse state of things exists, the last molar having the same peculiarities as the first in the lower.

In their structure the molar teeth do not resemble those of the Castors, to which they have been compared. They are all compound, consisting, like those of the Capybara, among Rodents, and those of the Elephant among Pachyderms, of a series of laminæ of dentine, invested with enamel, and united together by means of an interposed cæmentum or crusta petrosa. In the first molar of the upper and the last of the lower jaw, four such laminæ exist, while in each of the others there are but three. The worn grinding surface presents a series of sections of these laminæ, which are more or less contorted on the inner and outer border of the tooth, giving the appearance in some parts of the union of two adjoining laminæ, but which does not actually take place in any instance.

Thus we have teeth constructed upon an entirely different plan from that of the castors, in which they are simple, the ridges on the grinding surfaces being formed merely by involutions of enamel, and not unlike that of the posterior molares of the Capybara, which consist of a series of laminæ, united by means of crusta petrosa. In the last-named animal, however, the number of laminæ is thirteen, and the interspaces are imperfectly filled with cœmentum, so that the edges of the teeth are more or less serrated; but in the Castoroides the number of laminæ does not exceed four, and the crusta petrosa fills the whole of the interspaces. In the anterior teeth of the Capybara, there is an involution of the enamel at the edge which does not exist in the Castoroides.

On reviewing the description of this cranium we find that it presents analogies to the genera Castor, Fiber and Hydrochærus. Osteologically considered, the cranium bears a stronger resemblance in its shape to that of the Castors, than to either of the other genera; but in its dentition the type is wholly different, as is also the conformation of the pterygoid processes and fossæ.

Compared with the Castors, the relative capacity of the cranium is much smaller, and the occiput more depressed; the occipital condyles admit of a free and extensive motion vertically, but only a very limited one in a lateral direction; the *foramen magnum* has a depressed oval form, and is destitute of an emargination on its upper edge. It differs from all other Rodents in the size and conformation of the pterygoid processes and fossæ; especially in the incurvation of the internal processes and the consequent subdivision of the entrance to the posterior nares. It differs entirely from the Castors in the compound nature of the molar teeth, and in the flutings of the incisors; in the diminutive size of the incisive foramina, and in the conformation of the lower jaw with reference to the insertion of the muscles of mastication.

In the Hydrochærus the principal analogies are found in the compound nature of the molar teeth, from which those of the Castoroides, however, are readily distinguished by the posterior molars of the former having an increased number of laminæ; by the complication of the anterior molars in consequence of the involution of the enamel on the inside of the teeth of the upper, and the outside of those of the lower jaw, and by the serrated edges caused by the existence of a small quantity only of crusta petrosa between the laminæ.

In the Fibers the pterygoid fossæ are largely developed, but the entrance to the posterior nares has the same conformation as in other Rodents.

All the fossæ and processes which serve as origins or insertions to the muscles, (and consequently the muscles themselves,) of the lower jaw, are much more remarkably developed in this animal, than in the members of any of the allied genera of Rodents: they are indices of the great force with which their powerful incisors may be used.

The well-marked depressions which indicate the insertions of the mylo-hyoid, digastric and genio-hyoid muscles are also interesting. The functions of these muscles are twofold; first, to elevate or bring forwards the os hyoides, as in the act of deglutition, the lower jaw being a fixed body; this, however, requiring but a very moderate amount of muscular force: second, to depress the lower jaw, which they can do only when the os hyoides is rendered immovable by the action of the sterno-hyoid and sterno-thyroid muscles. It is with reference to this last function, the depression of the jaw, that the muscles in question are so remarkably developed, and thus supply a powerful antagonistic force to that which moves the jaw in the opposite direction. This force would frequently be brought into play in disengaging the teeth, when firmly imbedded, as must sometimes happen, in the woody substances which they were gnawing or cutting.

The great length of the portion of the incisor teeth imbedded in the alveoli, is scarcely less remarkable than the other peculiarities of this skull. The final cause of the great length and the curved form of the incisive teeth of the Castoroides as well as of the Rodents, in general, would seem to be twofold; first, to increase the surface of the attachment of the tooth, and thus afford more points of resistance to the pressure applied to its free extremity during the ordinary use; secondly, the curved form serving to transmit that pressure to the convex surface, instead of the base of the tooth; this last being always in a growing condition, is from necessity pulpy as well as highly vascular, and, therefore, incapable of sustaining any great degree of pressure.

Though a matter of great interest, it is hardly possibly to form a very correct estimate of the size of the Castoroides, almost the only data offered to us being those given by the cranium. The length of the skull of this animal is 10.5

inches, and its greatest breadth 7.2 inches. According to Professor Emmons, the skull of an old female beaver, measured, from the tip of the nose to the crucial ridge, 4.9 inches, and its greatest width 3.9 inches;[1] an adult skull in my own cabinet gives precisely the same measurements. The skull of the Castoroides is therefore a little more than double the size of that of the common beaver, (Castor fiber.) According to Dr. Richardson, the largest beavers which he had an opportunity of measuring, had a length of 2 feet, 6 inches; Dr. Godman estimates the average length at about 2 feet; assuming the proportions of the Castors and Castoroides to be the same, we should have the entire length of the latter amounting to about 5 feet.

The generic characters of the Castoroides which have been deduced from the cranium just described, and which, on comparison, will be found to differ materially from those given by Mr. Foster, are as follows.[2]

TEETH. Incisors, $\frac{1}{1}\frac{1}{1}$; Canines, $\frac{0}{0}\frac{0}{0}$; Molars, $\frac{4}{4}\frac{4}{4}$; total, 20. Molars consist of thin laminæ of dentine, surrounded by enamel, and united by crusta petrosa. The first in the upper and the last in the lower jaw, have four such laminæ, and the remaining teeth have only three each; the grinding surface is slightly concave in the lower jaw, and slightly convex in the upper, the enamel forming only a very small projection above the dentine and crusta petrosa. The internal pterygoid fossæ are largely developed, and the internal pterygoid processes are so far deflected inwards as to touch on the median line, and divide the entrance to the posterior nares transversely, thus forming a superior and an inferior orifice.

[1] Report on the Quadrupeds of Massachusetts, p. 51.

[2] Common usage among zoölogists would justify us in substituting a new name for that of Castoroides, especially since the generic characters have been very differently defined from what they were in the original description. The name Castoroides, however, having gone into general use, it would therefore seem desirable that it should be retained.

ART. XXX.—POLYTHALAMIA IN SAND FROM THE SAHARA DESERT. By JOHN BACON, Jr., M. D.

THERE is in the Cabinet of our Society a specimen of Sand from the Desert of Sahara, which I find to be partly composed of microscopic Polythalamian shells. I am unable to state from what part of this widely extended desert it was obtained. The society having committed this specimen to Dr. Charles T. Jackson for chemical analysis, a portion was kindly placed by him in my hands for microscopic examination.

Under the microscope, the sand is seen to consist mainly of irregular quartzose grains, of a reddish-yellow color, and a pretty uniform size, ranging between $\frac{1}{100}$ and $\frac{1}{300}$ of an inch. We can readily understand the facility with which the wind raises in clouds and conveys to great distances sand so fine as this. These grains are more or less rounded on the angles and edges. A few minute quartz crystals are also met with, presenting the usual six-sided prism with pyramidal terminations, and rounded in the same manner.

Among the translucent particles of quartz, a considerable number of rounded opake grains, of a white color, may be perceived by the unassisted eye. Some of these were submitted, under the microscope, to chemical tests, and proved to be calcareous. In order to examine them microscopically, the sand was put up in Canada balsam, on slips of glass, and covered by thin mica or glass. Being now viewed by transmitted light, with a moderate power, the white grains (to which the balsam communicated a degree of transparency) were at once seen to be Polythalamian shells; generally much broken, and presenting a worn and rounded exterior; so that nothing satisfactory could be made out when they were examined by reflected light.

Between one and two hundred specimens were obtained from a considerable portion of the sand, but only six or seven species could be made out. In the figures accompanying this paper, all the forms are represented which appeared specifically distinct. It is, however, very possible, especially as my acquaintance with the genera and species of the polythalamia is but slight, that other species may have escaped notice among the large number of worn and broken specimens.

The figures given were sketched by means of a camera lucida eye-piece attached to one of Chevalier's Horizonto-vertical microscopes. They are all drawn to one scale, indicated by fig. 10, (Pl. XX.) which represents $\frac{25}{100}$ of a millimetre, magnified equally with the sketches. By means of this scale, the dimensions of the specimens figured can be readily ascertained.

I have determined two only among the species figured. The one represented in figs. 1 and 2 is the Textilaria globulosa: fig. 9 is the Rotalia globulosa. Figs. 3 and 4 I have no doubt belong to the genus Textilaria; probably fig. 4 is the T. aciculata. The cells of these polythalamia are often partially or entirely filled with opake calcareous matter. More generally, the cells are empty; or only dark spots, such as are represented in figs. 2, 7, and 9, are seen in them. The average size of the shells is about the same as that of the quartz grains. But there are many fragments present which must have belonged to larger individuals than any that were found entire. No siliceous infusoria were met with. The imperfect state of the specimens prevented my giving outlines of them in other positions than those in which they are figured. For the same reason, it was not practicable to estimate accurately the proportion of individuals belonging to the several species represented, but the Textilaria globulosa and the form represented in figs. 6 and 7, are the predominant species. Only a few specimens of Rotalia globulosa were found.

I am unable to draw any conclusion with regard to the geological age of the Desert Sand from the presence of these Polythalamia. The species Textilaria globulosa, and T. aciculata, and Rotalia globulosa are among the most prevalent forms of the chalk formation; occurring in the cretaceous strata of all parts of the globe, and often making up a large part of the rock. But they occur also in the tertiary strata, though there accompanied by various larger forms belonging to genera peculiar to that period. Whether the fragments mentioned as present in the sand are such as would allow us to refer it to any of the divisions of the tertiary, my slight acquaintance with the subject does not enable me to decide. The polythalamia of the chalk are not extinct species, having been found living in our present seas. It has occurred to me that these in the sand might possibly be recent; but the circumstance that many of them have their cells completely filled with calcareous matter renders it very unlikely. The majority, however, are empty; but such is also the case with those which I have examined from both the secondary and tertiary strata. From Mr. Weaver's Abstract of Ehrenberg's Memoir on the Microscopical Structure of Chalk, &c., published in the Annals of Natural History, for 1841, I find that Ehrenberg is aware of the existence of polythalamia in the sand of the Libyan Desert, but no mention is made of any of the species present.

Through the kindness of President Hitchcock, of Amherst College, I have been favored with a portion of the specimen of Sand from the Desert of Arabia, described by him in an article on the Geology of Western Asia, contained in the Transactions of the American Geological Association, page 352. Its general appearance is similar to that of the specimen from the Sahara Desert, except that the eye can detect no calcareous particles in it. The quartz grains are, however, larger, (averaging $\frac{1}{60}$ of an inch,) and appear more transparent and of a somewhat deeper color. This specimen proved to be entirely free from polythalamia, consisting merely of reddish-yellow quartz grains.

ART. XXXI.—CHEMICAL AND MINERALOGICAL FRAGMENTS. By C. T. JACKSON, M. D.

Remarks on the Formation of Crystals of Argentiferous Galena, by Sublimation.

AT the meetings of the American Association of Geologists and Naturalists in Boston, New Haven and New York, I proposed to account for the origin of several metalliferous veins, by sublimation of their ores or constituents. In favor of this theory, I mentioned that a considerable loss was sustained in smelting lead ores, owing to the evaporation of the sulphuret of lead at the temperature required for its reduction; and called the attention of geologists to the quantities of sulphuret of lead which rise in the chimneys of smelting works, and to the particles of sulphuret of lead which fall on the roofs of the buildings, and on the surrounding soil.

It was ascertained by Berthier, that when galena is kept fused in a crucible, lined with charcoal, in which the reduction of the lead could not take place, a considerable portion of the galena was actually lost by sublimation. It is also known, that although silver is regarded as fixed in the fire, and does not volatilize when exposed for weeks to the heat of a porcelain furnace, it is partially sublimed with the vapor of lead in the process of cupellation; and that the last portions of litharge blown over, contain a notable proportion of silver.

It appears probable, that argentiferous galena is also volatile under certain circumstances; and from some phenomena which I observed at the Shelburne mines, and in the crystals of lead ore which I have examined, it would seem that the origin of those veins and crystals can be demonstrated to have arisen from vapor of the ore.

A cavern was struck by the miners, at the depth of about twenty feet, and the walls of this crevice were found to be covered with crystals of argentiferous galena, associated with brown spar and quartz. The crystals of argentiferous galena are in the forms of octahedra, having their solid angles replaced by single planes, and rhombic dodecahedra with their surfaces rounded and dimmed by decrystallization, or by irregular deposits of minute particles of the ore. There are also some cubic crystals which have their surfaces much altered, and their angles effaced or blunted, and which present depressions in the planes of the cube, as if the ore had sunk, in a semi-fluid state, into a cavity.

Some of the crystals exhibit the most decisive proof of their igneous origin, and have undergone a sort of eliquation, the interior of its mass having flowed out, and left the exterior crust in the form which the crystal originally assumed on cooling of its surface. Some of these crystals are somewhat larger than a hen's egg, and form very beautiful specimens to illustrate the origin of the ore, and would ornament the cabinet of a mineralogist.

We may suppose that the cavern in which these crystals occur, was originally filled with molten galena, and that the ore ran out from it into other crevices, and left the cooled and crystallized ore on the walls; or that an open crevice allowed the vapor of lead ore to sublime into the chamber, and that the crystals were deposited on its surface by their cooling action. The appearance of the walls seem to indicate the latter theory as the most reasonable; for the crystals of lead ore were deposited upon the quartz and brown spar crystals, which do not appear to have been bathed in the molten ore. I should assign the same origin to the resplendent octahedral crystals of black cupriferous blende, which are sprinkled over the surface of this cavern, and to the crystals of copper pyrites which are associated with the lead ore.

Assay of a Specimen of the Crystallized Argentiferous Galena from the Cavern in Shelburne Mine.

Two hundred grains of the ore, reduced with carbonate of soda and the iron of an iron crucible, yielded 147 grains of metallic lead, or 73.5 per cent.

One hundred grains of the lead cupelled for silver, yielded 0.27 gr., or $5\frac{4}{10}$ lbs. per ton.

In this assay there was a loss of sulphuret of lead by sublimation; for, according to its atomic formula, we should have obtained, if all the lead was saved, 86 per cent. This example is sufficient to show how much galena is generally lost in the process of reduction. It is rarely the case that we obtain more than from 79 to 82 per cent. of lead by reduction, when the ore contains 86 per cent. of that metal; but the temperature in this operation is so moderate that none of the sulphuret of silver volatilizes.

There is reason to believe that some of the metalliferous ores that are fixed in fire have been raised in vapor in combination with other materials. Thus, tin may have been raised in combination with fluorine, and by decomposition of the fluoride by water, the oxide of tin would be deposited, as has been suggested by M. Daubrée.

In other cases, we may suppose one of the elements of a combination to have existed in the rocks, and the other element may have been sublimed, and entered into combination with it, as may have been the case in the formation of iron pyrites. Specular iron ore, although oxide of iron alone is fixed, owes its origin to the decomposition of the chloride of iron; and the oxide rises in vapor and crystallizes on the walls of a crevice in the rocks.

Composition of the bones, tusks and teeth of the Mastodon.

Although it has long been known that a small proportion of animal matter is found in some fossil bones, it has remained until now to demonstrate that the bones, tusks and teeth of the American mastodons contain nearly if not all of their cartilaginous matter, and that they differ but little from recent bones.

There seems to be some confusion as to the term fossil; some supposing that a fossil must necessarily be petrified, or have its animal matter replaced by mineral elements. This is not necessary to constitute a fossil; for, under favorable circumstances, animal matter in bones may be preserved for an indefinite length of time.

When an animal is buried in sandy soil, through which rain water freely percolates, the animal matters are quickly decomposed, removed by solution, and by a slow combustion or oxidation, effected through the agency of the oxygen gas of the air, dissolved in the water, there being about twenty per cent. in bulk of oxygen gas dissolved in rain water. If, on the other hand, an animal is buried in clay or marl, but little water can flow through it, and air does not gain free admission; hence the animal matters remain in the bones, and even the decomposed flesh remains in the form of a black mould around the bones, and the clay has a strong odor of animal matter. In the tertiary clay marls of Westbrook, Gardiner, Augusta, Bangor, Lubec, South Berwick, and Kittery, in Maine, the membranous matter forming the epidermis of extinct species of shells, remains undecomposed, and the clay has a strong smell of sulphureted hydrogen gas, like that of ordinary dock mud. In some cases, the animal matter of the epidermis of the shells has proved more permanent than the carbonate of lime of the shells, which is not unfrequently removed by the acids in the clay, leaving the form of the shell perfectly represented by its membrane and mould in the clay.

When the skeleton of the seal was dug up in the clay marl of South Berwick, from a depth of thirty feet, the workmen noticed a black mould surrounding the bones, and a strong smell of animal matter was perceptible in the clay.

If animal matters are so well preserved in the tertiary deposits, it will not appear strange that the bones of animals in the more recent deposits should have preserved their animal tissues.

The bones which I have analyzed are those of the American mastodon. A quantity of the chips of bone cut from near the second molar tooth of the jaw of a young mastodon, belonging to the collection in Harvard University, was given me by Dr. John B. S. Jackson. This bone had a dark brown color, was tough and firm, and had evidently undergone no decomposition, though it had become penetrated somewhat with oxide of iron.

On immersing portions of the bone in water acidulated with chlorohydric acid, the mineral matters and bone salts were removed, and the cartilage remaining was found to be much larger than the original bone, from its absorbing water after the removal of the phosphate of lime, &c.

This cartilage, on being washed free from acid and boiled in water, was converted into gelatine, which formed a good glue. On burning off the animal matter from a portion of the bone, there remained 57.4 per cent. of bone salts, and the animal matter was 42.6 per cent. The bone earth had a light brown color, owing to the presence of peroxide of iron.

Analysis of the bones of the great Mastodon, belonging to Dr. John C. Warren.

A portion of one of the vertebral spines was sent me for analysis, which gave the following results. One hundred grains on being pulverized and dried at a temperature a little above 212° F. lost 6 per cent. of water. On burning off the animal matter, 64 per cent. of bone salts remained, and 30 per cent. of animal matter was burnt out. The bone salts had a strong blue color, which was deeper than that of the artificial ultramarine formed by burning ordinary bones, and was probably due to the presence of sub-phosphate of iron.

Another portion of the bone, dried at 300° and then burnt, left 72.27 per cent. of bone salts, and the animal matter would amount to 27.73 per cent. There was some decomposition of the cartilage in this case, so that the amount of animal matter is stated too low, the previous analysis being more exact. By immersing portions of this bone in diluted acid, the whole form of the bone was represented in cartilaginous matter, and glue was made by boiling it in water.

Analysis of the tusk of a Mastodon from Benton County, Missouri. Specimens furnished by Dr. J. C. Warren.

On examination of this tusk it was found to have undergone partial decomposition; the interior had become white and earthy, while most of the exterior plate of ivory had undergone but little change.

The white, earthy-looking matter in the middle of the tusk, on analysis, yielded 4.60 per cent. of water, 6.20 per cent. of animal matter, and 89.20 per cent. of bone salts.

The exterior plate analyzed, yielded

Water,	4.6
Animal Matter,	26.2
Bone Salts,	69.2
	100.0

The hard ivory of the tusk yielded

Water,	4.600
Cartilage,	30.800
Phosphoric acid,	27.424
Lime,	36.024
Magnesia,	.900
Fluorine, Carbonic acid, &c., by loss,	.252
	100.000

I etched a piece of glass with the fluohydric acid obtained from the bone salts of this ivory.

A portion of the ivory digested in water acidulated with chlorohydric acid, gave a tough and elastic piece of cartilage of the size and shape of the piece of tusk subjected to its action.

Analysis of Mastodon teeth from Benton County, Missouri. Specimens from my collection.

A portion of the ivory of the root of one of these teeth was immersed in dilute muriatic acid, which left a mass of very elastic cartilage, larger than the piece of ivory subjected to its action. The cartilage was of a yellowish-white color, and presented delicate filaments of membrane hanging to its surface. The appearance of the cartilage was like that obtained from the ivory of the tusks, but was more firm.

The following analyses were made in my laboratory by Mr. Joseph Peabody.

Analysis of the sound Ivory of Mastodon tooth.

Water,	8.64
Animal Matter,	23.28
Phosphate of Lime,	56.728
Carbonate of Lime,	9.844
Magnesia,	0.22
Soda and Fluorine, by loss,	0.588
	100.000

Analysis of the internal portion of same tooth, the decomposed Ivory.

Water,	4.84
Animal Matter,	6.84
Phosphate of Lime,	73.476
Carbonate of Lime,	9.604
Magnesia,	0.96
Soda and Fluorine, by loss,	4.28
	100.000

From the above researches, it is evident that the term *ivory*, of the teeth, is appropriate, not only on account of its physical resemblance to the ivory of the tusks, but also from its similarity in chemical composition to true ivory. The mastodon tooth has no cement like that of the teeth of elephants. We have yet to analyze the enamel of the mastodon tooth, and shall communicate the results of our researches hereafter.

Analysis of the Ear-bone of a Fish.

We are not aware that the ear-bone of the fish has hitherto been subjected to a chemical analysis, but it presents a strange anomaly in comparison with ordinary osseous matter. Attention was called to it from the fact, that it is used by the natives of some countries, as a remedial agent; and though, at first sight, this might be deemed fanciful, yet on examination we find an unusual quantity of carbonate of lime to be present, which may act as an antacid. The carbonic acid was first estimated by calcining the bone, and restoring, with carbonate of ammonia, the carbonic acid driven off; and secondly, by treating the powdered bone directly with hydro-chloric acid, in an apparatus nicely counterpoised with chloride of calcium tube attached, the acid contained in a tube within being weighed with it, so that when the acid was brought in contact with the powder, and again weighed, the only loss was the carbonic acid, which escaped with effervescence during the digestion; this served as a check on the previous trial, and exactly confirmed it.

Water,	0.92
Animal Matter,	12.44
Carbonate of Lime,	70.08
Phosphate of Lime,	16.16
Phosphate of Magnesia,	0.40
	100.00

This ear-bone presents a marked exception to the quantity of cartilage contained in the other bones of fish, which usually exceeds that of higher orders of the vertebrata.

ART. XXXII.—ON THE HABITS OF SALMO FONTINALIS. From a Letter addressed to Dr. STORER, by J. B. FORSYTH, M. D.

THE few observations I have to communicate upon the habits and peculiarities of the salmon trout, were made during a residence of ten years in Sandwich, Cape Cod, where the facilities for that purpose are very abundant.

It may be well to premise, that the distance, at this point of the cape, from one bay to the other, varies from five to ten miles, and the land is gradually elevated from each shore till it reaches the centre, and consequently the streams, for the most part arising from springs, are short, terminating in creeks upon the marshes. Many of these are of sufficient magnitude for mill sites, and are therefore crossed by permanent obstructions; and hence it frequently happens, in the short space of a quarter of a mile, you find specimens of both, as they are familiarly called, the fresh and salt water trout.

The following varieties in color and appearance have been observed. 1st. Those having the upper part and sides of a pale brown, gradually becoming less so, till it terminates in white on the under part, having a silvery appearance when first taken from the water, and covered with small, distinct scales; the circular yellow and red spots very indistinct; generally found in the marshy creeks, or in open streams, where the sun has free access. They are well fed upon minnows and shrimps, have a plump appearance, and are the variety mostly sought after by those who desire the trout, in its highest perfection, for the table. They are taken, mostly, between the months of January and July. They vary in size from one fourth of a pound to four pounds; but I have never seen one to exceed two and a half.

2d. Those having the upper part and sides of a dark brown, having a dark green appearance, terminating in white or orange underneath, and covered more or less with round, yellow spots, with a bright red centre, color varying according to the location; and generally not so plump and well fed as those above mentioned.

3d. Those having the upper part and sides of either a light or dark brown, with spots more distinctly marked on the dark than the light; underneath, the color uniformly ferruginous or orange.

Each of these varieties is found both in the streams communicating with the salt marshes, and in those which are entirely cut off from them, by permanent obstructions. The first named variety, however, is nowhere found in so great perfection as in close approximation to the salt creeks. The difference between the salt and fresh water trout, in this vicinity, seems to be only in name, so far as I have been able to determine, with ample opportunities in taking them, and with specimens before me. The peculiarity of these varieties seems to depend entirely upon the location, and the nature of the soil at the bottom of the stream they inhabit. The first variety is found in clear water, with light gravelly bottom, and where the banks are not shaded by shrubbery, but where they are almost constantly exposed to the rays of the sun. The second variety inhabits streams which are for the most part shaded by trees, or which take their rise in, or pass through, peat bogs. Thus, in one stream, the trout caught at the head of it were always of a very dark brown, almost black, highly marked with yellow and red spots, while those taken near the mouth of the stream were of a light color. One of these streams arises from a deep basin of dark water, thirty feet in diameter, and ten feet deep, surrounded by a peat bog, where the fish taken, so far as I know, have been uniformly of a dark brown. In other streams, having a bottom of iron ore, they are uniformly marked with orange underneath, the color of the upper part and sides appearing to depend upon the amount of exposure to the sun's rays. These observations are made independent of any of the changes of color or markings which take place duing the spawning season.

About the first of January these fish are found congregated together at high water mark, and seem to have come down the stream for the purpose of locating themselves in the marshes, where they can obtain food. So uniform are they in this, that for a number of years, it was my custom to visit one particular stream, during this month, and I was always sure to find them assembled in waiting for me, within a few rods of the same spot, in number I cannot say how many, but I would take of them, varying from sixty to seventy-five.

During the months of February, March and April, they become separated, and are distributed the whole length of the creeks, and about the first of May, begin again, in small numbers, to ascend the stream. This they continue to do as the season advances, and their means of sustenance increases, (which is principally insects and flies,) till about the middle of October, when they are found in great numbers, as near up as they can conveniently get to the origin of the stream. This is their spawning season, and having deposited their spawn, they begin to wend their way down the stream, for the most part in a body, till they reach again the marshes.

These fish were formerly taken in considerable numbers, with a kind of net used in the herring fishery; but this method of taking them is, I believe, prohibited by legislation. They are now taken, for the most part, with line and hook, bated with minnow, shrimp or earth-worm; or, at some seasons of the year, with the artificial fly, more especially in the fresh ponds. Two other methods of taking them have been resorted to in the small streams, both of which deserve a passing notice; the first is by titillation, so called, and the second, hooking them up by the caudal extremity, decidedly the meanest way of taking them.

The method of taking them by titillation is this: about the spawning season, they are found, for the most part, in the small and narrow head streams, and seem more sluggish than at any other season of the year, and less inclined to take the bait. Having arrived at the edge of the stream, the hand is carefully and gently passed along under the banks, till it comes in contact with the fish, generally near the tail. The titillation then commences, and the hand is made to approach towards the head, till sufficiently forward to prevent slipping through the fingers, when by a sudden grasp it is landed upon the shore, the fish remaining perfectly quiet during the process. This mode of taking them I have practised in one stream three years in succession, and taken many fine trout.

The unscientific mode of hooking them up by the caudal extremity, is also practised at the spawning season, when they are averse to taking the bait, and where the stream is deeper and wider. The manner is as follows. A large sized hook, made very sharp, is fastened to the end of a long straight stick, or piece of whalebone. The fish is then sought and generally found beneath the root of an old tree, or under the shadow of a log, with the head and part of the body out of sight; the hook is then carefully introduced near the extremity of the fish, and by a sudden jerk, is inserted so as effectually to secure him.

ART. XXXIII. — DESCRIPTION OF PYRANGA ROSEO-GULARIS, (ROSE-THROATED TANAGER.) By SAMUEL CABOT, JR., M. D.

MALE. Top of head, outer edge of primaries, and secondaries, and surface, of greater and lesser wing coverts, the tail and its upper coverts, bright brownish red. Under side of tail and its under coverts, throat, and flexures of wings, bright rose color. Back and posterior part of cheeks, dark brownish ash color. Anterior part of cheeks, breast and belly, light ash-colored. Twelve tail feathers. Bill strongly toothed, horn-color on top, lighter beneath. Legs and feet, horn-colored. Total length, $6\frac{2}{8}$ inches. Length of bill, $\frac{5}{8}$ of an inch along the ridge, and $\frac{6}{8}$ along gape, $\frac{5}{16}$ of an inch across at base, $\frac{3}{8}$ through from above down. Tooth situated at $\frac{2}{8}$ of an inch from point of the bill. Tarsus rather more than $\frac{6}{8}$ of an inch in length. Tail, $2\frac{6}{8}$ inches long. Wing from flexure, $3\frac{1}{8}$ inches.

I only saw one pair of these birds while I was in Yucatan, of which I only procured the male, from which the above description is taken. He was shot on the road from Chemax to Yalahao, on the 5th of April, 1842.

Fig 1.

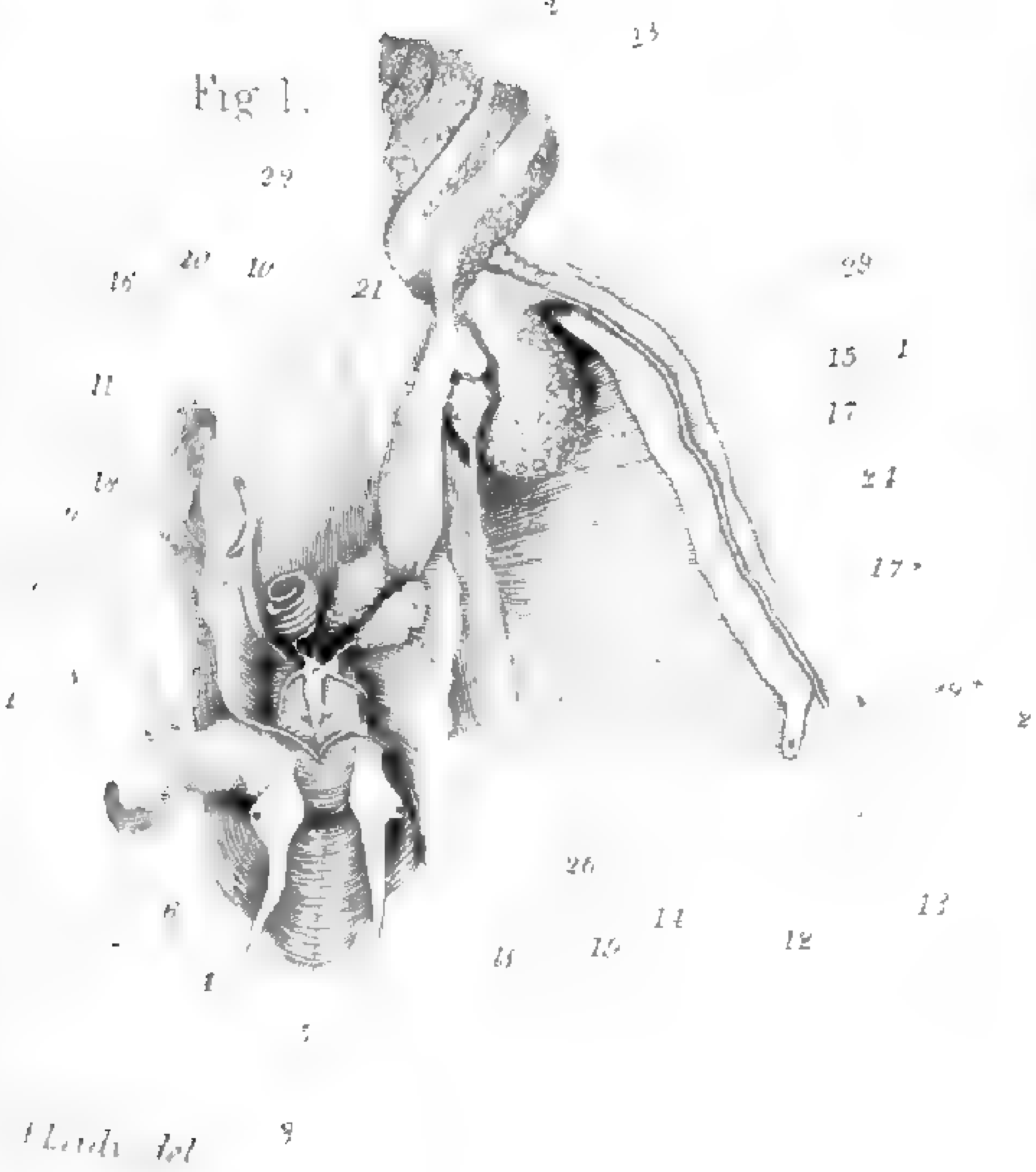


Fig 2

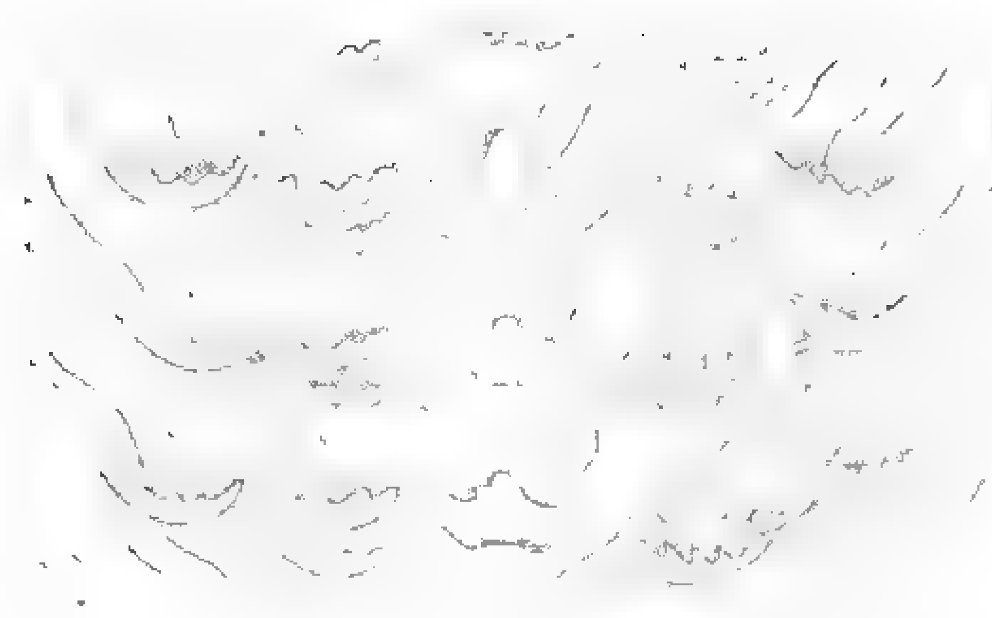
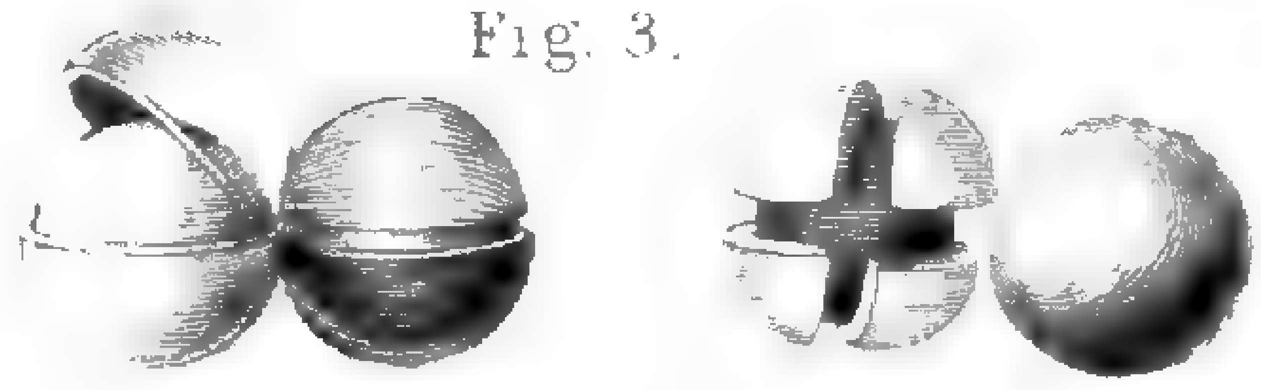


Fig. 3.



J. Leidy del.

Fig 1

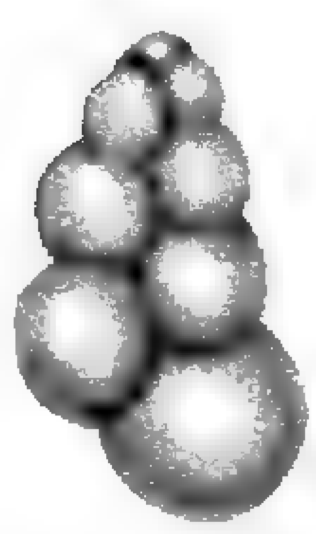


Fig 4.

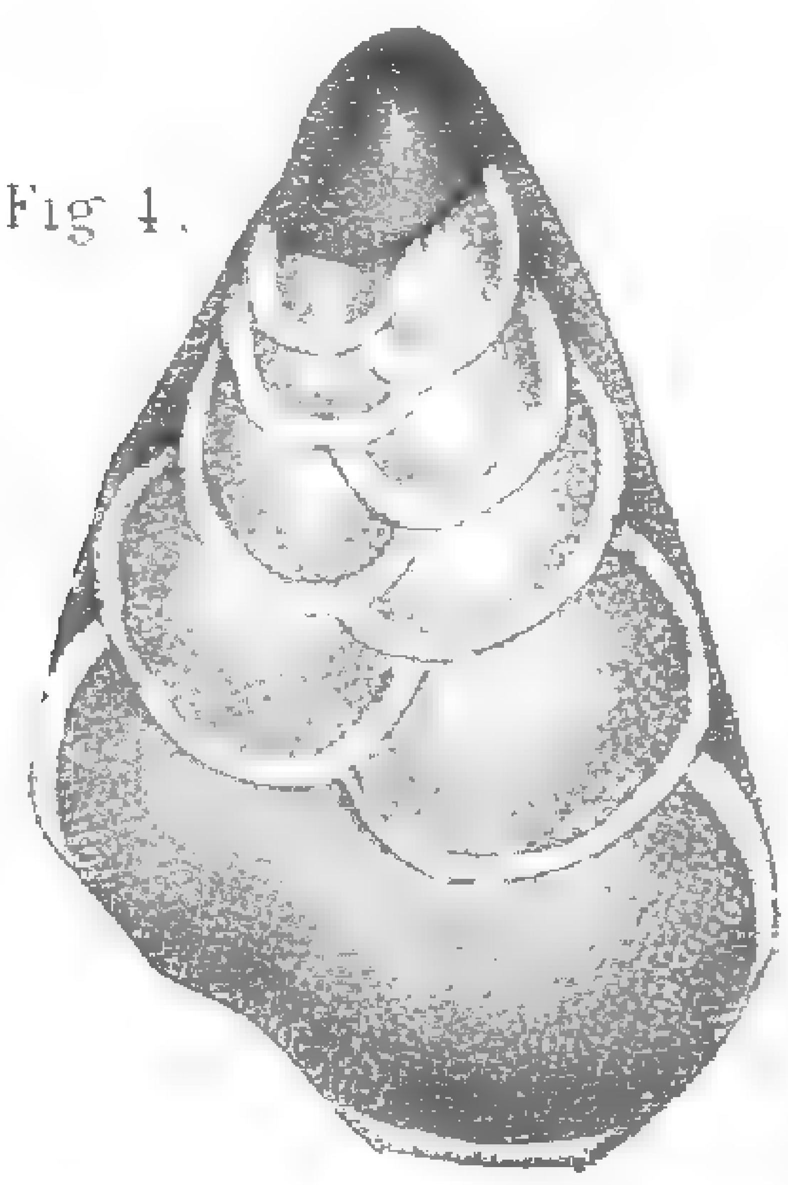


Fig 2

Fig 7

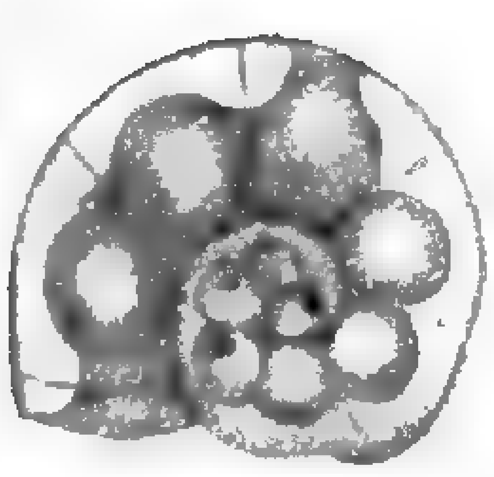


Fig 3

Fig 8.

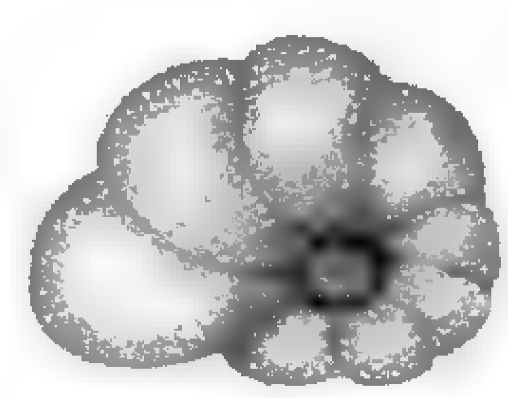


Fig. 5

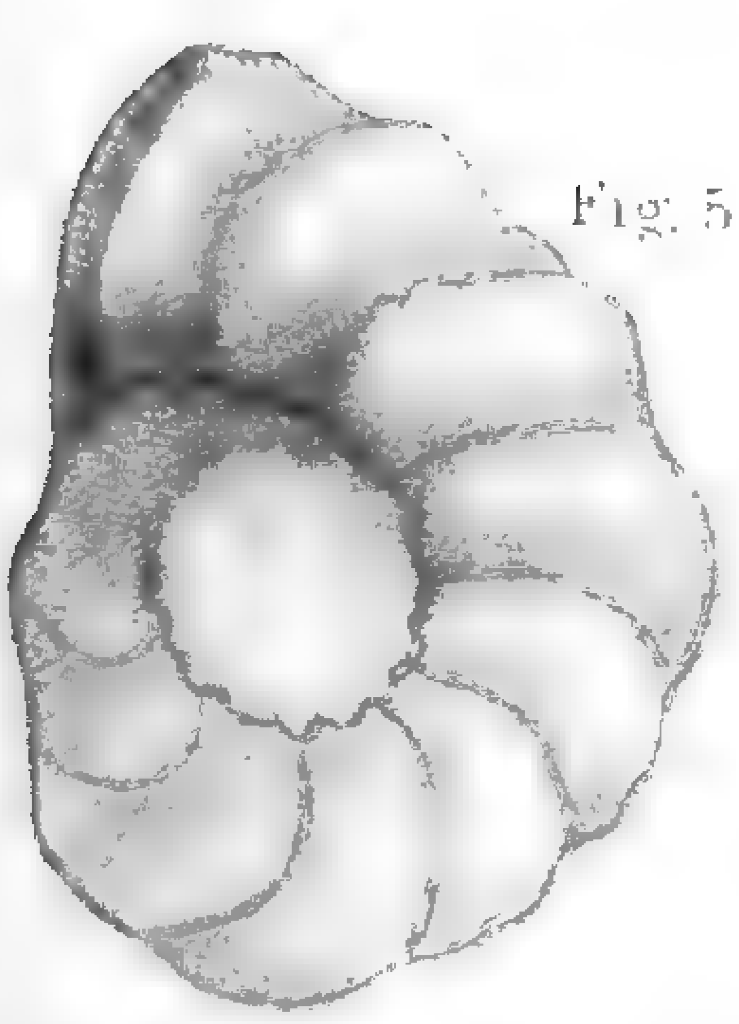
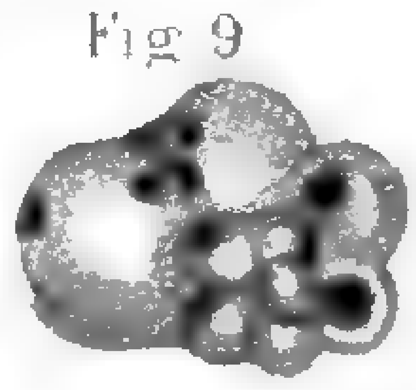


Fig. 6

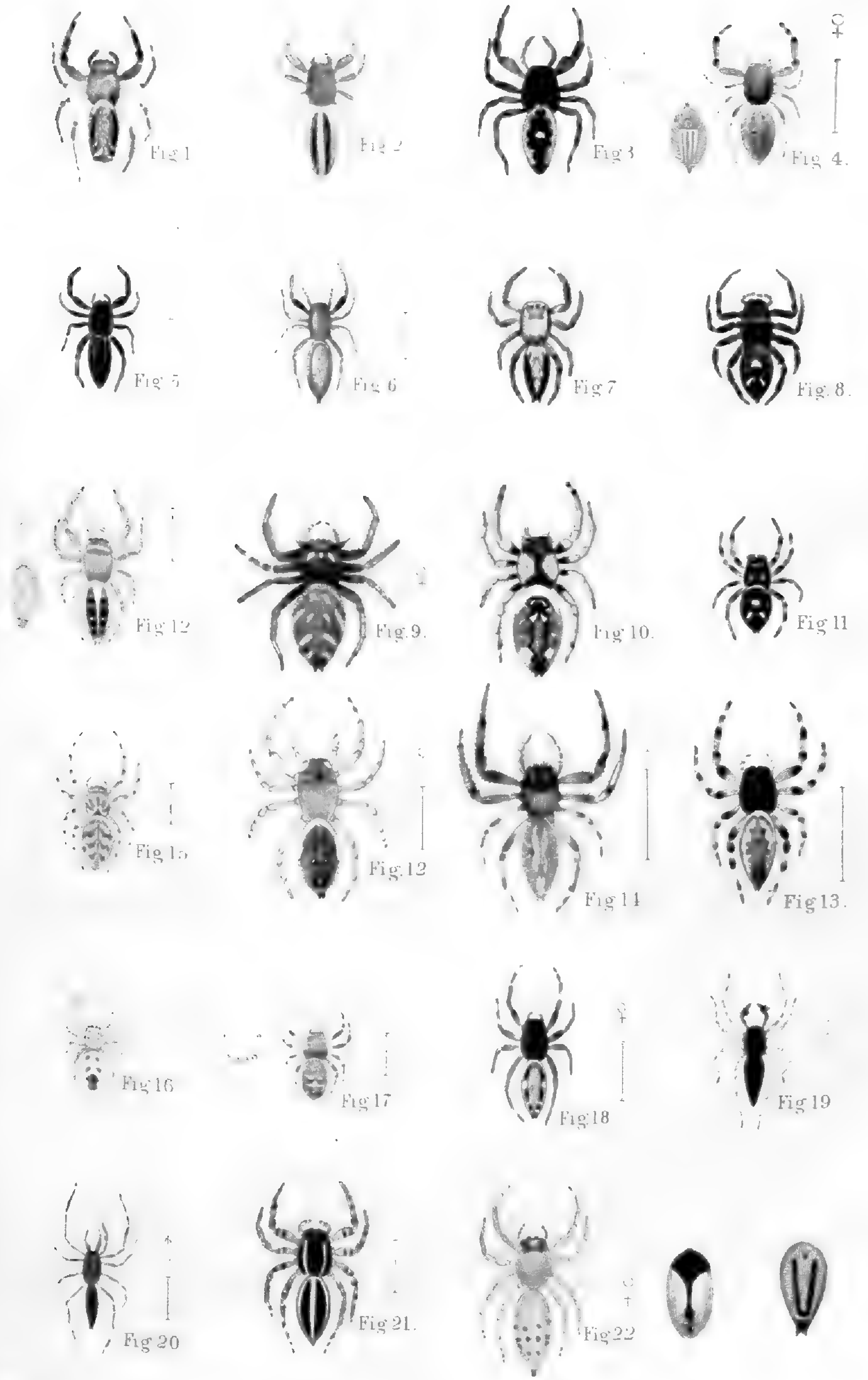
Fig 9



J. Leidy del. ⅟₁₀ Millimetre Fig 10.

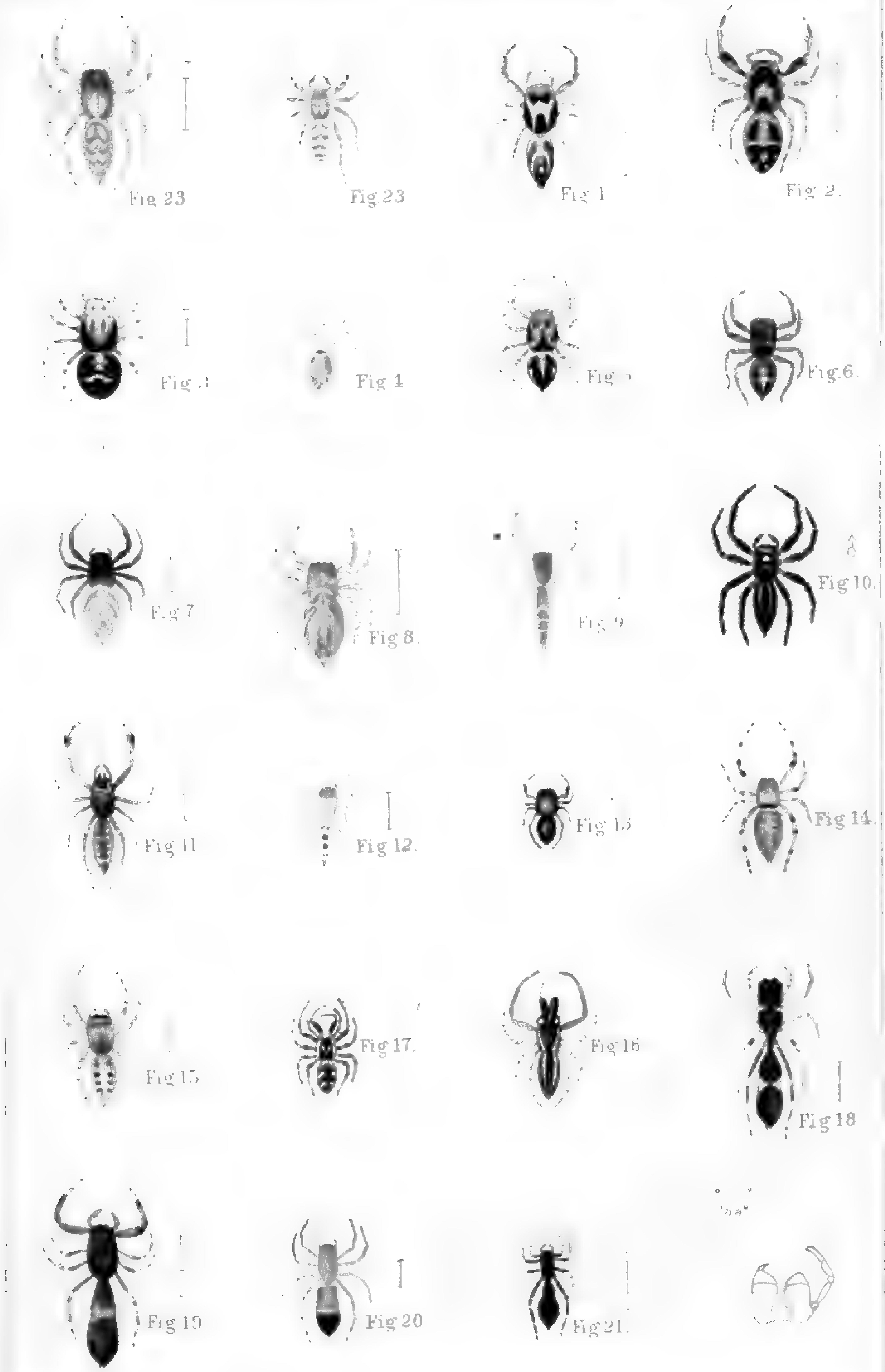
W.H. Tappan Sc.

Anatomy of Littorina angulifera.
Polythalamia from Sand of Sahara.



N M Hentz del. W H Tappan Sc

Hentz's Araneides of the U. States.

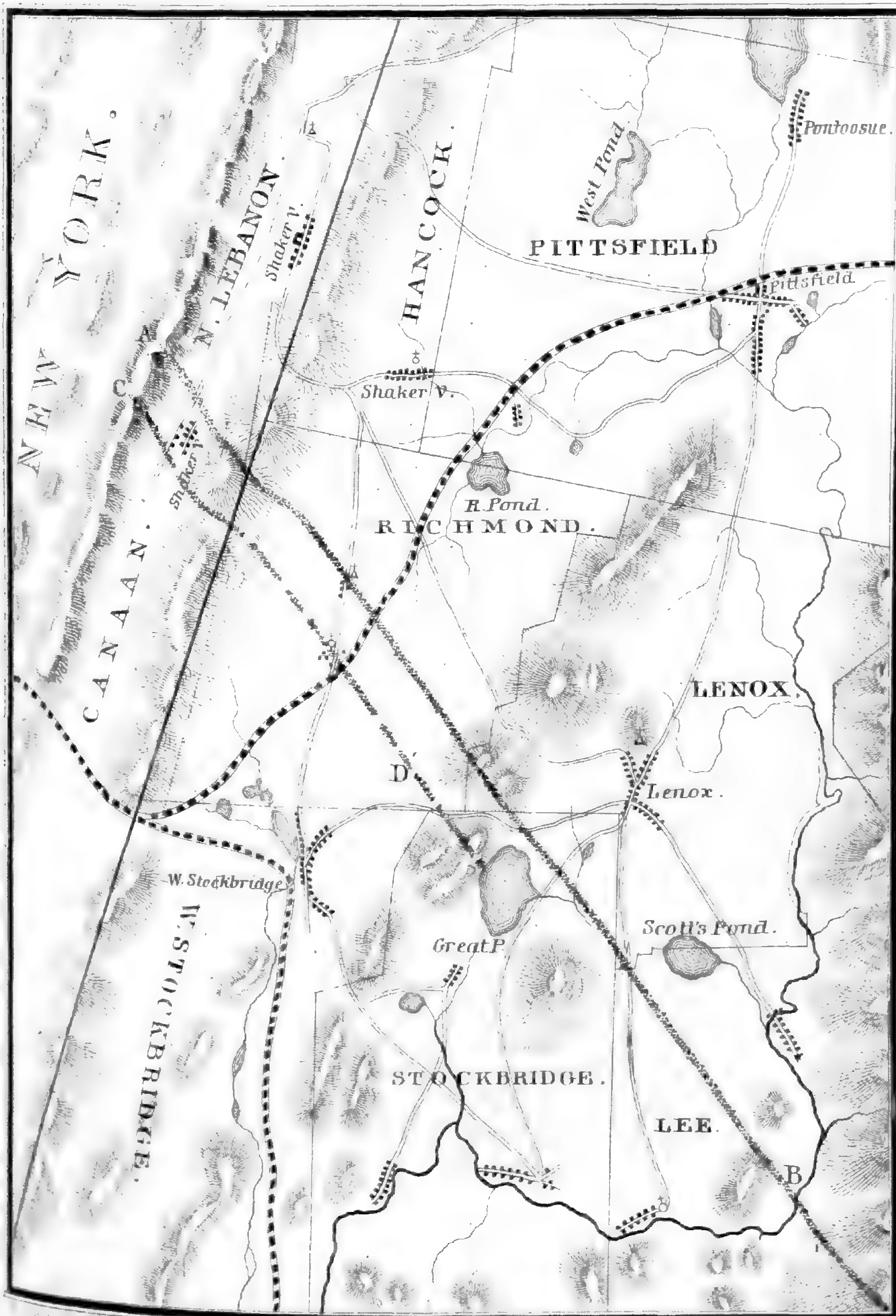


N. M. Hentz del. W. H. Tappan Sc.

Hentz's Araneides of the U. States.

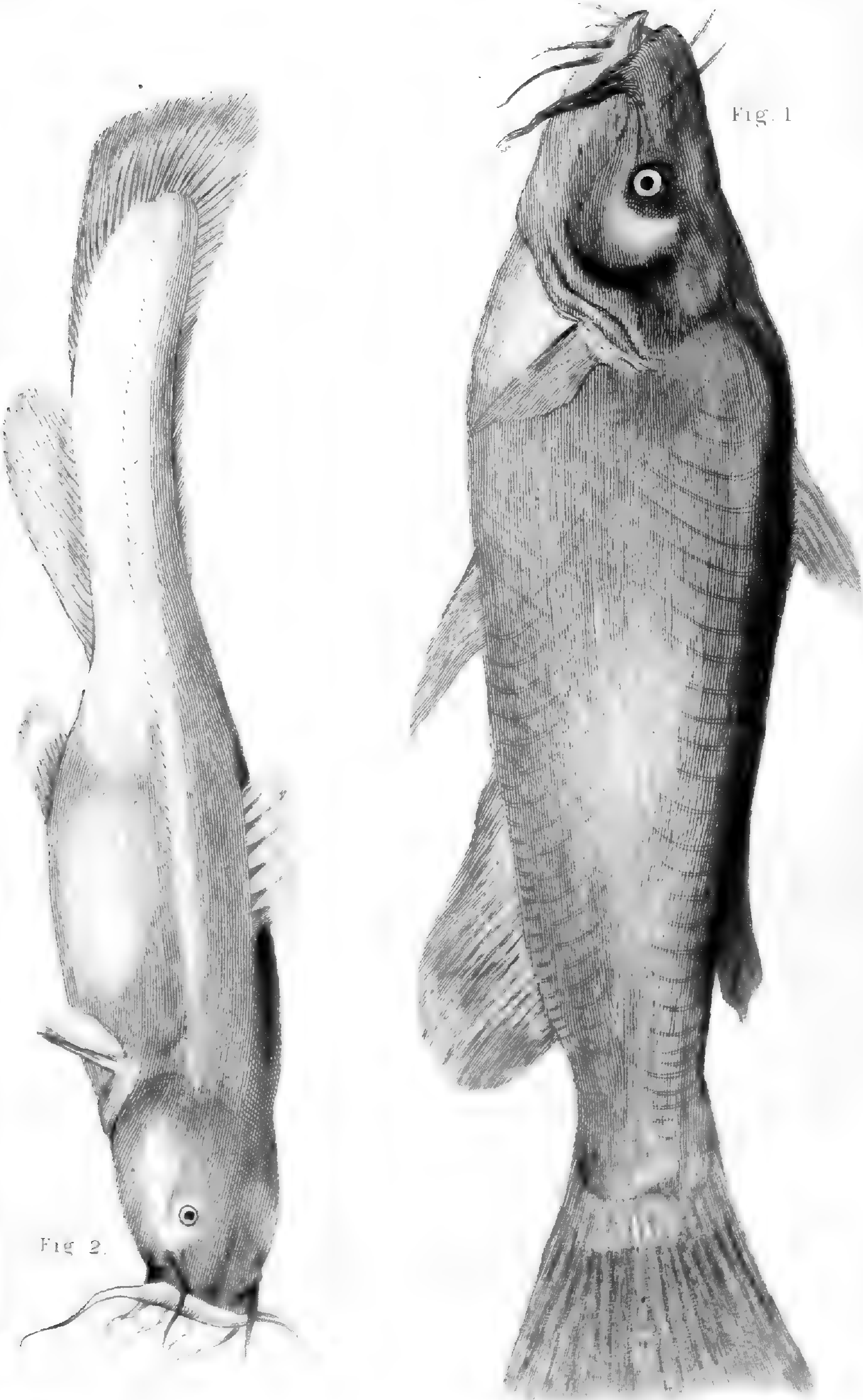
Pl. XXV.

Map illustrating a paper on two trains of Erratic Blocks, by Prof. H.D. Rogers and Prof. W.B. Rogers.



Lith of E.W. Bouve

A. B. the longer train. C D the shorter train.



J. Kirkland del.

W. H. Tappan Sc.

Fig. 1. Pimelodus catus. Lin.
Fig. 2. Noturus flavus. Raf.

J.P. Kirkland del. W.H. Tappan Sc.

Fig. 1 Pimelodus cœrulescens. Raf.
Fig. 2. Perca flavescens Mitch.

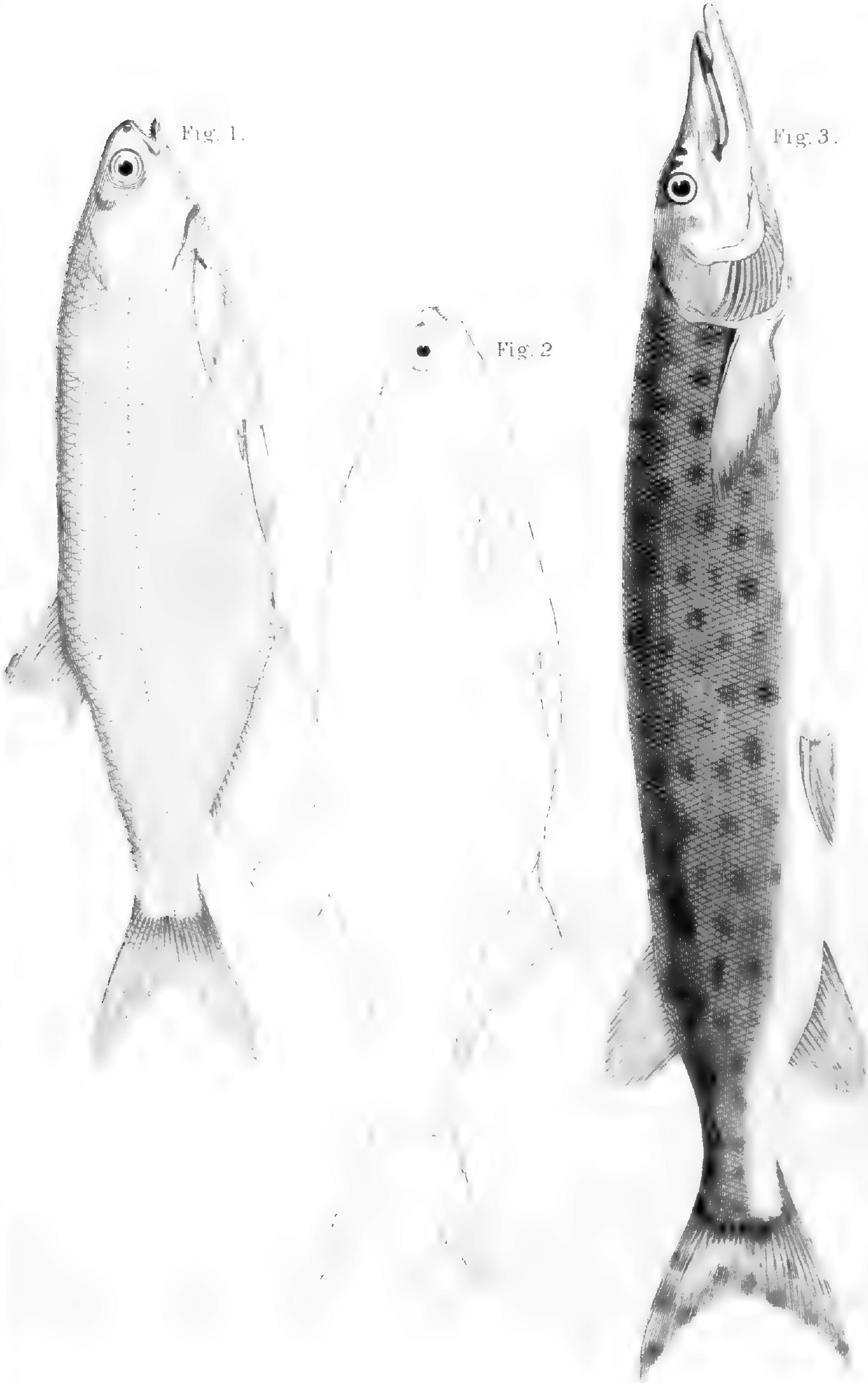


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Fig. 1. 2. Hyodon tergissus. Les
Fig. 3. Esox estor. Les.

J. P. Kirkland del. W. H. Tappan Sc.

Fig. 1. Pimelodus cœrulescens young
Fig. 2. Pimelodus cupreus Raf.
Fig. 3. Pimelodus limosus Raf.

Pl. I.

Pl. XXXIII

LITH OF E W BOUVE

Pl. 11

Pl. XXXIV.

LITH. OF E.W. BOUVÉ

Pl. III.

Pl XXXV

LITH OF E. W BOUVE.

Pl. IV.

Pl. XXXVI.

LITH OF E W BOUVÉ

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CASTOROIDES OHIOENSIS. Foster. Pl.1.

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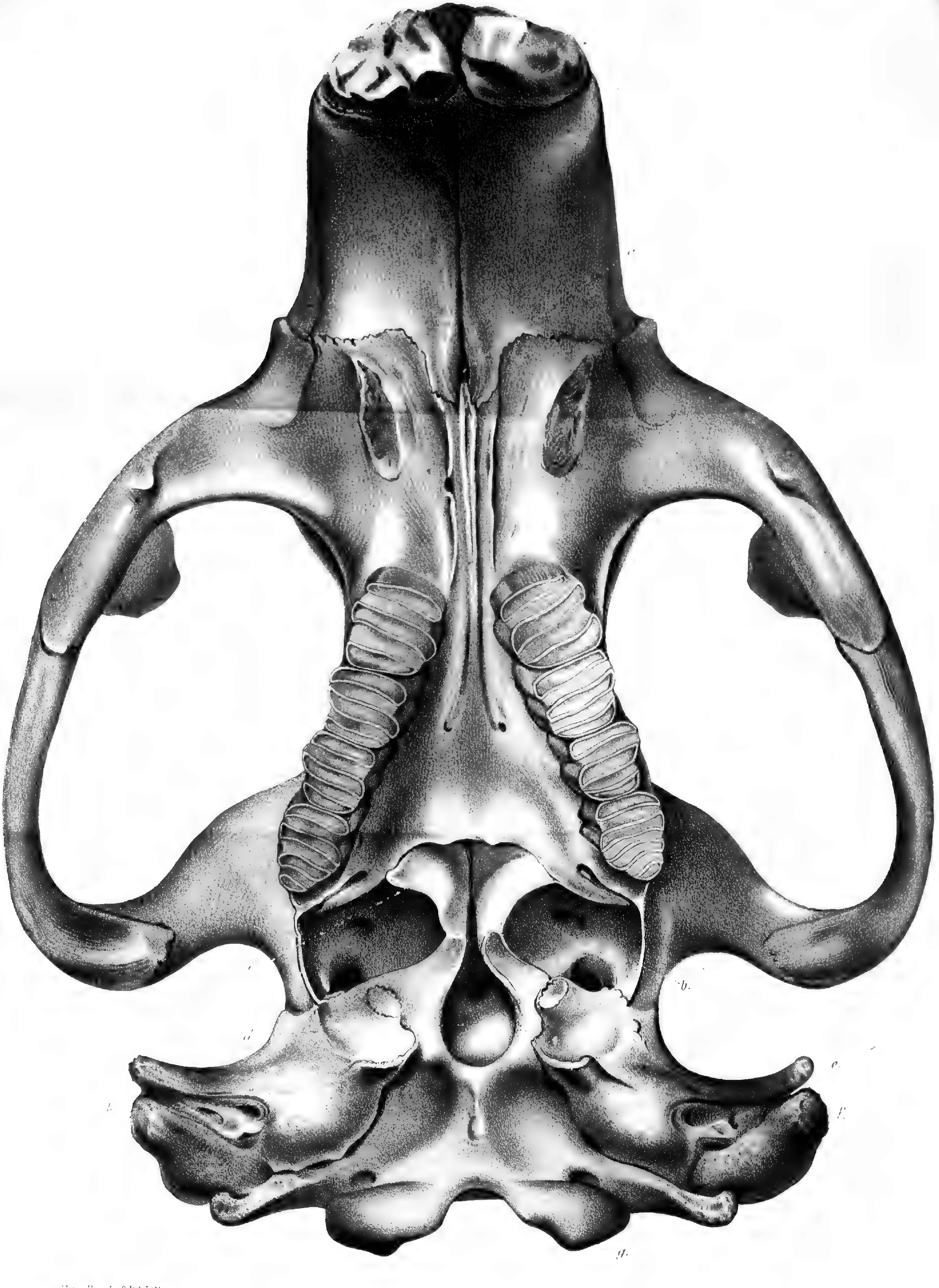
CASTOROIDES OHIOENSIS, Pl. 2.



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CASTOROIDES OHIOENSIS. Pl. 3.

BOSTON

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ART. XXXIV.—NOTICE OF THE EXTERNAL CHARACTERS AND HABITS OF TROGLODYTES GORILLA, A NEW SPECIES OF ORANG FROM THE GABOON RIVER, By THOMAS S. SAVAGE, M. D., Corresp. Memb. Boston Soc. Nat. Hist.; OSTEOLOGY OF THE SAME, By JEFFRIES WYMAN, M. D., Hersey Prof. Anat. in Harvard University. Read Aug. 18, 1847.

FOUR species of anthropoid Simiæ,[1] commonly known as Orangs,[2] have been described by naturalists; of these, three are found in the eastern world, either on the continent of Asia, or the islands of Borneo, Sumatra and Java, and a fourth on the western coast of Africa. In the East there exists

I. *Simia satyrus*, Lin. Pithecus satyrus, Geoff.; S. Abellii, Fisch.; L'Ourang outang, Cuvier; Red ourang. This

[1] Cyclopædia Metropolitana, Art. Simiæ, Vol. XXVII. London, 1845.
[2] The term Orang, more commonly but incorrectly written Ourang, is strictly applicable to the Eastern species only. Orang is a Malay word, which means a *reasonable being*, and is also given to man and the elephant. Outan means *wild* or *of the woods*; Orang-outan *wild man*, Cambang outan, *wild goat*. Outang, the word generally used as the adjective, signifies *a robber*. See Cuvier, An. Kingdom, McMurtrie's Translation, Vol. I., p. 57, note.

is the species most frequently exhibited in an immature condition, in America and Europe, and is obtained in Cochin China, Malabar, and Borneo.[1]

II. *S. Wurmbii,* Fisch. Pongo Wurmbii, Kuhl. Grand Ourang-outang, Geoff. Dusky orang ; from Borneo.

III. *S. Morio,* Owen. Of this species the cranium has been described by Prof. Owen,[2] but its external characters are not yet well known to naturalists.

In Africa is found

IV. *Troglodytes niger,* Geoff. Chimpanzée, Black Orang, Engé-eco, Jocko. This doubtless is the *Barris* of Pyrard de Laval, the *Smitten* of Bosman, *Quimpésé* of De la Brosse, and the *Quojas moras* of Tulpius.

The existence of a second species in Africa, does not appear to have been recognized by naturalists, nor in fact has there been hitherto adduced any evidence on which its existence might be predicated, except the vague statements of the different voyagers and travellers. But these, resting principally on information derived from the natives, and not on the personal observation of the narrator, are in general so mingled with absurd and marvellous accounts, that they have been deservedly regarded as unworthy of credence.

In two of the published narratives, however, the existence of a second species has been distinctly referred to. Andrew Battell, an English sailor, while a prisoner of the Portuguese, in Angola, speaks of the "two monsters," the "Pongo and Engeco."[3] This last, or as it is called by the natives of the

[1] Cuvier, op. cit. Vol. I., p. 57.

[2] Trans. Zoölog. Soc. Lond. Vol. II. p. 168. 1841.

[3] The greatest of these two monsters is called Pongo, in their language, and the lesser, is called Engeco. This Pongo is in all proportion like a man, but that he is more like a giant in stature than a man ; for he is very tall, and hath a man's face, hollow eyed, with long haire upon his brows. His bodie is full of haire but not very thicke, and it is of a dunnish colour. He differeth not from man but in his legs, for they have no calfe. Hee goeth alwaies upon his legs, and carrieth his hands clasped on the nape of his necke, when he goeth upon the ground. They sleepe in the trees, and build shelter for the raine. They feed upon the fruit that

Gaboon, the Enché-eco, is the common name for the Chimpanzée, and it is highly probable, though Battell has given no characters by which it might be recognized, that the Pongo was the animal which forms the subject of our communication.

The "*Ingena,*" referred to by Bowdich,[1] in his mission to Ashantee, is probably the Engé-ena of the natives of the Gaboon, though his statement, that the animal was "five feet high and four across the shoulders," detracts from the credibility of his narrative. Whatever doubt may have heretofore existed, the following notices of the habits, and external characters, and descriptions of the crania and some of the bones, will serve most satisfactorily to confirm the statements of Battell and Bowdich, with regard to the existence of a second African Orang, and to demonstrate that it is as specifically distinct from the *Troglodytes niger*, as from the Orangs of Borneo and Sumatra. The specific name, *gorilla*, has been adopted, a

they find in the woods, and upon ants, for they eate no kind of flesh. They cannot speake, and have no understanding, more than a beast. The people of the countrie, when they travaile in the woods, make fires where they sleepe in the night; and in the morning when they are gone, the Pongoes will come and sit about the fire till it goeth out; for they have no understanding to lay the wood together. They goe many together and kill many negroes that travaile in the woods. Many times they fall upon elephants which come to feed where they be, and so beat them with their clubbed fists, and pieces of wood, that they will runne roaring away from them. These Pongoes are never taken alive, because they are so strong ten men cannot hold one of them; but they take many of their young ones with poisoned arrows. The young Pongo hangeth on its mother's belly, with its hands fast clasped about her so that when the country people kill any of the females, they take the young which hangs fast upon his mother. When they die among themselves, they cover the dead with great heapes of boughs and wood, which is commonly found in the forrests. The strange adventures of Andrew Battell. Purchas, His Pilgrims. Part II. p. 984. London, 1625.

[1] "The favorite and most extraordinary subject of our conversations on Natural History, was an Ingena compared with Orang-outan, but much exceeding it in size, being generally five feet high and four across the shoulders. Its paw was said to be more disproportionate than its breadth, and one blow of it to be fatal. It is seen commonly by those who travel to Kaylee, lurking in the bush to destroy passengers, and feeding principally on wild honey which abounds." "Amongst other of their actions reported without variation by men, women, and children of Empongwee and Sheekar, is that of building a house in rude imitation of the natives, and sleeping outside or on the roof of it." Mission to Ashantee, by T. Edward Bowdich, Esq., p. 440. 4to. London, 1819.

term used by Hanno, in describing the "wild men" found on the coast of Africa, probably one of the species of the Orang.[1]

1. NOTICE OF THE EXTERNAL CHARACTERS AND HABITS OF THE ENGÉ-ENA.

While on the voyage home from Cape Palmas, I was unexpectedly detained in the Gaboon river, latitude 15′ N., and the month of April (1847) was spent at the house of the Rev. J. L. Wilson, Senior Missionary of the American Board of Commissioners for Foreign Missions to West Africa. Soon after my arrival Mr. Wilson showed me a skull, represented by the natives to be that of a monkey-like animal, remarkable for its size, ferocity and habits. From the contour of the skull, and the information derived from several intelligent natives, I was induced to believe that it belonged to a new species of Orang. I expressed this opinion to Mr. Wilson, with a desire for further investigation, and if possible, to decide the point by the inspection of a specimen alive or dead. He entered with interest into the matter, and promised his hearty coöperation. Having been a resident at that point for several years, well acquainted with the chiefs and people, possessing in an eminent degree their regard, and speaking freely their language, he was enabled to secure to me advantages of signal importance to my investigations. I did not succeed however, in obtaining the animal, but several crania of the two sexes, and of different ages, with other important parts of the skeleton were received. These have been forwarded for

[1] We arrived at a bay called the Southern Horn; at the bottom of which lay an island like the former, having a lake, and in this lake another island, full of savage people, the greater part of whom were women, whose bodies were hairy, and whom our interpreters called Gorillæ (*Γορίλλας*). Though we pursued the men, we could not seize any of them; but all fled from us, escaping over the precipices, and defending themselves with stones. Three women were taken, however; but they attacked their conductors with their teeth and hands, and could not be prevailed upon to accompany us. Having killed them, we flayed them and brought their skins with us to Carthage. The Voyage of Hanno, translated by Thomas Falconer, A. M., Fellow of C. C. C. Oxford. London, 1797. p. 13.

examination, and I now proceed to give the results of my investigations on its *External Characters and Habits.*

It should be borne in mind that my account is based upon the statements of the aborigines of that region. In this connection it may be proper for me also to remark, that having been a missionary, resident for several years, studying from habitual intercourse, the African mind and character, I felt myself prepared to discriminate and decide upon the probability of their statements. Besides, being familiar with the history and habits of its interesting congener, (*Troglodytes niger, Geoff.*) I was able to separate their accounts of the two animals, which, having the same locality and a similarity of habit are confounded in the minds of the mass, especially as but few, such as traders to the interior and huntsmen, have ever seen the animal in question. In this last fact stated we find an explanation of the confusion, inaccuracy and exaggeration which characterize the occasional references that have been made in books to both animals, the sources of such information being transient visitors and voyagers. If it be admissible to base and sustain a proposition on human testimony, then to my mind the existence of this new species of orang, aside from the evidence of its skeleton, is established, and the account that I now submit of its habits, authentic. It is on such grounds, and with such convictions I venture to place my statements on record, leaving them to the future for confirmation or correction.

The tribe from which our knowledge of the animal is derived and whose territory forms its habitat, is the *Mpongwe,* occupying both banks of the river Gaboon from its mouth to some fifty or sixty miles upward. The face of the country as you proceed inward is undulating and hilly, well watered with streams and rivers, and abounding with indigenous fruits. The river is visited for purposes of trade in ivory, ebony and dye-woods by vessels from different parts of America and Europe. In view of this fact it may seem surprising that the animal should be unknown to science, and without its proper place in systems of Zoology. But this is accounted for by the fact that its immediate habitat is back some distance from the coast, and its habits and ferocity such that it is not often encountered. The natives stand greatly in fear of it, and never attempt its capture except in self-defence.

If the word 'Pongo' be of African origin it is probably a corruption of *Mpongwe,* the name of the tribe on the banks of the Gaboon, and hence, applied to the region they inhabit. Their local name for the Chimpanzée is *Enché-eko,* as near as it can be anglicised, from which the common term "Jocko" probably comes. The Mpongwe appellation for its new congener is *Engé-ena,* prolonging the sound of the first vowel and slightly sounding the second.

The habitat of the *Engé-ena* is the interior of Lower Guinea, while that of the Enché-eko or Chimpanzée is nearer the seaboard.

Its height is above five feet, it is disproportionally broad across the shoulders, thickly covered with coarse black hair, which is said to be similar in its arrangement to that of the *Enché-eko.* With age it becomes gray, which fact has given rise to the report that both animals are seen of different colors.

Head. The prominent features of the head are, the great width and elongation of the face, the depth of the malar region, the branches of the lower jaw being very deep and extending far backward, and the comparative smallness of the cranial portion; the eyes are very large, and said to be like those of the Enché-eko, a bright hazel; nose broad and flat, slightly elevated towards the root; the muzzle broad and prominent, lips and chin with scattered gray hairs, the under lip highly mobile, and capable of great elongation when the animal is enraged, then hanging over the chin; skin of the face and ears naked, and of a dark brown approaching black.

The most remarkable feature of the head is a high ridge or crest of hair in the course of the sagittal suture, which meets posteriorly with a transverse ridge of the same, but less prominent, running round from the back of one ear to the other.

The animal has the power of moving the scalp freely forward and back, and when enraged, is said to contract it strongly over the brow, thus bringing down the hairy ridge, and pointing the hair forward so as to present an indescribably ferocious aspect.

Neck short, thick and hairy; chest and shoulders very broad, said to be fully double the size of the Enché-eko's; arms very long, reaching some way below the knee, the forearm much the shortest; hands very large, the thumbs much larger than the fingers.

Abdomen very broad and prominent, the hair thinner than on the back, legs bowed like the Chimpanzée's, but the muscles larger or better developed.

No tail nor callosities; a small tuft of hair at the extremity of the os coccygis; the genitalia similar in both sexes to the same parts in the Chimpanzée except their larger size in the male.

Their gait is shuffling, the motion of the body, which is never upright as in man, but bent forward, is somewhat rolling, or from side to side. The arms being longer than those of the Chimpanzée it does not stoop as much in walking; like that animal it makes progression by thrusting its arms forward, resting the hands on the ground and then giving the body a half jumping, half swinging motion between them. In this act it is said not to flex the fingers as does the Chimpanzée, resting on the knuckles, but to extend them, thus making a fulcrum of the hand. When it assumes the walking posture to which it is said to be much inclined, it balances its huge body by flexing the arms upward. They live in bands, but are not so numerous as the Chimpanzée's; the females generally exceed the other sex in number. My informants all agree in the assertion that but one adult male is seen in a band; that when the young males grow up, a contest takes place for mastery, and the strongest, by killing and driving out the others, establishes himself as the head of the community. The silly stories about their carrying off women from the native towns, and vanquishing the elephants, related by voyagers and widely copied into books, are unhesitatingly denied. They have been averred of the *Chimpanzée,* but this is still more preposterous. They probably had their origin in the marvellous accounts given by the natives, of the *Engé-ena,* to credulous traders.

Their dwellings, if they may be so called, are similar to those of the Chimpanzée, consisting simply of a few sticks and leafy branches supported by the crotches and limbs of trees; they afford no shelter, and are occupied only at night.[1]

They are exceedingly ferocious, and always offensive in their habits, never running from man as does the Chimpanzée. They are objects of terror to the natives, and are never encountered by them except on the defensive. The few that have been captured were killed by elephant hunters and native traders as they came suddenly upon them while passing through the forests.

It is said that when the male is first seen he gives a terrific yell that resounds far and wide through the forest, something like *kh—ah! kh—ah!* prolonged and shrill. His enormous jaws are widely opened at each expiration, his under lip hangs over the chin, and the hairy ridge and scalp is contracted upon the brow, presenting an aspect of indescribable ferocity. The females and young at the first cry quickly disappear; he then approaches the enemy in great fury, pouring out his horrid cries in quick succession. The hunter awaits his approach with his gun extended; if his aim is not sure he permits the animal to grasp the barrel, and as he carries it to his mouth (which is his habit) he fires; should the gun fail to go off, the barrel (that of an ordinary musket, which is thin) is crushed between his teeth, and the encounter soon proves fatal to the hunter.

[1] The natives ridicule this habit of the Engé-ena. They call him a fool, to make a house without a roof, in a country where they have so much rain. They say he has not so much sense as a certain bird, which makes a large nest with a tight roof, then it daubs the inside with mud, and unfolding its wings whirls round and round till the crevices are all filled and the inside smoothly plastered like a house. Mr. Wilson once pointed out to me this bird, and confirms this account of its habits.

The killing of an *Engé-ena* is considered an act of great skill and courage, and brings to the victor signal honor. A slave to an Mpongwe man, from an interior tribe, killed the male and female whose bones are the origin of this article. On one occasion he had succeeded in killing an elephant, and returning home met a male Engé-ena, and being a good marksman he soon brought him to the ground. He had not proceeded far before the female was observed, which he also killed. This act, unheard of before, was considered almost superhuman. The man's freedom was immediately granted to him, and his name proclaimed abroad as the prince of hunters.

It is said that this animal exhibits a degree of intelligence inferior to that of the Chimpanzée; this might be expected from its wider departure from the organization of the human subject. I could not ascertain that more than one or two at most of the young had ever been captured. One was taken and kept for a year by a native, and then sold to a Frenchman, but it died on the passage home. Whether the skeleton was preserved is not known. No information respecting its habits in a state of domestication could be had upon which reliance might be placed.

In the wild state their habits are in general like those of the *Troglodytes niger*, building their nests loosely in trees, living on similar fruits, and changing their places of resort from the force of circumstances.

The *Amomums*, which constitute in every locality of the Orangs a prominent article of food, I found to be of entirely different species from those at Cape Palmas. At the latter point but one species and a small variety, with acid pulp is known, but at the Gaboon at least *three*. They eat only those species which have an acid pulp or arillus. Fruits distinguished by the opposite qualities of acidity and sweetness are eaten with equal zest. The stem of the *Saccharum officinarum*, the fruit of the *Elais Guineënsis* or oil palm, *Carica papaya*, *Musa sapientium*, and several others unknown to Botany are prominent on the list. Here, as at all other points on the coast, the orangs are believed by the natives to be human beings, members of their own race, degenerated. Some few, who have put on a degree of civilization above the mass, will not acknowledge their belief in this affinity; such profess to view them as embodied spirits, the belief in transmigration of souls being prevalent. They say that the Enché-eko or Chimpanzée has the spirit of a *Coastman*, being less fierce and more intelligent, and the Engé-ena that of a *Bushman*. The majority however, fully believe them to be men, and seem to be unaffected by our arguments in proof of the contrary. This is especially true of the tribes in the immediate vicinity of the locality. They believe them to be literally "wild men of the woods."

They are generally eaten, and their flesh, with that of the Chimpanzée, and monkeys at large, occupies a prominent place in their "bill of fare."

II. DESCRIPTION OF THE CRANIA AND SOME OF THE BONES OF THE ENGÉ-ENA.

The collection of crania and bones brought from Africa by Dr. Savage, and which served as the basis of the following descriptions, consists of four skulls, two males and two females, one of each in a perfect condition, and all of them adult; a male and female pelvis, the long bones of the upper and lower extremities, and a few vertebræ and ribs.

The crania of the males are much larger than those of the females, and exceed in their longest diameter the skull of a well characterized Negro by two and a quarter inches, and by nearly one inch the diameter across the zygomatic arches.[1]

The sutures were entirely obliterated in one, and nearly so in the other, a condition similar to that of the cranium of the adult Simia satyrus; and of the older crania of the Troglodytes niger, in both of which all sutures sooner or later disappear.[2]

When viewed laterally, the incisive alveoli in both the

[1] See Table of Admeasurements.

[2] See Boston Journal of Nat. Hist. Vol. IV. p. 370.

Orang and Chimpanzée form a strong projection below the nasal orifice, but are most conspicuous in the former, giving the lower part of the face that remarkable degree of prominence which is so characteristic. In the Engé-ena the outline of the face is straight from below the superciliary ridges (Pl. I. and II.) to the edge of the incisive alveoli, and when the head is so placed that the edge of the lower jaw is horizontal, the facial line makes with it an angle of about 45°. The facial angle according to the usual method of measuring it (the superciliary ridges excluded) is about 30°. According to Mr. Owen that of S. satyrus is 30°, and that of Troglodytes niger 35°.[1]

The most remarkable peculiarity, one which strikes the observer at sight, is the great development of the interparietal and occipital crests, as well as of the superciliary ridges, (Pl. I.) all of which give the head great angularity of outline, causing it somewhat to resemble that of S. satyrus, and to contrast with that of T. niger, on which there are no crests, and the superciliary ridges of which, though well developed, are much more curvilinear and smooth. Both crests are quite thin on the free edges, and are elevated about 1½ inches above the skull; the occipital extending across from one mastoid process to the other, and the interparietal extending forward at right angles to it terminates near the centre of the coronal region in two strong diverging ridges, which are directed to the outer angles of the orbits, including between them a deeply concave triangular space. The superciliary ridges are much more prominent than in the Chimpanzée, especially at their union over the nose, and the apertures of the orbits are more nearly square. A single large supra-orbitar and a small infra-orbitar foramen exists on each side. The two following peculiarities, pointed out by Prof. Agassiz, exist in all the crania, and are specific characters; one of them is drawn from the structure of the infra-orbitar canal, which in the Chimpanzée forms a deep groove terminating in the spheno-

[1] Trans. Zoolog. Soc. London, I. p. 372.

maxillary fissure, its depth remaining uniform to its termination; but in the Engé-ena this canal becomes gradually less deep from before backwards, and at the fissure is scarcely obvious.[1] The second character is derived from the internal walls of the orbits, which recede from each other in descending towards the floor, thus leaving a large pyramidal space for the lodgment of the os ethmoides, and serving to increase the capacity of the maxillary sinuses.

The *foramen lacerum* of the orbit, which serves to transmit the III, IV, part of the V, and the VI nerves, and which in the human cranium has an elongated form, is in the Engé-ena very nearly round, having a diameter of only two or three lines. The spheno-maxillary fissure is much more narrow and contracted, forming only a linear opening between the orbit and the zygomatic fossa.

The *ossa nasi* are firmly co-ossified with each other and with the surrounding bones, but their outline is sufficiently distinct. They have a more triangular form than in the Chimpanzée, the apex being much more acute, and on the median line presents a prominent ridge. In four skulls of Chimpanzées the nasal orifice is of a triangular form, the angles more or less rounded, and the apex directed upwards; in three of the skulls of the Engé-ena it is nearly square, and in the fourth approaches the triangular form, but the apex is directed downwards. The form of the posterior nares also in the two species is materially different; in the Chimpanzée the transverse diameter of the orifice exceeds that of the vertical, but in the Engé-ena the vertical is twice that of the transverse, a condition which results from the elongation downwards of the superior maxillary bones; the posterior edge of the palatine bones in the new species is emarginated on the median line as in *S. satyrus*, while in the Chimpanzée it is either destitute of an emargination or extended into a spine; the lower edge of the

[1] In an adult cranium of the Chimpanzée belonging to Dr. J. C. Warren, this canal posteriorly is completely closed over, as in man.

vomer in the Engé-ena is thin and delicate, and articulates imperfectly with the palatine bones, the reverse condition existing in the second.

If the length of the bony roof of the mouth compared with its breadth is an index of inferiority, the Engé-ena certainly occupies a lower position in the animal scale than the Chimpanzée; in the latter the breadth is to the length as 1.5 inches to 2.8 inches, and in the former as 1.5 inches to 3.9 inches. The incisive canals, which in the Chimpanzée open into the mouth by two distinct orifices, in the Engé-ena are but imperfectly separated from each other at their termination; a single foramen on each side exists midway between the incisive foramen and the edges of the alveoli laterally, which is represented in the Chimpanzée by two or more smaller foramina on each side.

After the cranial crests and ridges there is no one character by which the head of the new species may be more easily distinguished from that of the Chimpanzée than by the zygomatic arches. In the latter they are thin and slender, especially at their posterior part, and the superior edge is very nearly horizontal. In the new species the arches are much broader, more massive, at their posterior third suddenly arched upwards, and the zygomatic fossæ much deeper; a well marked impression indicates the attachment of the strong masseter muscle; in all these respects they resemble the corresponding parts of the S. satyrus.[1]

One of the male crania only was in a condition to permit an examination of its cavity. Well marked impressions corresponding with the convolutions of the brain existed on the inner table of the skull, and the canals for the lodgment of the dura-matral artery, and the longitudinal sinus were distinctly visible. No *crista galli* existed, and the orbitar plates of the frontal bone, being situated above the plane of the cribriform plate of the os ethmoides, enclosed between them a deep de-

[1] Compare Mr. Owen's figure of the skull of S. satyrus in Trans. Zoolog. Soc. London, Vol. I. Plate LIII.

pression. The mastoid cells of the temporal bone were largely developed, and were continuous with other cells of similar size situated in front of the auditory meatus; large cells also existed at the inner extremity of the petrous bone.

As in S. satyrus, the foramen magnum of the base of the skull is elongated, and has an emargination on its posterior edge, and the anterior condyloid foramen is double in one of the males, though in the other crania the second or venous canal is very minute compared with that which transmits the hypoglossal nerve. (XIth pair.) A well developed ridge on the temporal bone, (corresponding with the "vaginal process" of the human anatomist) extends from the carotid foramen to the auditory meatus, but there is no obvious surface for the attachment of a styloid process. A stout cylindrical process obliquely terminated, the extremity somewhat roughened as if for a muscular attachment, is situated just behind and beneath (the head being in its natural position) the orifice of the Eustachian tube.

The lower jaw presents a degree of massiveness and strength which the anatomist would be led to anticipate from an examination of the great surface for the attachment of the temporal muscles, and the great size of the zygomatic arches. In its general conformation it resembles that of the Simia satyrus, but surpasses it in size, although the projection of the face in the last is the greatest. Its ascending portion is nearly vertical, and contrary to that of the Chimpanzée and Orang; the coronoid process is more elevated than the condyloid.[1]

The dental formula, as in the Orangs and the Catarrhine Quadrumana, is generally the same as that of man,[2] viz. incisors $\frac{2-2}{2-2}$, canines $\frac{1-1}{1-1}$, premolars $\frac{2-2}{2-2}$, molars $\frac{3-3}{3-3}$, total, 32. The middle incisors had been lost, in all the crania except in one of the females, in which they were much worn, terminating in

[1] In the skull figured by Prof. Owen, Op. cit. Vol. I. Plate LI., the coronoid is the most elevated; this is not the case in the skull belonging to the cabinet of the Boston Society of Natural History, nor in two others which I have examined.

[2] Owen, Odontography, Vol. I, p. 441.

a broad straight edge, while the lateral incisors were pointed, very closely resembling a human canine. The interval between the lateral incisors and the canines in both sexes was proportionally less than in the Chimpanzée, though there could not be said to exist any great regularity in this respect in the different crania. The canines of the males were much larger than those of the females, but the points were too much abraded to render it practicable to determine exactly their original length. The canine of the male, worn as it is, measures 2.2 inches, and projects about an inch below the edge of the alveolus; that of the female, which was not worn, projected only 0.7 inch below the edge of the alveolus. In both sexes these teeth were laterally compressed with a slightly trenchant edge behind, and on the inner face impressed with two distinct grooves. The premolars are equal in size, the external cusps longer and more pointed than the internal; the molars have each four cusps the two external the longest, the crown having a more rhomboidal form than in the Chimpanzée; the third molar is the smallest of the three, and in all, the anterior cusp on the inside is united by an oblique ridge to the posterior cusp on the outside.

In the lower jaw the lateral incisors are much longer than the middle, and are separated by a small space from the canines. The first premolars have blunt stout conical crowns, with the rudiment of a second cusp on the posterior and inner edge; the second premolar is the smallest, has two cusps on its anterior edge, with a third much smaller on the posterior inner angle, a rudiment of a fourth cusp is seen on the outer angle. Of the molars, the third is the largest, and the first the smallest of the series; all have three cusps on the outside and two on the inside, in which respect they resemble those of the Chimpanzée, and differ from the Orangs. "In the true monkeys (Cercopitheci) the Gibbons and the Orangs, the last molar of the lower jaw has a square quadri-tuberculate crown, like that above."[1]

[1] Owen, Op. Cit. Vol. I., p. 442.

The heads of the two females, as will be seen by reference to the table of measurements, were both smaller than those of the males. A small occipital crest exists in both, but the inter-parietal is entirely wanting in one, and is represented by a very slight ridge in the other, though both, as is shown by the teeth being all protruded and more or less worn, have reached the adult period. The crania are much more smooth, the outlines less angular, and the general expression of the face far less savage and brutal than in the males. In the younger of the females the dentes sapientiæ were perfectly protruded, and some of their points slightly worn; in this head, as well as the others, the cranial sutures had become obliterated, but some of those of the face were still obvious, viz. the zygomatic, the malar, and a portion of that between the maxillary and intermaxillary bones, and between the ossa palati. The inferior maxillary bone is smaller, and its ramus much more narrow than in the male, a condition corresponding with the less perfect development of the canine teeth. Two infra-orbitar foramina existed in one of the females, but only one in the other.

Trunk. Of the vertebral column only a few bones were preserved; two adjoining cervical vertebræ probably the fifth and sixth, were remarkable for the great length of the spinous processes, the longest of which, measured from the inside of the spinal canal (posterior face) had a length of 2.4 inches, the longest process in the neck of the Chimpanzée was only 1.1 inches.

The last dorsal, and the first two lumbar vertebræ were also preserved, all of which present a peculiarity obviously in relation to the natural semi-erect attitude of the animal. In man, the vertical diameter of the body is greater on the anterior than on the posterior face, and it is from this that results the anterior convexity of the lumbar region; in the Engé-ena the anterior diameter is shorter than the posterior, so that there would exist a concavity instead of a convexity anteriorly, thus rendering it almost impracticable to balance the trunk on the base of the sacrum, or to maintain with ease an erect attitude unaided by the arms.

All the long bones of the upper extremity are remarkable for their great size and strength.[1] By reference to the table of admeasurements it will be seen that the scapula is two inches longer, and nearly two inches broader than that of an ordinary man. Instead of having the narrow and elongated form of the Chimpanzée, the bone is more nearly equilateral, and recedes farther from the human type in having the fossæ above and below the spine more nearly equal; the spine itself is not so well developed, and after passing the middle of the bone is represented only by a slightly prominent ridge, which terminates but a few lines above the middle of the posterior edge of the dorsum. The supra-spinous portion is more nearly in the same plane with the inferior part than in either man or the T. *niger*; the acromion process is broad and flat as in man, but is more straight, its curves are larger, and it is destitute of the prolongation inwards which characterizes the same part in man. The glenoid cavity presents the form of that of the human scapula, except that its superior extremity is deflected towards the base of the acromion instead of the coracoid process. A subscapular fossa exists, which is subdivided into three smaller fossæ, and the coracoid process is much stouter than in man, its terminal portion forming a right angle with the bone.

The humerus, seventeen inches in length, exceeds that of the adult S. *satyrus* by 2.6 inches, has its bicipital groove as in the Chimpanzée, more on the anterior face than in man; its tuberosities are largely developed, indicating the great strength of the rotator muscles; and the impressions formed by the attachment of the pectoralis major and latissimus dorsi are very strongly marked on each side of the bicipital groove, having each a length of about three inches, indicating the great

[1] Of the upper extremity, the clavicles and bones of the wrist and hand were lost.

strength of these suspensory muscles of the body, and which are so essential to an arboreal life. The humerus is slightly twisted, though less so than in man, but there is not the prominence of bone corresponding with the insertion of the deltoides, its anterior face being uniformly concave, and the posterior convex, as in the Chimpanzée. The smaller head is less spherical, the trochlear portion less deeply emarginated, and the internal edge of the trochlea less prominent than in the T. *niger*, but as in the latter, the humerus has a perforation of its inferior extremity.

In the proportions between the length of the humerus and ulna, the Engé-ena recedes less from the human type than the Orang or the Chimpanzée. In S. *satyrus* the ulna is nearly an inch longer than the humerus, in T. *niger* the two bones are (as in Mr. Owen's specimen[1]) nearly equal; in the Engé-ena the ulna is to the humerus as 1 to 1.2, and in man as 1 to 1.5 very nearly. (See table.) The radius more stout and massive than in the Chimpanzée, has the same curved form necessary for that constantly pronated condition of the hand essential to their climbing habits.

The sacrum was broken through the body of the fifth vertebra; the canal was complete as far as the broken edge, and the intervertebral spaces, except the first, had become obliterated. As in the Chimpanzée compared with that of man, the sacrum was long and narrow, and its anterior face more nearly straight than in either. The articulating surface (facette articulaire) extends down on each side as far as a point midway between the third and fourth sacral foramina, its breadth as in the Chimpanzée, being proportionally much less than in man; the broadest part is at the lowest extremity, becoming very narrow above; in man the surface is much broader, and the breadth more nearly uniform throughout. Here again, we have a mark of the inferiority of the higher Quadrumana, of a

[1] Op. Cit. p. 375. In a skeleton presented to the Boston Society of Natural History by Dr. Savage, the ulna is 0.8 inch shorter than the humerus.

want of strength in the pelvis, resulting from diminished articulating surface, and consequently a want of adaptation to sustain the erect position.

"In the Chimpanzée the iliac bones are long, straight and expanded outwardly above, but narrow in proportion to their length; the posterior face is concave for the lodgment of the glutæi muscles, the anterior surface nearly flat, and stretching outwards almost parallel with the plane of the sacrum."[1] "In the Orang, the ilia are rather more expanded than in the Chimpanzée."[2] The ilia of the Engé-ena make a much nearer approach to the human type than either of the animals above-mentioned; the space between the anterior spinous processes is proportionally larger, the wings are much broader, the anterior face has a deep concavity, the dorsum has a corresponding convexity, but is destitute of the semicircular lines indicating the origins of the glutæi muscles, and the superior spinous processes are farther in advance of the plane of the sacrum. The crest of the ilium is destitute of the curve like an *ſ*, which is characteristic of the human pelvis.

If, in the upper extremity, the Engé-ena approaches nearer to man than his congeners in the relative lengths of the ulna and humerus, he recedes much farther in those of the humerus and femur. In the Chimpanzée the humerus and femur are almost exactly of the same length, but in the Engé-ena the humerus exceeds the femur by three inches, a disproportion very nearly the same as that which exists in the corresponding parts of the S. *satyrus*. As in the Chimpanzée, the head of the femur has an impression corresponding with the attachment of the round ligament, but the greater trochanter is proportionally stouter, the shaft of the bone is more curved, and the inner condyle much longer, so that when the two condyles rest in a horizontal surface, the shaft of the bone has an inclination outwards as in man, instead of a direction nearly vertical as in the Chimpanzée.

[1] Owen, Trans. Zoolog. Soc. Lond. vol. i. p. 351.
[2] Owen, Op. cit. p. 363.

The two articulating surfaces on the upper extremity of the tibia are situated on different planes, the internal, the lowest is concave, and the external convex. The depressed concave surface corresponds with the longer condyle of the femur, so that the one compensates for the other, and when the bones are in place their axes are very nearly in the same line. The tibia is more cylindrical than in man, and is destitute of the ridge separating the internal and posterior faces.

III. GENERAL REMARKS.

From the preceding descriptions there can be no reason to doubt that the Engé-ena is specifically distinct from the Enché-eco or Chimpanzée, the only member of the sub-genus Troglodytes hitherto recognized by naturalists. From the Enché-eco it is readily distinguished,

1. By its greater size;[1]
2. By the size and form of the superciliary ridges;
3. By the existence of the large occipital and interparietal crests in the males, and by rudiments of the same in the females.
4. By the great strength and arched form of the zygomatic arches;
5. By the form of the anterior and posterior nasal orifices;
6. By the structure of the infra-orbitar canal;
7. By the existence of an emargination on the posterior edge of the hard palate;
8. The incisive alveoli do not project beyond the line of the rest of the face as in the Chimpanzée and Orang;
9. The distance between the nasal orifice and the edge of the incisive alveoli is less than in the Chimpanzée;

[1] Prof. Owen estimates the height of the Chimpanzée at "about four feet." Dr. Savage gives as the result of the measurement of four adults, that two were four feet six inches, and two "five feet nearly." (See Bost. Journ. Nat. Hist., Vol, iv. p. 366.) The measurements of the Engé-ena given in the subjoined table, when compared with the corresponding ones of the Enché-eco, will justify the assertion that the former must have acquired a much greater size than the latter.

10. The ossa nasi are more narrow and compressed superiorly;

11. The scapula is more nearly equilateral;

12. The ulna is shorter in proportion to the humerus;

13. The ossa ilia are much broader, more concave on the anterior face, and the anterior spines project farther forward.

The Engé-ena in the strength of the zygomatic arches, in the existence of the occipital and interparietal crests, and in the strength and size of the lower jaw, approximates the Orangs, but is readily distinguished from all those yet described,

1. By its large superciliary ridges;
2. By the straight outline of the face;
3. By the existence of a fifth tubercle on the last molar of the lower jaw;
4. By the existence of a round ligament in the hip joint;
5. By the more anthropoid conformation of the pelvis;
6. In having the cerebral cavity more depressed behind the face;
7. In having the ulna shorter than the humerus.

It should be borne in mind that the above distinctions are not based upon observations made upon a single specimen, but upon the examination of four adult crania of the Engé-ena, two males and two females, and upon six adult crania of the Enché-eco.[1] In no one of these last has there been found any approach to an interparietal crest, nor have they in any instance deviated materially in their dimensions from those given in the table. The temporal ridges are generally separated from each other by a space varying from half an inch to

[1] Of the adult crania of the Chimpanzée, there are two in the Cabinet of the Boston Society of Natural History, one in that of Dr. J. C. Warren, two in that of the Academy of Natural Sciences in Philadelphia, and one in my own collection.

one or two inches, according to age, but in none of them is to be seen even a rudiment of the interparietal ridge.

The skull of the Engé-ena recedes much farther from the human type than that of the Enché-eco, in its greater development of the cranial crests and ridges, in the greater elongation of the upper jaw downwards and forwards, in the length of the bony palate, no less than in the much more brutal and ferocious expression of the face; in this last respect it even surpasses the Orangs of Borneo and Sumatra.

In the conformation of the pelvis, as indicated by the broad and concave iliac bones, the projection forwards of the anterior spines, it is, on the other hand, the most anthropoid of all the Simiadæ. The central portion of the ilia acquires a certain degree of transparency in both sexes, and the same has been noticed, though to a less extent, in the pelvis of the Enché-eco. This observation is interesting in connection with the results obtained by Vrolick with reference to the marks of degradation in the Negro, an index of which he finds in the absence of this character.[1] Certainly, a much more satisfactory index of degradation is to be derived from the general shape of the bones, and their approximation in form to those of the semi-erect animals with which they have been compared; and the exact measure would be the amount of deviation from the Caucasian type.

[1] "The pelvis of the male Negro, in the strength and density of its substance, and of the bones which compose it, resembles the pelvis of the wild beast, while on the contrary, the pelvis of the female of the same race combines lightness of substance and delicacy of form and structure. Yet the pelvis of the female Negro, though of light and delicate form, when compared with that of the male, is destitute of that transparent portion in which, in the pelvis of the European female the tables of the bone are so closely united. This transparency was found only in one old Negress, in which, however, the part in question when held up to the light, yet appeared not entirely destitute of diplöe intervening between the bony plates." "Delicate however as is the form of the pelvis in the female, it is difficult to separate from it the idea of degradation in type, and an approach towards the form of the lower animals. This character is imparted by the vertical direction of the ossa ilia, the elevation of the ilia at the posterior and upper spines, the greater proximity of the anterior spines, the smaller breadth of the sacrum, the smaller extent of the haunches, &c." Pritchard, Researches into the Phys. Hist. of Mankind, 4th edit. vol. i. p. 324.

From an examination of the narratives of travellers, and the works of some naturalists, it will be found that no one peculiarity is more strongly insisted upon than the ability and disposition of the Orangs to assume and maintain the erect attitude. An attentive examination however, of their organization, as compared with that of man, gives the most conclusive evidence on the other hand, that they are not constituted like him for the erect position, a conclusion abundantly supported by the observation of living specimens exhibited from time to time in America and Europe. Evidence is yet to be adduced that any Quadrumanous animal whatever, assumes or maintains the erect attitude in its ordinary and natural movements. The gait of an Orang walking on its legs alone, is one of great instability, the animal showing by its bent position like that of an infirm old man, by the attitude of the arms, the constant effort to balance itself, and its disposition to get assistance from surrounding objects, that such a mode of progression is one of extreme difficulty.

The conditions for walking erect, as manifested in the human skeleton, are as follows:

1. The head must be balanced, or very nearly so, on the atlas;

2. The curves, and the general direction of the vertebral column must be such that the centre of gravity of the trunk shall be over the plane of the pelvis, passing through the heads of the thigh bones;

3. The lower extremities on which the pelvis rests should have the axes of the thigh and leg in one and the same vertical plane;

4. The feet should be directed at right angles to the axes of the legs, the sole resting on the ground.

These conditions are found to co-exist in man, and in man alone; they are not found in any of the anthropoid animals hitherto described, nor is there any nearer approximation to them in the species now under consideration, unless it be the existence of a pelvis a little more perfect in its conformation than in the congeners. The natural attitude of the Orangs on the ground is *semi-erect,* aided and supported by one or both of their long arms; the Chimpanzées and Orangs resting on their callous knuckles, and the Engé-enas on the palms of their hands. If they at any time support themselves on their legs alone, their heads droop, the trunk is bent forwards, the thighs are flexed, and their feet inverted, all which necessarily results from the mechanical arrangements of their skeleton. The *foramen magnum* and (consequently the occipital condyles), instead of being situated in the middle of the base of the skull as in man, is situated in the middle of the posterior third, from which results the greater preponderance of the head forwards.[1]

The vertebral column is concave throughout nearly the whole of its anterior face, and in the lumbar region especially, deviates from the form of that of the human body, in which it is strongly convex. This results from the anterior portions of the bodies of the lumbar vertebræ in the Orangs having the vertical diameter of the anterior face shorter than that of the posterior, so that when they are piled one above another, the superior ones incline forwards, and will necessarily cause the whole superimposed trunk to preponderate in that direction, consequently throwing the centre of gravity forward in a proportional degree.

The bent position of the body necessarily involves a greater or less flexion of the legs, in order that a portion of its lower part should be thrown behind the centre of gravity, to compensate in a measure for the upper portion including the head, which is thrown in front of it.

[1] The position of this foramen in the Orangs is correctly regarded as an evidence of degradation. Sœmmering has imagined that an approach to it existed in the crania of Negroes, and his statement has been frequently repeated by subsequent anatomists. The more recent observations of Owen and Pritchard however, have a tendency to show that this foramen does not occupy a place in the Negroes materially different from that of the Caucasians; so that the difference between the Negroes and Orangs with regard to this peculiarity is vastly greater than between any two of the human races. See Pritchard, Res. Phys. Hist. Man. 4th ed. vol. i. p. 290.

Lastly, the feet are always inverted, in consequence of the mode of their articulation with the leg. Living habitually in trees, and the natural locomotion being that of climbing or swinging from limb to limb by the aid of long and powerful arms, their feet are so constructed as to enable them to apply the soles against the sides of the trunks and branches, consequently requiring them to be in planes, either really in, or approximating to a vertical direction. When on the ground, therefore, they are from necessity obliged to walk on the outer edge of the foot, and this with the other peculiarities of their organization, gives them an unstable gait, contrasting with that of man, who, habitually walking erect on a horizontal surface, has the soles of the feet necessarily in a horizontal plane.

The organization of the anthropoid Quadrumana justifies the naturalist in placing them at the head of the brute creation, and placing them in a position in which they, of all the animal series, shall be nearest to man. Any anatomist, however, who will take the trouble to compare the skeletons of the Negro and Orang, cannot fail to be struck at sight with the wide gap which separates them. The difference between the cranium, the pelvis, and the conformation of the upper extremities in the Negro and Caucasian, sinks into comparative insignificance when compared with the vast difference which exists between the conformation of the same parts in the Negro and the Orang. Yet it cannot be denied, however wide the separation, that the Negro and Orang do afford the points where man and the brute, when the totality of their organization is considered, most nearly approach each other.

TABLE OF COMPARATIVE MEASUREMENTS

OF THE CRANIA AND BONES OF SIMIA SATYRUS, TROGLODYTES NIGER, TROGLODYTES GORILLA, AND MAN.*

	Simia Satyrus.	Trog. niger.	Trog. Gorilla. male.	Trog. Gorilla. female.	Man.
CRANIA.					
From the posterior plane of the occiput to margin of incisors	7.6	7.3	12.0	9.10	9.6
Greatest lateral diameter of cranium at post auditory ridges	5.4	4.6	6.1	5.2	5.4
Smallest lateral diameter of cranium behind orbits	2.6	2.8	2.5	2.5	3.4
Diameter of face across zygomata	6.0	4.8	6.5	5.5	5.7
Diameter of face outside of orbits	4.2	4.0	4.9	4.3	4.9
From posterior plane of occiput to fronto-nasal suture	4.7	5.3	7.3	6.5	7.2
From fronto-nasal suture to margin of incisors .	4.4	4.4	4.8	4.5	3.5
Breadth of zygomatic fossa		1.1½	1.7	1.4	1.1
Inter orbitar space	0.5	0.7	1.1	1.0	1.2
Lateral diameter of orbit	1.4	1.6	1.5	1.4	1.6
Vertical " " "	1.6½	1.3	1.6	1.4	1.3
Length of bony palate	3.3	2.10	3.7	3.4	1.7
LOWER JAW.					
Length of lower jaw from condyle to symphysis .	6.2	5.0	7.0	6.5	5.3
" " " " " angle " " .	5.6	3.3			4.0
From angle to condyle	3.10	2.5			2.8
Breadth between angles (inside)	3.9	1.10	4.5	3.8	3.5
Breadth of ramus	2.3	1.10	2.9	2.4½	1.7½
Height of " . . . . ,		2.4	4.6	4.3	2.9
UPPER EXTREMITY.					
Length of scapula along base	5.5	5.5	9.0		7.0
Broadest part of scapula		2.7	6.5		4.8
Posterior extremity of spine from upper angle .			4.5		2.0
Humerus	13.4	10.9	17.0		15.0
Radius	13.7	10.0	13.5		10.6
Ulna	14.5	10.8	14.2		
PELVIS.					
Length of sacrum		3.4	6.0		
Breadth of "	3.4	2.6	3.7	3.2	
Breadth of pelvis between spinous processes of ilia	11.5	9.3	15.0	15.0	
" " ilium	4.9	4.2	8.0	7.5	
Length of os innominatum	9.10	9.10	14.0	12.0	
Antero-posterior diameter of pelvis from symphysis to edge of base of sacrum	5.5	5.0		8.0	
Transverse diameter of pelvis	4.0	3.5		5.1	
Length of symphysis	2.0	1.6	3.0	2.3	
Long diameter of obturator foramen	1.9	1.7	2.1	2.2	
From outside of one tuber ischii to that of the other	5.8	6.0		5.8	
LOWER EXTREMITY.					
Femur	10.3	11.0	14.0		
Tibia	9.0	8.5	11.5		
VERTEBRÆ — 12th. DORSAL.					
Transverse diameter		1.0½		1.7½	
Antero-posterior "		0.9½		1.0	
Vertical diameter of anterior face		0.9½		0.8	
" " " posterior face		0.9			
2d. LUMBAR.					
Antero-posterior diameter		0.11		1.1½	
Transverse diameter		1.4		1.7	
Vertical " anterior face		0.9		1.0	
" " posterior "		0.11		1.1	

* These measurements of the cranium were made from that of a negro remarkable for the perfect development of all the characteristics of the Ethiopian race. See Catalogue of Boston Society for Medical Improvement. J. B. S. Jackson, M. D. Spec. No. 89. The measurements of the S. satyrus and T. niger are taken from Prof. Owen's Memoir in Trans. Zoolog. Soc. Lond., vol. i. p. 374. The first two columns are in inches and lines, the others in inches and tenths.

EXPLANATION OF PLATES.

PLATE I. *Head of Male, profile.* In this view, are to be seen the strongly developed inter-parietal crest and superciliary ridges, the broad and curved zygomatic arches, and the expanded ramus of the lower jaw.

PLATE II. *Head of Female, profile.* The inter-parietal crest here exists in a rudimentary condition only, and the ramus of the lower jaw is much more narrow than in the male, but the curve of the zygomatic arch is quite conspicuous.

PLATE III. *Head of Male, front view.* This represents the head so placed that the border of the lower jaw is horizontal, in which position the cranium proper almost disappears behind the superciliary ridges. The occipital crest cannot be seen in this position. The middle incisors of the upper jaw were missing.

PLATE IV. FIG. 1. *Head of Female, front view.* The teeth of this head are irregularly arranged in the lower jaw; the canine of the right side is opposed to the lateral incisor of the upper jaw, and the right middle incisor is to the left of the median line.

FIG. 2. An ideal representation of the teeth of the female.

ART. XXXV.—DESCRIPTIONS AND FIGURES OF THE ARANEIDES OF THE UNITED STATES. By NICHOLAS MARCELLUS HENTZ, Tuscaloosa, Alabama.

[Continued from Vol. V. page 370.]

Genus THOMISUS. Walck.

Characters. *Cheliceres small, cuneiform, fang small; maxillæ pointed at tip, more or less inclined over the lip; lip pointed at tip, wider in the middle than at base, as long as, or longer than, half the length of the maxillæ; eyes eight equal or subequal, commonly in two rows of four each, the posterior one longest, bent from the base towards the anterior one; feet, commonly the first and second pair longest, or the second alone longest.*

Habits. Araneïdes wandering after prey, making no web, but casting irregular threads, cocoon flattened, usually placed under leaves, watched by the mother till the young are hatched.

Remarks. Well was it remarked by Walckenaer, that a subgenus so easily recognized as THOMISUS is nevertheless excessively difficult to characterize. There is not one feature save the small size of the cheliceres, a secondary character, which is not liable to vary in the different species, and yet, the sub-division is a natural one. Nay, the sub-genus PHILODROMAS which seems to correspond to my first tribe, the DEPRESSÆ, does not appear to be sufficiently characterized to be separated from this, at least if my THOMISUS VULGARIS can be referred to it.

SECTION I. HETEROPODÆ. *Four posterior legs shortest.*

Tribe I. DEPRESSÆ. *Legs very long, equal in thickness, body flattened.*

1. THOMISUS VULGARIS.

Plate XXIII. Fig. 1.

Description. Pale grey, abdomen with four impressed dots, body flat; legs with indistinct darker rings.

Observations. This spider, commonly seen on fencing or prostrate timber, like those of the same genus, moves sideways and backwards, but it is much more active than T. *celer.* When pursued by an enemy, like ATTUS and EPEÏRA, it leaps and hangs by a thread, which supports it in the air.

Habitat. United States.

Tribe II. CANCROÏDES. *Legs very long, four anterior ones largest, abdomen oval.*

2. THOMISUS ALEATORIUS.

Plate XXIII. Fig. 2.

Description. Cephalothorax greenish yellow, region of the eyes reddish with whitish lines between and before the eyes, trophi piceous; abdomen yellow with six impressed dots, yellow underneath; feet, two first pair piceous, third and fourth greenish yellow. A small species.

Observations. This little spider is not rare, usually found on plants.

Habitat. Alabama, September.

Tribe. III. PYRIFORMES. *Legs moderately long, abdomen pyriform.*

3. THOMISUS FEROX.

Plate XXIII. Fig. 3.

Description. Brownish yellow; cephalothorax with a dusky band each side, abdomen with four or six angular brownish spots; two anterior pair of feet hairy.

Observations. This common species is found on plants with the same habits as T. *celer.* I have found in Alabama, in April, a male and a female on a bush; the male was grasping her with his long legs. His abdomen was not truncated, and its marking was somewhat different from that of the female. This spider is apt to vary in color and marking.

Habitat. United States.

4. THOMISUS FARTUS.

Plate XXIII. Fig. 4.

Description. Pale yellow; cephalothorax with an orange fascia in the region of the eyes; abdomen with a marginal red band not reaching the apex, and five or seven impressed dots, the band sometimes obsolete.

Observations. This elegant species first found on the *Actæa spicata* in the Cambridge botanic garden, and often seen since in various places, is always found on plants. It watches its cocoon, which is attached usually under a leaf, like that of a Coccinella, and remains near, till the eggs are hatched. It varies in marking, and I have one species with red spots on the back of the abdomen. It is nevertheless distinct from T. *celer*, and may be T. *citreus*, Règne An. IV. 256.

Habitat. Massachusetts, Alabama.

5. THOMISUS CELER.

Plate XXIII. Fig. 5.

Description. Pale yellow, with a slight tinge of grass green, particularly the legs. Two curved rows of impressed dots on the abdomen; lateral eyes not borne on tubercles.

Observations. This spider is found usually on blossoms, where it remains, patiently waiting for Dipteræ, other small insects, and even butterflies, which it secures with amazing muscular power. It moves backwards and sideways more commonly than forwards. Sometimes seen larger, though never attaining great dimensions.

Habitat. Found in South Carolina, North Carolina, Massachusetts, Alabama, Ohio, &c.

Tribe IV. Oculatæ. *External eyes borne on tubercles, eyes equal.*

6. THOMISUS PIGER.

Plate XXIII. Fig. 6.

Description. Yellowish brown; cephalothorax with two brownish bands; abdomen with two curved lines of impressed dots; somewhat paler underneath.

Observations. This species is probably the largest, and is very distinct from any other, particularly by its habits. It dwells under stones, where it watches for its prey, and has not been found on plants.

Habitat. North Carolina.

7. THOMISUS ASPERATUS.

Plate XXIII. Fig. 7.

Description. Pale, covered with short bristles; cephalothorax, outer eyes of second row tuberculated, with two blackish bands, and a few longer bristles about the eyes; abdomen pale brown above, pale glabrous underneath; feet, first and second pair with brown rings, third and fourth with fewer bristles.

Observations. This spider, which is found on plants, seems quite distinct from any other, though the species of this subgenus are very variable.

Habitat. Alabama. September.

8. THOMISUS PARVULUS.

Plate XXIII. Fig. 8.

Description. Rufous; abdomen yellowish with a transverse band black, near the apex; third and fourth pair of legs greenish or yellowish; first and second pair longer and slender in the male.

Observations. The external eyes appear to be larger, on account of their being placed on elevations. This species is common, and frequently found on the blossoms of umbelliferous plants.

Habitat. The Southern States.

Tribe V. TUBERCULATÆ. *A tubercle on the abdomen, external eyes larger, tuberculated.*

9. THOMISUS CAUDATUS.

Plate XXIII. Fig. 9.

Description. Dusky; abdomen with a tubercle or tail behind above the apex, about six small black dots on the disk; pale beneath, with a longitudinal band, and sides blackish; feet, $\overbrace{1.\ 2.}\ \overbrace{4.\ 3.}$

Observations. This species is not rare. It is sometimes found wandering in mid-winter. The eyes are unequal in size, the two lower external ones are largest, and the four external ones are borne on tubercles.

Habitat. Alabama.

Section II. EQIPEDES. *Four posterior legs not invariably the shortest.*

Tribe VI. Filipedes. *Feet slender, long, second pair longest, then the fourth.*

10. THOMISUS? DUTTONI.

Plate XXIII. Fig. 10.

Description. Pale grey; cephalothorax with a longitudinal rufous band; abdomen long and slender, with a like narrow band, and two minute black dots near the apex; legs yellowish, 2. 4. 1. 3.

Observations. This singular spider was communicated to me by Mr. Thomas R. Dutton, who collected it in Georgia in 1838. The alcohol in which it was preserved may have changed its colors.

Habitat. Georgia.

Tribe VII. not determined; *eyes in four rows.*

11. THOMISUS? DUBIUS.

Plate XXIII. Fig. 11.

Description. Pale; cephalothorax with two slender longitudinal blackish lines edged with greenish; abdomen with a similar green edged line, which bifurcates towards the base, and has one small black dot on each bifurcation; feet, first pair wanting, second very long, fourth next, third shortest.

Observations. This singular spider was unfortunately mutilated when discovered, and the drawing was left unfinished, as I hoped other specimens would occur; none however, were ever found. There is an affinity in some points between this and T. *Duttoni.*

Habitat. North Carolina.

THOMISUS? TENUIS.

Plate XXIII. Fig. 12.

Description. Testaceous, downy; cephalothorax with a longitudinal white band, and a tuft of hair between the eyes; abdomen with two interrupted longitudinal whitish fillets, four long nipples; feet bristly, $2.\ \overbrace{1.\ 4}\ 3.$

Observations. This is undoubtedly congeneric with my *Thomisus dubius.* But knowing nothing of their webs nor of habits, I still refrain from making any generic distinction. These will probably form the type of a new sub-genus. This one was found enclosed in the clay nest of a Sphex.

Habitat. Alabama.

Genus Clubiona. Latr.

Characters. *Cheliceres long, fang moderately long; maxillæ parallel, wider above the insertion of the palpi, lip widest in the middle; eyes eight, equal, in two rows, the lower one nearly straight; feet, the fourth or the first pair longest; body usually of a pale or livid color.*

Habits. Araneïdes sedentary, watching their prey, and inclosing themselves in silk tubes; cocoon orbicular.

Remarks. This sub-genus like Thomisus, cannot be characterized with any precision, owing to the variations in the form of the trophi, the position of the eyes, &c. It is nevertheless a natural subdivision of Aranea. The species composing it have nocturnal habits; little therefore, is known of their history. They dwell under leaves, under bark or stones, where they may be found in silk tubes, from which they seldom issue during the day.

Tribe I. Dryades. *Eyes, posterior row bent toward the base, fourth pair of legs longest, then the second.*

1. CLUBIONA PALLENS.

Plate XXIII. Fig. 13.

Description. Livid white; abdomen varied with plumbeous spots above, and four small dots near the apex underneath; feet, 4. 2. 1. 3. Both sexes alike.

Observations. This spider is found in silk tubes, concealed under the bark of decaying trees, where it spends the winter. There is a spotless variety which may prove a distinct species.

Habitat. North Carolina, Alabama; common.

2. CLUBIONA OBESA.

Plate XXIII. Fig. 14.

Description. Testaceous or brownish, abdomen with a longitudinal more or less distinct brown band above.

Observations. This spider, usually found concealed in silk tubes, was sometimes seen in the blossoms of the Magnolia seeking for prey. It is perfectly distinct from *Clubiona inclusa.*

Habitat. Massachusetts, North Carolina, Alabama.

Tribe II. HAMADRYADES. *Eyes, posterior row bent from the base, lip emarginate, first pair of legs longest.*

3. CLUBIONA PISCATORIA.

Plate XXIII. Fig. 15.

Description. Dingy rufous; eyes sub-equal, two middle ones larger; abdomen pale, piceous, with a sub-obsolete spot near the base, four nipples, two external ones bi-articulate. Feet long, 1. 4. 2. 3.

Observations. The difference between the eyes of this and those of my *Clubiona obesa* prevents my referring them to the same species. The pulmonary orifices are white, under a gloss. This spider made an even web like AGELENA. Wandering at night.

Habitat. Alabama.

4. CLUBIONA TRANQUILLA.

Plate XXIII. Fig. 16.

Description. Deep rufous or piceous; abdomen greyish black, with four impressed dots.

Observations. It is difficult to learn much of the habits of this spider, which moves chiefly at night. A male and a female were found in Alabama in July, in the folds of an old piece of paper, near a silk tube of extreme whiteness, which was probably destined to receive the eggs. Always found in a tube except at the approach of winter, when it is sometimes found wandering.

Habitat. Common in the United States.

Tribe III. NYMPHÆ. *External eyes approximated, lip emarginate, first pair of legs longest.*

5. CLUBIONA INCLUSA.

Plate XXIII. Fig. 18.

Description. Livid white, or pale yellow; cheliceres, last joints of all the feet and of the palpi tipped with black; a longitudinal dusky line beginning at base of the abdomen.

Observations. This spider was always found in tubes of white silk, the female watching her cocoon, which is covered with a very thin coat of silk; the eggs are loose and not glued together. It probably moves out only at night, as its pale color indicates. The young are deeper in color even than the mother.

Habitat. South Carolina, North Carolina, &c.

Tribe IV. FURIÆ. *External eyes not touching, lip truncated at tip, fourth pair of legs longest.*

6. CLUBIONA FALLENS.

Plate XXIII. Fig. 17.

Description. Yellowish or rufous; cephalothorax with blackish lines; abdomen pale, with two rows of sub-obsolete dots, and two abbreviated rows of smaller ones obscure, same color underneath; feet hairy, particularly the third and fourth pair, in the female, 4. 1. 2. 3. and in the male 1. 4. 2. 3. The sexes marked alike.

Observations. Were it not that the eyes are differently placed, this might be taken for C. *celer*. Males and females were found in silk tubes constructed on leaves. A male was found in November, with imperfect blackish rings on the legs, one more distinct at the base of the antepenult joint. Is it a variety or a distinct species?

Habitat. Alabama. October, November.

7. CLUBIONA GRACILIS.

Plate XXIII. Fig. 19.

Description. Yellowish; cephalothorax with two longitudinal bluish bands; abdomen with two longitudinal bands of numerous small red dots, the bands uniting towards the apex; feet, hairy, 4. 1. 2. 3. The sexes alike.

Observations. This very active spider is often seen in mid-winter on a mild day apparently migrating in great numbers, being supported in the air by a long thread, and borne by the breeze. Once, many were seen in December, thus approaching a large tree, under the bark of which they probably intended to hibernate. A variety, perhaps a distinct species, was found, destitute of dots or bands; it was concealed in a silk tube on a leaf.

Habitat. North Carolina, Alabama.

8. CLUBIONA CELER.

Plate XXIII. Fig. 20.

Description. Pale; cephalothorax with angular markings near the edge, and some lines; abdomen pubescent, with indistinct dots; feet, hairy. Male resembling the female in every point of markings.

Observations. This little spider was found in December, suspending itself from a thread, and moving with great activity. A male somewhat larger than the scale was found in Alabama, April, wandering about at night.

Habitat. North Carolina, Alabama.

Tribe V. CAVERNOSÆ. *Eyes in two sub-parallel rows, lip pointed at tip, feet variable.*

9. CLUBIONA ? AGRESTIS.

Plate XXIII. Fig. 21.

Description. Livid green; abdomen purplish brown, with four impressed dots; feet, 1. 4. 2. 3. Male of a piceous color.

Observations. The male and the female were found under a stone. The female has two curved rigid shining elevations under the vulva, forming an arch open towards the base. It is with some hesitation that I place this species in this subdivision.

Habitat. Alabama. March.

10. CLUBIONA IMMATURA.

Plate XXIII. Fig. 22.

Description. Yellowish rufous, middle lower eyes black; abdomen immaculate pale green; legs with very short hairs, 4. 1. 2. 3.

Observation. This was found in a cellar.

Habitat. Alabama. October.

Tribe VI. Not determined.

11. CLUBIONA ? SUBLURIDA.

Plate XXIV. Fig. 1.

Description. Pale yellowish; cheliceres very large; abdomen with two obscure sub-obsolete lines, same color beneath with a few minute brown spots; feet, long, slender, 1. 4. 2. 3.

Observations. This spider was found upon a bush, without any web. It displayed great activity and vigor. When at rest it had its legs spread out.

Habitat. Alabama. July.

12. CLUBIONA ? SALTABUNDA.

Plate XXIII. Fig. 23.

Description. Pale; cephalothorax with a few obscure marks near the edge, palpi with bristles; abdomen with two rows of blackish dots, and a few minute ones towards the sides; pectus with a scolloped black line on each side; venter with four or five small spots, and many small dots black; feet, slender, 1. very long, 4. 2. 3.

Observations. This spider is found in the fields, wandering, and running with great activity. It leaps like ATTUS, and like it too, it leaves a thread behind to secure its flight. A female found in November, made a tube or tent as a residence in the vial in which it was enclosed. The male resembles the female. Probably congeneric with *Clubiona? sublurida.*

Habitat. Alabama. May, November.

13. CLUBIONA? ALBENS.

Plate XXIII. Fig. 24.

Description. Pale bristly; abdomen deeper in color, venter with its base and three spots, pale green, pectus with a line each side, pale green, nipples, four long ones and two short. Feet, very long and slender, 1. 4. 2. 3. First much the longest.

Observations. This is undoubtedly related to my *C. saltabunda,* and with it will probably constitute a new subgenus at some future time.

Habitat. Alabama.

Genus HERPYLLUS. Mihi.

SILLIMAN'S J. Vol. XXI. p. 102.

Characters. *Cheliceres moderately large, without teeth; maxillæ parallel, wider above the insertion of the palpi, cut obliquely above; lip about half the length of the maxillæ, narrower towards the point; eyes, eight, sub-equal in two parallel rows of four each, both commonly bent towards the base; feet, the fourth pair longest, then the first, then the second, the third being the shortest.*

Habits. Araneïdes wandering after prey, making no web, but running about with great swiftness, and hiding under stones, crevices, &c. Cocoon unknown.

Remarks. This sub-genus, very closely related to Clubiona, is very well characterized notwithstanding the similarity. The character derived from the respective length of the legs is very constant, showing the property of being fast runners in all the species of this division.

In habits they differ wholly from Clubiona, being in fact wandering Araneïdes. The swiftness with which they run is truly surprising. They are not exclusively nocturnal, being often seen to run in the brightest sunshine.

Tribe I. Brevipedes. *Legs strong, rather short, maxillæ long, cut obliquely above.*

1. HERPYLLUS ECCLESIASTICUS.

Plate XXIV. Fig. 2.

Description. Black; cephalothorax with a whitish longitudinal band; abdomen with an abbreviated band, and a spot white.

Observations. This spider is not rare, found between boards and crevices in dark places; running very fast, chiefly at night; I never could find its cocoon or its permanent dwelling-place.

Habitat. The United States.

2. HERPYLLUS ATER.

Plate XXIV. Fig. 3.

Description. Deep glossy black, immaculate, feet rather short.

Observations. This species, readily distinguished from H. *descriptus*, which has long slender legs, is found running with great rapidity on paths and frequented places. It is diurnal, and when pursued it seeks shelter under stones or leaves. It has the same habits with H. *bicolor*, to which it is related.

Habitat. Pennsylvania, New England.

3. HERPYLLUS BICOLOR.

Plate XXIV. Fig. 4.

Description. Rufous; abdomen bluish black, with about six impressed dots. Male same colors.

Observations. This common species is found usually on the ground or under stones, leaves, &c., running with great rapidity. The female almost invariably kills the male and eats him, after the calls of nature are satisfied. It is related to H. *ater.*

Habitat. North Carolina, Alabama, and probably the United States.

4. HERPYLLUS BILINEATUS.

Plate XXIV. Fig. 5.

Description. Whitish; cephalothorax above, and abdomen above and beneath with two longitudinal black bands somewhat curved; feet yellowish. Male with the same marks.

Observations. This spider is remarkably active, usually found on trees. No species of this sub-genus is more distinct, and invariably spotted in the same manner. It is not rare.

Habitat. North Carolina, Alabama.

5. HERPYLLUS ORNATUS.

Plate XXIV. Fig. 6.

Description. Golden rufous; abdomen with abbreviated and interrupted transverse bands black; feet, yellowish, varied with black, thighs of two anterior pairs of legs black.

Observations. Wandering on paths, and very active, in woods or unfrequented places. The young usually has its abdomen black, with transverse whitish bands which are formed by hairs.

Habitat. North Carolina.

6. HERPYLLUS DESCRIPTUS.

Plate XXIV. Fig. 7.

Description. Black; abdomen with an abbreviated, longitudinal band, golden rufous; two anterior pairs of legs with last three joints brownish or paler.

Observations. There are probably several species very similar to this. A large specimen was found in Alabama, with no yellow spot on its abdomen, its legs with a few stout bristles, its two posterior thighs had two whitish bands above, and the base of its abdomen had a whitish spot, these bands and spot formed by short hairs. Another specimen occurred with the whole disc of the abdomen red, the abdomen had a peduncle one third the length of the cephalothorax, the cheliceres were more prominent. Are these two distinct species? This is closely related to H. *ornatus.*

Habitat. North Carolina, Alabama.

7. HERPYLLUS CROCATUS.

Plate XXIV. Fig. 8.

Description. Piceous black; abdomen darker, with a saffron-colored band widening towards the apex, blackish beneath; feet, fourth pair hairy.

Observations. This species inhabits houses, hiding in cracks, under boards, &c. It does not vary in marking, and is very well characterized.

Habitat. Alabama. November.

8. HERPYLLUS LONGIPALPUS.

Plate XXIV. Fig. 9.

Description. Black; palpi nearly as long as the cephalothorax; abdomen with sub-obsolete transverse white bands; feet spotted with white; immaculate black underneath.

Observations. The spots and bands in this, as well as in most of the other species of this sub-genus, are produced by scales or hairs which are quite deciduous, and hence there are many varieties of markings. This spider moves with the rapidity of lightning.

Habitat. Alabama. September.

9. HERPYLLUS MARMORATUS.

Plate XXIV. Fig. 10.

Description. Black, varied with whitish markings formed by deciduous scales; feet, 4. 1. 2. 3. Fourth pair stoutest.

Observations. This can scarcely be the male of my H. *longipalpus.*

Habitat. Alabama.

10. HERPYLLUS VARIEGATUS.

Plate XXIV. Fig. 12.

Description. Cephalothorax rufous; abdomen blackish with three whitish bands, the middle one as an inverted ⊥; feet, varied with piceous and rufous.

Observations. This spider, drawn from a specimen collected by Prof. Peck of Massachusetts, was immersed in spirits ten or twelve years at least, before it was painted. The colors may not be correctly represented in consequence of that. A specimen was found in North Carolina, and also one in Kentucky, in a silk tube, which had only two bands on the abdomen, and the external eyes of which were placed nearer together. These will probably be found to belong to another species.

Habitat. Massachusetts?

11. HERPYLLUS CRUCIGER.

Plate XXIV. Fig. 11.

Description. Gray; abdomen with spots and dots black.

Observations. This spider is really black, but covered with grey hairs or scales which can be easily rubbed off, and which are arranged on the abdomen somewhat in the form of a cross. It moves with great celerity, and hides under stones, &c.

Habitat. North Carolina.

12. HERPYLLUS VESPA.

Plate XXIV. Fig. 13.

Description. Piceous; cephalothorax with the middle lower eyes black ; abdomen usually deeper in color, with four impressed dots, separated from the cephalothorax by a whitish peduncle, underneath with a pale spot over each pulmonary orifice.

Observations. This spider, like other congeneric species, runs very fast and conceals itself under stones. It is common. It may be that *Agelena plumbea* will be referred to this.

Habitat. Alabama.

13. HERPYLLUS ? RAMULOSUS.

Plate XXIV. Fig. 14.

Description. Obscure brown ; abdomen with two diverging bands and several spots pale brown, spotless pale beneath.

Observations. This may be referred to CLUBIONA, as it bears some affinity to C. *celer* and others.

Habitat. Alabama. May.

14. HERPYLLUS ? PYGMŒUS.

Plate XXIV. Fig. 16.

Description. Piceous ; feet and palpi paler ; feet, 4. $\overbrace{2.\ 1.\ 3.}$ A very small species.

Observations. This species is referred to this division with but little hesitation. It is probably not common. It was found wandering.

Habitat. Alabama. August.

Tribe II. LONGIPEDES. *Legs slender, long, maxillæ short, truncated.*

15. HERPYLLUS ? AURATUS.

Plate XXIV. Fig. 15.

Description. Bright rufous ; abdomen brilliant gold color above and beneath, with four abbreviated white lines above, and four on the sides towards the base, with a tinge of silvery green around the vulva in the female ; feet, filiform, long and slender, dusky towards the extremity, particularly the fourth pair.

Observations. This beautiful slender species moves like a mouse, and with such rapidity, as to make it quite an arduous undertaking to capture it. The male and female have been repeatedly found with the same colors and marking. One specimen, soon after being inclosed in a glass tube, made a beautifully wrought tent like that of Attus, open at both ends. It would seem that this spider has a fixed place of abode, from which it issues for hunting excursions, for a female was observed by some children, several times on the same plant, repeatedly escaping to the ground when pursued, until it was at last taken in the very same spot. A female in a state of gravidity was found September 30th, agreeing in every description except in having obscure bands in the form of an Λ ; about four distinct ones, near the apex.

Habitat. Alabama. August, October.

16. HERPYLLUS ZONARIUS.

Plate XXIV. Fig. 17.

Description. Brown ; abdomen piceous, with two transverse white bands interrupted in the centre, unspotted beneath ; feet varied with brown and yellowish. A small species.

Observations. This little spider is probably not a variety of H. *auratus.* Its feet are not so filiform. It runs with great celerity.

Habitat. Alabama. September.

17. HERPYLLUS TRILINEATUS.

Plate XXIV. Fig. 18.

Description. Rufous ; abdomen with three transverse golden yellow lines or bands produced by hairs, rufous unspotted beneath ; feet, slender and long, paler towards the extremity, penult joint blackish, particularly of the first and second pair. Both sexes alike.

Observation. This spider was found wandering.

Habitat. Alabama. April, May.

18. HERPYLLUS PARCUS.

Plate XXIV. Fig. 19.

Description. Rufous; abdomen with some transverse subobsolete obscure bands near the apex, where the abdomen is covered with hair which turns pale green in a certain light, pale underneath; first two pair of legs with two rows of knobs on which long hairs are inserted. A small species.

Observations. This spider is usually found under logs in the woods. It is strongly characterized, and cannot be taken for any other. The hairs or bristles on the knobs of the legs are laid close on the leg, and are not visible to the naked eye on that account; they are probably susceptible of voluntary motion, for defence.

Habitat. Alabama. July, September.

19. HERPYLLUS ALARIUS.

Plate XXIV. Fig. 20.

Description. Cephalothorax pale rufous, with a scolloped margin darker; abdomen obscure piceous with four or five transverse bent lines yellowish; feet, pale, first pair with the top of the thighs and the two next joints blackish hairy, second pair with a blackish ring on the antepenult joint. A small species.

Observation. This species was found under a board.

Habitat. Alabama.

Tribe III. Doubtful.

20. HERPYLLUS? DUBIUS.

Plate XXIV. Fig. 24.

Description. Black; abdomen with two white spots; feet rufous, thighs black.

Observations. This species, unfortunately not completely painted, was found running on walls.

Habitat. South Carolina.

Genus Tegenaria. Latr. Walck.

Characters. *Cheliceres moderately long; maxillæ parallel, rounded, very slightly inclined towards the lip; lip short, rounded at tip; eyes eight, equal, in two rows, anterior one composed of four eyes in a straight line, posterior one longer, curved towards the base; feet, fourth pair longest, then the first, the other two nearly equal.*

Habits. Araneïdes sedentary, making in obscure corners an horizontal web, at the upper part of which is a tubular habitation where the spider remains motionless till some insect be entangled in the threads.

Remarks. The distinction first proposed by Latreille between this and the Agelena of Walckenaer should be preserved. The habits of the spiders differ considerably, and the position of the eyes is so different as to point out the necessity of a separation. I would have preserved the name Aranea to this division; but confused ideas would arise from attributing to a sub-genus the name, which, though legitimate, belongs more properly to the whole family of spiders.

These make webs of slender texture in dark places without the addition of the strong cross threads which Agelena adds to the horizontal texture. It is only at night that they can be seen at work in the construction of their webs.

1. TEGENARIA MEDICINALIS.

Journal of the Acad. of Nat. Sc. Philad., II. p. 53, pl. V. fig. 1.

Plate XXIV. Fig. 21.

Description. Pale brown; turning to bluish black; cephalothorax with a blackish band on each side; abdomen varied with black, or plumbeous and brown; feet varied with blackish.

Observations. This species which was described by the author in the Journal quoted above, is found in every cellar or dark place in the country. For some time the use of its web as a narcotic in cases of fever, was recommended by many physicians in this country; but now it is probably seldom used. The author being absent from Philadelphia when the second volume of the Journal was published, a strange mistake was committed. The publishers caused a delineation of my *Lycosa lenta* to be printed instead of the original drawing of this species, which was probably lost; and as soon as they were informed of the error, they caused an imperfect delineation of this species to be substituted, which may be seen on Plate V., along with some representations of crystals of Zircon, published by Dr. G. Troost. The palpi of the male of this spider are very complicated, as may be seen by the drawing. The colors vary much.

On the 28th of February, I observed a male specimen of this species in a dark corner, apparently devouring another spider. On moving them with a straw I discovered that the other was a female of the same species, and not dead, but with its legs closely folded on its body, and perfectly motionless. One of the palpi of the male was buried in the vulva of the female, and could not be extricated by the efforts which he made to avoid my intruding straw. I threw them on the ground and had ceased to watch them, when suddenly I saw the female escaping from him, apparently in great terror. In the meanwhile, the male, from whose cheliceres she had escaped, had seized a small bit of stick as a substitute, and ran about with ludicrous haste, seemingly out of his senses for some time. This fact may prove that the female of spiders is not always the tyrant and oppressor of the other sex.

Habitat. The United States.

2. TEGENARIA PERSICA.

Plate XXIV. Fig. 23.

Description. Pale gray; cephalothorax with serrated black lines; abdomen obscure, with about eight pale oblique spots, central line blackish, upper mammulæ very long, obscure beneath, with indistinct markings; feet varied with many blackish rings. Male not differing from the female; feet, 4. 1. or 1. 4. 2. 3. A small species.

Observations. This is quite distinct from T. *medicinalis*, by its size, markings, and particularly by the respective length of the legs, the first pair of which is very frequently as long as, or longer than, the fourth. It makes its web on the trunk of trees, with a winding tube turned downward, very much like that of Agelena. I often found it on the peach tree. It never was found larger than the mark on the plate.

Habitat. Alabama. September.

3. TEGENARIA? FLAVENS.

Plate XXIV. Fig. 22.

Description. Yellowish; cephalothorax rufous; abdomen long and slender; feet slender, 4. 1. 2. 3.

Observations. I do not remember where this was found, and it would be well to know what web it makes. It has all the characters of Tegenaria. It must have been some time in whiskey, and the color may have changed.

Habitat. Alabama.

Genus Agelena. Walck.

Characters. *Cheliceres strong; maxillæ slightly inclined, rounded externally; lip conical, as long as, or more than half the length of the maxillæ; eyes eight, equal, two anteriorly, four in a row curved anteriorly, two behind the intermediate ones of the second line; feet, fourth pair longest, then the first, then the second, the third being the shortest, upper mammulæ very long.*

Habits. Araneïdes sedentary, making in the fields, on bushes or stumps a large horizontal web, with a tubular habitation, the web connected with strong crossed threads extending high above it.

Remarks. The name of Walckenaer is preserved for the reasons given in the remarks upon Tegenaria.

No spider is more common or familiar to the eye of every one who rambles in the fields than the first species of this sub-genus. Its habitus is totally different from that of Tegenaria; it is very voracious, attains an immense size, and probably lives many years.

1. AGELENA NÆVIA ? Bosc.

Plate XXX. Fig. 1, 1 a, young.

Description. Rufous hairy, cephalothorax with two longitudinal black bands, abdomen blackish with two longitudinal rows of whitish dots. Feet very hairy, with joints terminated by a blackish ring.

Observations. This species, common in the United States, makes a large horizontal web, spread on bushes or on the grass, with a tubular retreat which terminates in some crevice in the ground, a stump, or any convenient hole to hide itself; strong cross threads are attached to the bushes above the web. It varies very greatly in size, and is remarkably voracious. When very young it makes its web on the ground, on highways; and in the morning, when the earth is covered with dew, myriads can be seen in April and May.

Habitat. Common in all parts of the United States.

2. AGELENA ? PLUMBEA.

Plate XXX. Fig. 2.

Description. Pale rufous; abdomen leaden color, with four impressed dots, the six nipples long; same color beneath, one pale spot each side of the base of the abdomen, over the pulmonary orifices.

Observations. This spider was found in North Carolina under a stone, in a silken tube. Another specimen was also found under a stone in Alabama; it was discovered watching a cocoon made of thin but strong white silk, containing about fifty or sixty eggs of a whitish color. As its web was not seen, it may not belong to this division, and may be ultimately referred to Herpyllus.

Habitat. North Carolina, Alabama.

Genus Cyllopodia. Mihi.

Characters. *Cheliceres small; maxillæ short, inclined over the lip; lip wider than long, triangular; eyes six, subequal, two very small, placed near together in the middle, two larger far apart placed above, and two placed each on a tubercle on the side; feet, fourth pair longest, then the first, the third shortest.*

Habits. Araneïdes sedentary, making a cocoon.

Remarks. This anomalous spider appears to be related to Epeïra. I found it in the attitude of one, suspended from a thread or web which I would have examined carefully, had I not taken it as a new species of that sub-genus. It has certainly six eyes only; its cephalothorax is flattened in the middle, being deeply excavated behind; the last joint of its palpi are terminated with a small nail; its abdomen is gibbous and rugose, covering anteriorly a great part of the cephalothorax, with four mammulæ and a cauda; the two anterior pair of legs are directed forward, and the other two in the opposite direction, so that the sternum has a vacant place in the middle.

The trophi are nearly those of Epeïra, but approach Theridium. The cheliceres are very small, but capable of reciprocal motion.

CYLLOPODIA CAVATA.

Plate XXX. Fig. 3.

Description. Piceous; cephalothorax deeply excavated at base for the reception of the abdomen; abdomen varied with white dots and lines, five tubercles covered with tufts of scales on each side above, the second from the base hornlike; feet, 4. 1. 2. 3. two anterior pair directed forward, the other two turned backwards, leaving a vacant space on the sternum.

Observations. This was found on a twig near an Epeïra.

Habitat. Alabama, October.

Sub-genus Prodidomus. Mihi.

Characters. *Eyes eight, placed near together, four in* *front, making a straight row, two on each side, forming a curve with the external ones of the first row, and leaving a space above, external ones sub-oval, two middle ones round and black ; maxillæ triangular, wide at base, pointed at tip ; cheliceres very large, fangs long and bent ; feet* 4. 1. 2. 3.

Observations. This new sub-genus shews some of the characters of Clubiona and of Theridion. I hope some future naturalist will give its history and its location in the natural arrangement. I know nothing of its habits.

PRODIDOMUS RUFUS.

Plate XXX. Fig. 4.

Description. Rufous ; abdomen deeper above, venter pale, four nipples ; feet, 4. 1. 2. 3.

Habitat. Alabama, in dark cellars.

Genus Epeïra. Walck.

Characters. *Cheliceres short ; maxillæ parallel, short, wide at base, truncated at tip ; lip wide, sub-triangular ; eyes eight, four in the middle placed in the form of a square, two on each side placed near each other diagonally on a common eminence ; feet, commonly the first and second longest, the third being the shortest.*

Habits. Araneïdes sedentary, forming a web composed of spiral threads crossed by other threads departing from the centre, often dwelling in a tent constructed above the web. Cocoon of various form.

Remarks. I endeavored to arrange the numerous species of this sub-genus according to the method of Walckenaer; but the characters of Epeïra are not very liable to vary, except by the form of its body. The middle eyes offer some variations it is true, and the lateral ones are sometimes placed lower than in others ; but I could not avail myself of these characters to establish natural subdivisions.

The spiders of this sub-genus are known to every observer of nature. Their habits, and particularly their webs, are familiar to every one. Their history enters into the history of man. If it be not a fiction, it was a spider of this section which, by making its web at the entrance of the cave concealing Mahomet, saved the life of the impostor. The description of Ovid is sufficient to show that the ill-fated *Arachne* was transformed into an Epeïra by the Goddess Pallas, or rather by the observant poet of Sulmo. [Ovid's Metamorph. VI. p. 141.]

Tribe I. Ovatæ Inermes. *Body without spines, generally large.*

1. EPEIRA RIPARIA.

E. Fasciata? R. A. IV. p. 249.

Plate XXX. Fig. 5.

Description. Black, cephalothorax covered with silvery white hairs, abdomen varied with bright yellow spots and dots. Thighs usually bright rufous at base, except the first pair. Of a large size, seldom small.

Observations. This remarkable species usually dwells on the margin of waters, where it makes a web of strong threads, in which large Libellulæ and Melolonthæ are often caught. The abdomen of the female is flat in the early part of the season, and it is not till August, that being distended with eggs it assumes the oviform shape. Its cocoon is conical, as large as a small plum, like a pear hanging down. Whenever opened it was found full of young spiders instead of eggs. Is it viviparous?

Habitat. The United States.

2. EPEIRA FASCIATA? R. A. IV. 249.

Plate XXX. Fig. 8.

Description. Covered with silvery white hairs; abdomen with about fifteen transverse, nearly interrupted black bands, and several yellow marks between; feet rufous with black bands, anterior thighs black.

Observations. This spider should be dedicated to the greatest Entomologist of this age, (Latreille) if it proves not to be the *fasciata.* No doubt it is related to E. *fasciata* of Europe. (R. A. IV. 249.) It is quite rare in the Southern States, but common in New England, particularly in Maine. It abounds in meadows, near the ground, where it makes its web. An immaculate species was found in North Carolina, which may be referred to this, as its abdomen was not distended with eggs, and the bands may become apparent when it is full. It was surrounded with several males four or five times smaller.

Habitat. United States.

3. EPEIRA VULGARIS.

Plate XXX. Fig. 6.

Description. Pale gray, abdomen piceous, with various winding white marks, a middle one in the form of a cross; feet with piceous rings.

Observations. This spider is well known even to those who are not attentive observers of nature. Every one has noticed its regular geometrical web, which is frequently placed near the windows of our houses. It is subject to such variations in color and marking that it is quite difficult to distinguish several other species from varieties of this species. I have once found seventeen varieties of spiders enclosed in the nest of a SPHEX, called *dirt-dauber* in the Southern States, and each could be referred to this species, though they all differed more or less from each other. This species seems domesticated, being seldom found far from our gardens. The reason probably is, that it is more secure there from its enemy the Sphex.

Habitat. South Carolina.

4. EPEIRA DOMICILIORUM.

Plate XXX. Fig. 7.

Description. Gray or brownish, covered with coarse white hairs; cephalothorax with a blackish band near the edge;

abdomen with many markings of black and dusky surrounding a spot in the form of a cross; thighs rufous at base, tipped with a blackish ring, other joints with dusky rings; abdomen underneath with a large black spot, near the centre of which, are two white dots. A large species.

Observations. This spider is often found in dark places, and even in dark apartments not much frequented, where it makes its web. The female is supplied with a hook over the vulva as in E. *diadema.* See Régne Animale, IV. p. 218. It makes a cocoon of yellow silk in the shape of a button, lenticular, and attached to a solid body.

Habitat. Alabama. July, September.

5. EPEIRA SEPTIMA.

Plate XXX. Fig. 9.

Description. Rufous, spotless, hairy above; abdomen with two impressed dots above, and with two angular lines yellowish beneath, thus ⊼7, blackish in the centre; feet varied with yellowish and deep rufous.

Observations. This large species is not rare, and is found more commonly in the Autumn. When caught it spins, probably for defence, a large quantity of beautiful white silk which it draws out by pressing its posterior feet against the abdomen.

Habitat. North Carolina, Alabama.

6. EPEIRA INSULARIS.

Plate XXX. Fig. 10.

Description. Cephalothorax rufous; abdomen yellow with many waving purplish markings; thighs and proximate joints orange with rufous rings, terminal joints white, with black rings. A large species.

Observations. This is no doubt related to E. *trifolium, aureola,* and *obesa,* but the rufous rings which are found on all the thighs of this, are wanting in those. Like E. *domiciliorum,* the female has a small hook above the vulva.

Habitat. Found on an island of the Tennessee, Oct. 13th, after some frost.

7. EPEIRA OBESA.

Plate XXX. Fig. 11.

Description. Testaceous; abdomen with obscure marks, nearly orbicular, feet with joints tipped with rufous.

Observations. This species was found after the first frosts, its abdomen still filled with eggs.

Habitat. Maine.

8. EPEIRA TRIFOLIUM.

Plate XXXI. Fig. 1.

Description. Cephalothorax pale, with three longitudinal blackish bands; abdomen purplish, with many spots and two undulated bands white; joints of feet tipped with black, posterior thighs with one black ring near the middle.

Observations. This elegant species is one of those which it is very difficult to distinguish from others. It was found in houses and near dwellings.

Habitat. Maine.

9. EPEIRA AUREOLA.

Plate XXXI. Fig. 2.

Description. Pale testaceous; cephalothorax rufous; abdomen orange color with white dots of various sizes; joints of feet tipped with rufous, posterior thighs with one rufous ring near the middle.

Observations. This species certainly differs much in markings from E. *trifolium*, and yet, being found after the first frosts, it may have changed by the cold, and prove a mere variety of that species. For the present, however, I consider it as distinct.

Habitat. Maine.

10. EPEIRA LABRYNTHEA.

Plate XXXI. Fig. 3.

Description. Reddish brown, abdomen varied with paler spots, and a scolloped white line above, a white longitudinal line edged with black, and two white dots near the apex beneath; feet rufous, yellowish towards the end; male the same, with hairy legs.

Observations. This very distinct and common species is of a middling size, seldom larger than the drawing. Its web is very compound, for it unites together that of a THERIDIUM, partly that of an AGELENA, and that of an EPEÏRA. The web peculiar to this sub-genus is in front, then usually a tube like that of AGELENA leads from this to one made of crossed threads like that of THERIDIUM, at the upper part of which is constructed a tent covered with dried leaves in the manner of shingles, under which it remains sheltered during the day. The cocoon is in the shape of a button or flattened cone, sometimes brownish above and pale gray beneath; as many as five have been found in a string, one above the other. The young when just hatched resemble the mother. The first time I found this spider, I also found the first MIMETUS, which had invaded the web of one of these and taken its place, so that for a period I thought this species a transition to that sub-genus. But this has all the characters of EPEÏRA.

Habitat. North Carolina, Alabama.

11. EPEIRA PROMPTA.

Plate XXXI. Fig. 4.

Description. Pale bluish; abdomen with two indented lines and several spots black; base of the thighs rufous, a black ring between this and the tip, and black rings on the other joints.

Observations. This very distinct species is very active after sunset, running with great speed, and leaping like an ATTUS. It is motionless during the day. A small specimen of this species was found in Alabama, with its abdomen black underneath, having a central whitish spot.

Habitat. Massachusetts. Alabama.

12. EPEIRA STRIX.

Plate XXXI. Fig. 5.

Description. Rufous; abdomen yellowish, with a scolloped blackish band on each side above, and about six black dots, a broad black spot underneath, with a yellow lunule on each side; feet, with joints terminated by a black band.

Observations. The male and female were found very frequently near streams, where they make perpendicular webs. This spider during the day remains strictly concealed near its web, in a dwelling which it constructs with leaves drawn together in the manner of a tube by means of threads.

Habitat. Pennsylvania. Alabama.

13. EPEIRA THADDEUS.

Plate XXXI. Fig. 6.

Description. Cephalothorax rufous; abdomen green, yellowish towards the base, with a black band on each side of the abdomen, piceous underneath, with a yellow spot in the centre; feet orange, varied with rufous and blackish. A somewhat large species.

Observations. This species, which is sometimes whitish on the abdomen, is nevertheless very readily recognized. I have seen some specimens larger than the delineation. Its dwelling-place is really beautiful; it is placed above its web, and made of the finest white silk, shining with a satin lustre; its shape is that of an inverted thimble, and it is usually placed under a leaf bent together for the purpose of affording shelter and security.

Habitat. Alabama. September, October.

14. EPEIRA HEBES.

Plate XXXI. Fig. 7.

Description. Brown, abdomen with several forked lines, and two spots black.

Observations. This would appear to be an obscure species, and not easily distinguished from E. *vulgaris*; but, being first described in South Carolina, then seen in North Carolina several years afterwards, I consider it as a distinct species. It is perfectly inactive in the daytime, living chiefly on coleopterous insects, which it binds up in a few minutes with a strong web of silk.

Habitat. Southern Atlantic States.

15. EPEIRA MAURA.

Plate XXXI. Fig. 8.

Description. Rufous; abdomen oval, black, highly glossy, with yellow spots, underneath blackish, spotted with yellowish; feet varied with black rings. A middle size species.

Observations. This very distinct species was usually found in the vicinity of streams of water.

Habitat. Alabama. April, May, September.

16. EPEIRA NIVEA.

Plate XXXI. Fig 9.

Description. White above and beneath; abdomen nearly orbicular, with an oval blackish spot on the disc.

Observations. This spotless species is remarkable for its pale color, and in that respect approaches E. *alba*, but it differs from it by the form of its abdomen, and by its more slender legs.

Habitat. Alabama. July.

17. EPEIRA ? HAMATA.

Plate XXXI. Fig. 10.

Description. Whitish; abdomen with a blackish band broad at base, and terminating in a point before the apex; feet, (in the male) varied with blackish, with a few long hairs, second pair with antepenult joint crooked, having one bristle longer than the rest.

Observations. The characters of this, somewhat depart from Epeïra. The web has not been observed, and the female is unknown. Could it be the male of E. *nivea?*

Habitat. Alabama. August.

18. EPEIRA PRATENSIS.

Plate XXXI. Fig. 11.

Description. Yellow; abdomen yellowish rufous, with two rows of black dots approaching each other towards the apex.

Observations. This spider, found in a field, was seen only once.

Habitat. Massachusetts.

19. EPEIRA PLACIDA.

Plate XXXI. Fig. 12.

Description. Yellowish or pale rufous; cephalothorax with an obscure band and darkish edge; abdomen varied with whitish, brownish lines, and an angular piceous band; feet hairy. A small species.

Observations. This may be distinguished from E. *spiculata* by its marking, but particularly by the lower middle eyes, which are farther from each other than the upper ones. It makes a perpendicular web.

Habitat. Alabama. April.

20. EPEIRA SPICULATA.

Plate XXXI. Fig. 13.

Description. Pale or yellowish; cephalothorax with a narrow blackish band; abdomen whitish, with a barbed purplish black band; feet hairy, with a shade of greenish. A very small species.

Observations. This species is very common in the woods, making a perpendicular web.

Habitat. Alabama. September, October.

21. EPEIRA FOLIATA.

Plate XXXI. Fig. 14.

Description. Pale brown; abdomen ovate terminating in a joint, with waved black lines, two external almost meeting at the apex, two internal meeting before or near the middle.

Observations. This spider is not unfrequently found on weeds and bushes. When at rest it gathers some leaves together as a tent. It moves with amazing rapidity. It is quite distinct from E. *hebes.*

Habitat. Alabama. June, July.

22. EPEIRA SANGUINALIS.

Plate XXXI. Fig. 15.

Description. Greenish yellow; abdomen above crimson with about three central spots, and two opposed bands scolloped towards the median line, white. A small species.

Observations. This singularly marked spider was found in my cocoonery, suspended from a thread.

Habitat. Alabama. July.

23. EPEIRA BOMBYCINARIA.

Plate XXXI. Fig. 16.

Description. Cephalothorax rufous; abdomen grayish above and beneath, above with two white spots near the base, two little dots near the middle, and two opposed scolloped lines blackish; feet rufous, varied with black.

Observations. This spider was found making its web, and abiding in my cocoonery.

Habitat. Alabama.

24. EPEIRA DISPLICATA.

Plate XXXI. Fig. 17.

Description. Yellowish or whitish; cephalothorax with two upper middle eyes much larger than the rest; abdomen with four impressed dots before the middle, and six black dots near the apex, each dot surrounded by a pale ring. A small species.

Observations. This spider is very common in the spring in low bushes and grass.

Habitat. Alabama. May, October.

25. EPEIRA RUBENS.

Plate XXXI. Fig. 18.

Description. Red; cephalothorax with the region of the eyes black; abdomen with four impressed dots placed somewhat anteriorly; feet black, except the base of the thighs, which is red like the palpi and the rest of the body. A small species, about the size of the drawing.

Observations. This species is not rare, both sexes having been found on perpendicular webs. It will be readily distinguished from L. *coccinea,* by the form of its abdomen, which is nearly orbicular, by its legs, which are short, &c.

Habitat. Alabama. June, October.

Tribe II. OVATA INCLINATA. *Body sub-cylindrical, web horizontal.*

26. EPEIRA HORTORUM.

Plate XXXI. Fig. 19.

Description. Tender green; abdomen above silvery white with branching blackish lines, beneath green with yellowish lines and an orange spot.

Observations. This truly elegant and common inhabitant of gardens and fields, makes an horizontal web on bushes generally sheltered from strong winds, which would destroy its slender fabric. Its web is extremely regular, and is a fair sample of the skill of the genus EPEIRA.

Habitat. All the United States.

27. EPEIRA GIBBEROSA.

Plate XXXI. Fig. 20.

Description. Pale yellowish green, body covered with round yellow dots; cephalothorax elevated in the middle; abdomen yellowish above, with three longitudinal and several diagonal lines purplish black, and three or four transverse orange lines, underneath greenish with blackish lines and small whitish spots; feet hairy, 1. 4. 2. 3. in all specimens. A species of moderate size.

Observations. This very distinctly marked species is by no means common, dwelling in low grassy places, and making sometimes perpendicular, sometimes horizontal webs. Except in the respective length of its feet, it is related to E. *hortorum.*

Habitat. Alabama. September, October.

Tribe III. Elongatæ Cylindricæ. *Body elongated, cylindrical.*

28. EPEIRA DIRECTA.

Plate XXXI. Fig. 21.

Description. Pale testaceous ; abdomen oblong, with three or four parallel rufous lines on each side of a central one which alone reaches the base.

Observations. This spider is found generally near water, where it makes a perpendicular web on low bushes. When approached, it drops down and remains motionless where it falls. Its body is very soft. The same was found in Alabama, differing only in having about four minute blackish dots on the second line from the central one on the abdomen.

Habitat. South Carolina, Alabama.

29. EPEIRA RUBELLA.

Plate XXXI. Fig. 22.

Description. Bright rufous ; abdomen oblong, with a white longitudinal band ; feet slender ; a very small species.

Observations. This little spider was found on a web which I think was perpendicular. It may prove to be the young of E. *directa,* but it is not probable.

Habitat. Alabama. August.

30. EPEIRA SUTRIX.

Plate XXXI. Fig. 23.

Description. Whitish ; covered with short silvery hair, varied with brownish abbreviated lines, and bands on the feet.

Observations. This spider, found on the sea shore, has the talent of adding to the strength of its web, in places where the wind ever moves it, by adding to it strong white threads in a zigzag manner, just as a seamstress darns stockings. This is usually done between two of the concentric lines, and also in a circular way in the middle of the web.

Habitat. South Carolina, Pennsylvania.

ART. XXXVI.—DISSECTION OF SCYMNUS BREVIPINNA. (Lesueur.)

By S. Kneeland Jr. M. D.

The first named shark, a female, was recently caught on the coast of Massachusetts; it was 7 feet 9 inches in length; weight 275 pounds; branchial orifices five on each side.

On opening the abdominal cavity, the peritoneum was white and shining, its fibres running obliquely across each other.

The first organ seen was the *liver*, which entirely covered all the other viscera; it adhered only at the top, to the diaphragm. There were two lobes, meeting on the median line, overlapping each other by their internal thin edge, the left overlapping the right: the external border thick and rounded. Each lobe 5 feet long, 6 inches wide and 3 thick at top, gradually tapering to a blunt point $\frac{1}{3}$ of an inch wide. Color yellowish-white, with rosy tints here and there: the interior of the same light color, containing very little blood. The gall bladder, at the top of the left lobe, dipped down under the right: of the shape and size of an adult human heart: it was full of a thin, dark yellow bile. Two large vessels, an inch wide cut open, ran along the internal borders of the liver, giving off and receiving numerous branches to and from its substance.

The *heart* was enclosed in a pericardiac cavity, separated from the abdominal cavity by the membranous diaphragm: the apex was not adherent. The blood is first received into a large *sinus*, with evident muscular fibres; it passes thence into the *auricle*, through an opening guarded by two valves, each an inch in length, having also muscular fibres. The auricle measured 2 inches in every diameter: the parietes about a line in thickness; muscular fibres numerous but delicate: the auriculo-ventricular orifice cut open, measured $2\frac{1}{2}$ inches, guarded by two equal valves. The ventricle was less capacious than the auricle; the walls very strong and muscular, one third of an inch thick. The entrance into the branchial artery, cut open, was $1\frac{3}{4}$ inches. The commencement of this artery very thick and muscular for a length of $2\frac{1}{2}$ inches, the walls being three lines in thickness; this portion, which Cuvier has called "the bulb," measured, cut open, $1\frac{3}{4}$ inches. The bulb presents a *double system of valves.*

Cuvier, in his Comparative Anatomy, mentions the occurrence of valves in the "bulbus arteriosus" of the cartilaginous fishes; but he gives no particular description of them. In an elaborate article by Müller, (Abhandlungen der Akademie der Wissenschaften zu Berlin, 1844,) it is said (page 125) that the higher cartilaginous fishes are distinguished from the osseous fishes by the occurrence in the "bulbus arteriosus" of three or more longitudinal rows of valves, the number of valves in each row varying from two to five, according to the species." On page 126, it is stated that in the rays and sharks their number is never more than fifteen, (in Raia, Myliobatis, Pteroplatea, Scymnus, Squatina.)

The first system extends upwards about an inch from the ventricular opening; it consists of three *principal* longitudinal bands of fleshy valves, resembling vegetations, with one or two *smaller* rows between each two large ones; each longitudinal band contained *four valves, one above the other,* like the steps of a ladder, when open: numerous delicate fleshy bands extended from the apex of one valve to the base of the one above; each large valve was about three lines square; when lying against the parietes they formed a continuous line of prominent rough valves; a most beautiful, and one would think, sufficient system. But as if this were not enough to prevent the reflux of blood, there is another stronger system immediately above it, consisting of three semilunar valves, nearly half an inch in depth, and set each upon a prominent fleshy columna, $\frac{3}{4}$ of an inch in length, and $\frac{1}{3}$ of an inch wide, rounded at each extremity, and fixed for its whole length to the walls of the vessel; a semilunar valve over each longitudinal row of large valves. This upper system of valves is just below the first branch given off to the branchiæ — the branchial artery gives off the first and second branches of each side close together, just at its origin from the bulb; an inch higher up, the third branch; two inches above this it bifurcates, almost at right angles; each bifurcation runs about an inch, and then again bifurcates into the fourth and fifth branchial branches, the fifth being the smallest; the diameter of the main artery is $\frac{1}{2}$ an inch; that of the branches, $\frac{1}{4}$ of an inch. Müller (Op. citat. p. 127) states that the "bulb" in the osseous fishes is no part of the active central organ of circulation, and does not pulsate as the heart — while in the Selachi and Ganoids it acts as a true heart, or ventricular cavity, to propel the blood.

Müller gives no plate of the valves in the "bulb" of the Scymnus. His 4th fig. Pl. 5, represents them in a species of Lamna; but their arrangement is different in the Scymnus: in the latter they appear more as in his 3d figure of the 2d Plate, though the number of valves in each longitudinal row is less in our specimen.

From the branchial arteries the blood passes to the branchial veins, which ultimately unite above to form the "aorta," corresponding to this vessel in mammalia.

Though the heart of fishes has but two cavities, we see that their circulating system is very different from that of the lowest reptiles, whose heart consists also of two cavities. In fishes, there is no *arterial* heart, but only a *venous* auricle and ventricle, or the *right* cavities of the heart; in the Batrachians the heart is both arterial and venous — the circulation of fishes resembles the branchial circulation of the perenni-branchiate amphibia.

The circulation in fishes shows that the heart is not the *sole agent* which keeps the blood in motion; its impulsive power cannot extend beyond the obstruction the blood must meet with in the extremely minute ramifications of the branchial capillaries and veins; it seems impossible that the vis a tergo, after this resistance, should send the blood through the whole arterial and venous system back to the heart; we must admit a power resident in the coats of the vessels themselves. Though the system is furnished with pure arterial blood, the circulation must necessarily be sluggish.

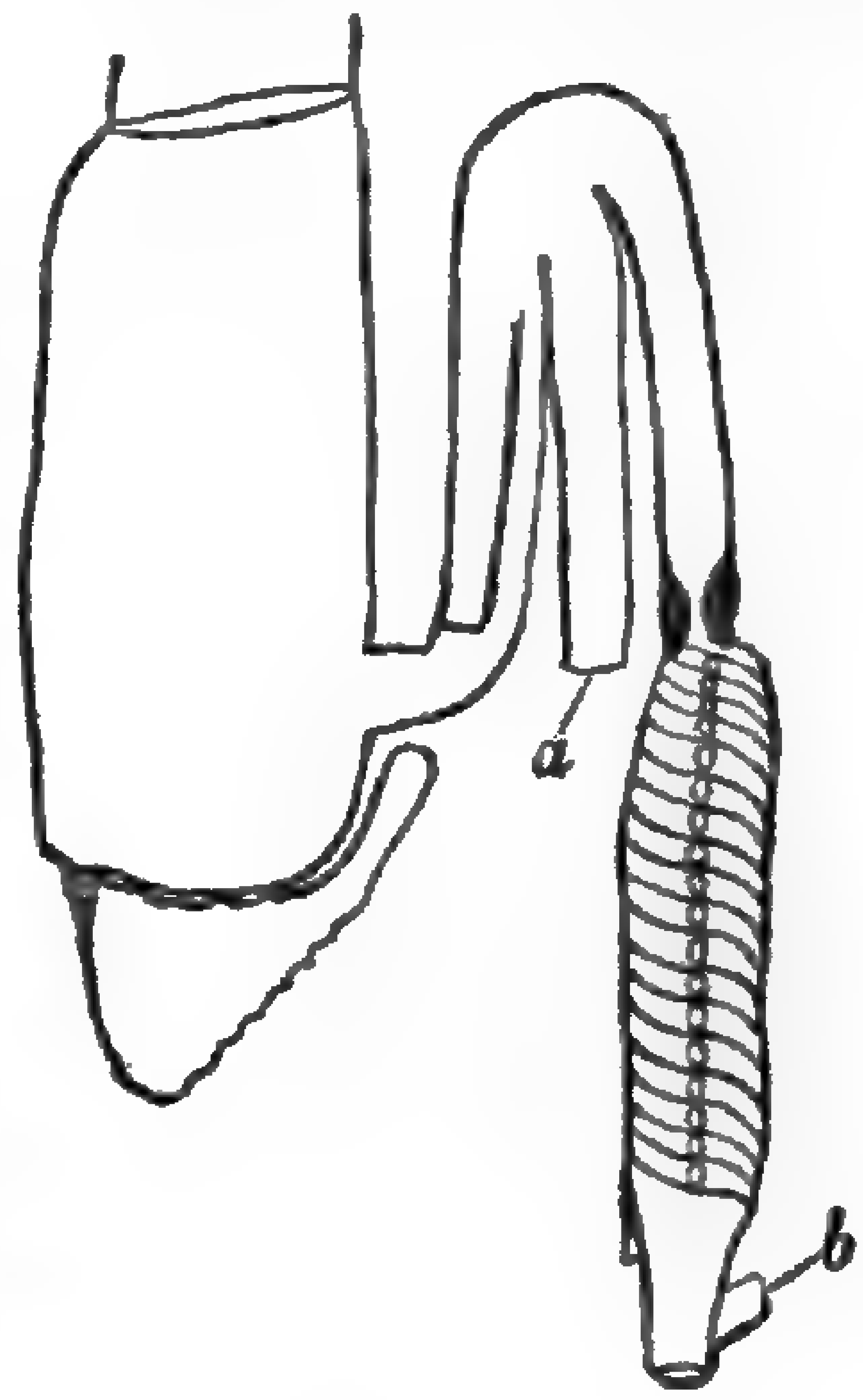
The *œsophagus* was very short, 3 inches in length from the last branchial orifice to cardia; cut open, 15 inches wide; color white, longitudinal fibres distinct. The separation between it and the stomach well marked by a band of circular fibres, most conspicuous externally.

The *stomach* contained a fish 2 feet 6 inches long, a wolf-fish, (*Anarrhicas lupus*) doubled on itself, and partly digested; with many fragments of echini and shells. The stomach was 2 feet 9 inches long; cut open, 22 inches wide; the mucous membrane without wrinkles, and covered with a tenacious slime; in parts, much injected; parietes $\frac{1}{3}$ of an inch thick.

The *spleen* was attached to the lower extremity of the stomach, resembling an arrow-head in shape, the point downwards; it was lobulated and convoluted. Length 10 inches; width at top 6 inches; thickness 1 inch: there was a prolongation upwards towards the pyloric orifice, 9 inches long, at the top 2 inches wide, and $\frac{1}{2}$ an inch thick; it presented a marbled appearance internally; it contained but little blood, though it was dark colored.

The *pylorus* was 7 inches from the bottom of the stomach;

its opening surrounded by circular fibres. From the pylorus to the anus was 5 feet 6 inches; the mesentery was very delicate.



The *duodenum,* cut open, was 3 inches wide. Three inches from pylorus the canal was suddenly narrowed to an inch in width cut open, and for a length of five inches; it then became suddenly 4 inches in width. This portion externally has the same apparent size; but the remainder of the calibre is occupied by a cul-de-sac, 5 inches long, closed at the bottom; so that in this portion there are two tubes, the largest closed at the bottom, but communicating freely with the intestine above, [as in the figure]; when distended it may serve as a sort of valve. Fourteen inches from pylorus was a cœcal prolongation (as in the figure), 11 inches long; 3 inches wide when cut open; between this and the descending intestine was the *pancreas,* of two lobes, 18 inches long; the left lobe one inch wide; the right $\frac{1}{2}$ an inch, gradually tapering to a point, of a pink color: the thin right lobe was spread on the cœcal prolongation.

Two feet from the anus was a second constriction 1 inch long, the walls being from $\frac{1}{3}$ to $\frac{1}{2}$ an inch thick; immediately below this was arranged a series of membranous folds, which might be extended an inch across the intestine, arranged in a spiral manner, leaving a central aperture large enough to admit the finger, following the axis of the intestine, though much larger following the area of the spiral: the spirals gradually increased in size to the middle, thence they decreased to their termination: they were thirty-three in number, and ceased about six inches from the anus. The fold was in general much injected; the whole surface covered with a very fine net work of lacteals; the design of this fold is evidently to increase the extent of surface over which the digested food passes; the purpose of the net-work to absorb its nutritive portions. The intestine, cut open, 5 inches wide; 18 inches long.

Below the spirals, the width of the intestine becomes suddenly less; in this portion, the *rectum,* the walls were very thin: at the top, cut open, 2 inches wide; gradually becoming narrower to anus. As the spiral must have been in the small intestine, and the part below it must have been the rectum, (taking the anatomy of the higher animals as the standard of comparison) there was in this animal *no colon,* and *no cæcum;* and unlike the higher animals, the small intestine was larger than the rectum.

About an inch from the end of the spiral, was a hollow glandular organ, about an inch square; its cavity was very small, the walls being $\frac{1}{3}$ of an inch thick; its opening into the rectum was 2 lines in diameter: its contents, analyzed by Dr. Bacon, consisted of mucus: it would seem to be a gland for the secretion of mucus.

The *kidneys* extended on each side of the spinal column, to which they were firmly bound down; they were of a cylindrical shape, 5 feet in length, 2 inches in diameter.

The *ovaries* consisted of two membranous sacs, on the internal border of which was a light colored tubuliform glandular mass, filled with innumerable granules, about half the size of a pin's head: each ovary had a duct about the size of a crow quill, extending nearly the whole length of the spinal column.

This fish ought to take a high rank among the sharks, from the shape of the upper lobe of the tail, which is not so much prolonged as in sharks generally; according to Prof. Agassiz, the long upper lobe of some *adult* sharks is the *embryonic* condition of the higher species: this, then, should take a high rank. The cartilaginous fishes are said to be the only fishes which have a pancreas; which, as far as this goes, would place them, low as they are, above the osseous fishes. Müller (Op. citat. 1843, p. 126,) adds in a note, that a pancreas is not peculiar to the Plagiostome fishes; it has been found in Esox lucius, in Silurus glanis, and in the sturgeon.

DISSECTION OF A FEMALE FOX SHARK. (THRESHER OR SWINGLE-TAIL.) (ALOPIAS VULPES.)

The specimen was quite small; total length 5 feet 1 inch, of which the body was 2 feet 6 inches, the upper lobe of tail 2 feet 7 inches.

The only difference in the heart of this fish from that of the Scymnus was in the valves of the branchial artery; the upper system, consisting of three semilunar valves, was ½ an inch from the heart; the lower system consisted of three longitudinal bands of rough valves, each band having only two valves, one above the other, instead of four as in the Scymnus. The ventricle was 1 inch in diameter; the walls nearly half an inch thick.

The *liver* consisted of two lobes; the left 16 inches long, the right 9 inches; width 3 inches.

The principal differences were in the alimentary canal, this being more simple in the present fish.

The mouth and branchial arches were quite rough to the finger, passed from below upwards; but smooth in the opposite direction; thus securing their hold of their prey.

The œsophagus was 2 inches long; cut open, 2½ inches wide: divided into about a dozen prominent longitudinal folds.

The cardiac orifice was 2½ inches wide, cut open; having a well marked fold which would act as a valve to retain the contents of the stomach. Stomach 1 foot long; 7 inches wide, cut open; in the upper half, both the longitudinal and circular fibres very distinct. Pylorus opened half an inch from the bottom of stomach; its valve well marked; half an inch wide, cut open. From pylorus to anus 1 foot 10 inches; from pylorus to spiral portion 9 inches; length of spiral 9 inches; from end of spiral to anus 4 inches. Between the pylorus and the spiral portion, the intestine was only half an inch wide, cut open; very thin; its fibres running obliquely;

a well marked valve between this and the spirals; the spiral portion, cut open, 2 inches wide at the top; at the bottom, 3 inches; walls three lines thick at middle part, gradually becoming thinner at each end; 34 spirals, covered with a fine net-work, injected less and less as you descend. Half an inch from anus, an oval pouch, 1 inch long, half an inch wide. Rectum, cut open, 3 inches wide, very thin.

The ducts of the liver, spleen and pancreas opened into the spiral portion.

This fish should take a lower rank in the class of sharks, from the shape of its tail.

ART. XXXVII.—DESCRIPTION AND ANALYSIS OF THREE MINERALS FROM LAKE SUPERIOR. By J. D. Whitney.

I. WOLLASTONITE OR TABLE-SPAR.

The Wollastonite which is found on Lake Superior differs considerably in external characters from any known variety of that mineral. Indeed, its true nature could only be recognized by chemical examination. It is remarkable for its excessive toughness, which quality it seems to possess in a higher degree than any known mineral. It is compact, with an uneven fracture. Its color is light flesh-red; hardness, 6; lustre vitreous to pearly. It is readily decomposed by acids, the silica separating in the form of a flocky precipitate.

The analysis of two specimens gave the following results:

	I.	Oxygen.	II.
Silica	49.09	25.51	49.06
Lime	46.38	13.18	44.87
Protox. of manganese	.48		.93
Alumina	.23		1.28
Magnesia	.14		
Water	2.96		2.96
Carbonic acid and loss	.72		.90
	100.00		100.00

The mineral is therefore essentially a silicate of lime, in which the oxygen of the silicic acid is double that of the lime; the formula is therefore $\dot{C}a^3 \dddot{S}i^2$, or that of common table-spar.

The amount of water in the mineral dried at 100° C. was found by two determinations to be 2.92 and 2.96 per cent.; still the quantity seems too small to allow it to be considered as forming an essential part of the mineral, especially as it retains all its properties unchanged after ignition.

This mineral forms a large mass nearly a foot in thickness in the trap of Kewenaw Point at the Cliff mine, and also at Scovill's Point on Isle Royale.

It receives a beautiful polish.

II. JACKSONITE.

Associated with the above described mineral there occurs at both of the localities above mentioned, a mineral, which was found on examination to differ in composition from any known silicate; I have therefore given it the name of Jacksonite, in honor of Dr. C. T. Jackson, whose name is so well known in connection with the Lake Superior region, and to whom we are so much indebted for our knowledge of its mineralogy.

The Jacksonite occurs in finely radiated, and lamellar-radiated masses of a white color slightly tinged with green. Its hardness is 6; specific gravity 2.881; lustre vitreous; translucent.

The finely pulverized mineral is perfectly, though slowly, dissolved by chlorohydric acid, the silica separating in the form of a flocky powder.

Before the blowpipe in the platina forceps it fuses very readily, with strong intumescence, and emits a brilliant yellow light.

A large quantity of soda dissolves it readily; if more of the assay be added it swells up to an infusible slag.

It gives with borax a colorless, transparent glass; with salt of phosphorus, a glass enclosing a siliceous skeleton and faintly tinged by iron.

The analysis of the ignited mineral gave

		Oxygen.	Ratio.	Calculated.
Silica	46.12	23.96	3	46.17
Alumina and a little $\ddot{\text{F}}\text{e}$	25.91	12.09	$1\frac{1}{2}$	25.68
Lime	27.03	7.90	1	28.14
Soda	.85			
	99.91			

The oxygen of the silica, alumina and lime being as $3 : 1\frac{1}{2} : 1$, or $6 : 3 : 2$, the formula will be

$$\dot{C}a^2 \ddot{S}i + \dddot{A}l \ \ddot{S}i$$

This, it will be perceived, is the formula which is given by Walmstedt for Prehnite, except that it contains no water. The Jacksonite, dried at 100° C., was found to contain less than $\frac{1}{10}$ per cent. of water. The ratio of the oxygen in this mineral is an unusual one, and had led Berzelius to adopt another formula for Prehnite.

III. CHLORASTROLITE.

This mineral was found by Dr. C. T. Jackson on the shores of Isle Royale, in small rounded pebbles. It occurs in finely radiated, stellated masses, with a pearly lustre, and slightly chatoyant on the rounded sides. Hardness 5.5 to 6.; specific gravity 3.180; color light bluish green.

In the open tube it gives water and becomes white.

Before the blowpipe it fuses with great facility to a greyish, blebby glass. It intumesces and swells up like a zeolite.

Soda dissolves it in small quantity and gives a bead colored by a trace of manganese; if more of the assay be added it swells up to an infusible slag.

It is dissolved by borax readily, and in considerable quantity, to a transparent glass colored by iron.

Salt of phosphorus dissolves it in small quantity and gives the reaction of iron.

With nitrate of cobalt it gives a beautiful blue.

It is readily dissolved by chlorohydric acid, the silica being entirely separated in the form of a flocky precipitate.

The analysis gave

		Oxygen.	Ratio.
Silica	36.99	19.22	3.00
Alumina	25.49	13.90	2.10
Peroxide of iron and a little $\dot{F}e$	6.48		
Lime	19.90	6.50	1.01
Soda	3.70		
Potash	.40		
Water	7.22	6.40	1.00
	100.18		

The ratio of the oxygen of $\dot{H}$, $\dot{R}$, $\ddot{R}$ and $\dddot{Si}$; being 1 : 1 : 2 : 3, the formula will be

$$\left.\begin{matrix}\dot{C}a^3\\ \dot{N}a^3\end{matrix}\right\}\dddot{Si} + 2\left.\begin{matrix}\dddot{Al}\\ \dddot{Fe}\end{matrix}\right\}\dddot{Si} + 3\dot{H}$$

This formula would be that of Meionite with the addition of three atoms of water. A small portion of the iron exists in the mineral as protoxide, so that the analysis gives a slight excess of the bases $\ddot{R}$.

This mineral was named by Dr. Jackson, in allusion to its peculiar stellated structure and greenish color. It receives a fine polish, and would form beautiful ornaments for setting in jewelry could it be found in quantity sufficient for that purpose.

Note. The Wollastonite and Jacksonite were first obtained by Dr. Jackson and myself at the Cliff mine, in the summer of 1845. The analyses of the former were made in the laboratory of Prof. H. Rose in Berlin. The specimen of Jacksonite which was analyzed was from Isle Royale.

XXXVIII.—THE DODO (DIDUS INEPTUS) A RASORIAL AND NOT A RAPACIOUS BIRD. By SAMUEL CABOT, M. D.

CUVIER took one side of this question and Prof. Owen takes the other. My object in this paper is to examine the merits of these two opinions, and also to endeavor to carry the investigation somewhat farther, and if possible, more exactly to define the true position which this interesting bird occupies.

First, I will merely state that Cuvier, after an examination of a head, sternum and humerus, discovered under a bed of lava in the Isle of France, says, that "they left no doubt in his mind, that this huge bird was one of the gallinaceous tribe."[1]

Mr. Owen has, I believe, examined only the head and feet. His article is in No. 119, of The Annals and Magazine of Natural History, page 276; and I shall take the liberty of only quoting extracts here and there, as they suit my purpose. He says, "the Dodo's skull differs from any species of *Vulturidæ*, or any raptorial bird, in the greater elevation of the frontal bones above the cerebral hemispheres, and in the sudden sinking of the interorbital and nasal region of the forehead; in the rapid compression of the beak anterior to the orbits; in the elongation of the compressed mandibles; and in the depth and direction of the sloping symphysis of the lower jaw. The eyes of the Dodo are very small, compared with those of the Vulturidæ or other Raptores. The nostrils it is true, pierce the cered, but are more advanced in position; this however seems essentially to depend upon the excessive elongation of the basal part of the upper mandible before the commencement of the uncinated extremity; the nostrils are pierced near the commencement of this uncinated part, as in the Vulturidæ, but are nearer the lower border of the mandible in the Dodo."

Now, in these very points in which Mr. Owen says this bird

[1] Cuvier doubts the identity of the species in the Museum at Oxford with that represented in the painting at London.

differs from the Order with which he connects it, does it agree with the Columbidæ. We find in the *Vinago Capellei* "the sudden sinking of the inter-orbital and nasal region of the forehead; the rapid compression of the beak anterior to the orbits; the elongation of the compressed mandibles, the depth and direction of the sloping symphysis," and the position of the nostrils. All the pigeons have the high forehead, some more than others. Then Mr. Owen omits one point, in which the Dodo differs from all rapacious birds, and indeed from all other birds, I believe, except the pigeons, and some Waders, viz., the bulging out of the lower mandible on its sides beyond the upper; we see this most strongly marked with young pigeons in the nest, at which time their general shape has a striking resemblance to that of the Dodo. According to Mr. Agassiz's theory, this is what we should expect.[2]

Then, in the form of the foot, the evidence that the Dodo belonged to the Rasorial and not to the Raptorial order, is to my mind quite as strong, if not stronger, than that afforded by the head. We cannot compare the actual bones, having only casts of the head and feet of the Dodo, taken with the integuments still upon them;[1] let us therefore take them as we have them, and compare them with those of some species of Pigeons, with the same parts still adherent to them.

But before doing this, let us look for a moment at the general question, how far mere comparative anatomy, the anatomy of a very limited number of bones, is competent to decide a question of this kind? Is it not possible that there may be a coincidence in the forms of two tarsi from birds of very different genera? This very bird answers that question in the affirmative, if we admit that the function which a bone has to perform has any influence on its shape; for I think no one would pretend for a moment, that there was any similarity

[1] The horny part of the bill appears to be gone, and this may account for the absence of the scale over the nostril.

[2] That embryonic forms of the present epoch resemble adult forms of some former epoch.

even, in the uses to which the tarsus of a fishing eagle (to which Mr. Owen compares it,) and that of the bird under consideration, were to be put. The one almost never walks, and I may say never, for it moves in hops, with very rare exceptions; the other has no other means of locomotion. The tarsus of the eagle is grooved for the reception of the powerful tendons whereby the talons are driven through its living prey; that of the Dodo is adapted for those which enable it to move its heavy body over the ground, its claws being smaller in proportion than many pigeons. Then either Cuvier or Owen must be wrong. They both judged from the shape of bones, and certainly Owen, though a very great and excellent comparative anatomist, is no better than the great father of the science, himself. But more than this, even Mr. Owen's own words help me here. He says, in speaking of the main point in which the tarsus of the Dodo resembles that of the fishing eagle, that "this half twist of the rudimental hind metatarsus is feebly repeated in the Gallinæ," a type allied to the Columbidæ. Again, he says, "in the common cock, the calcaneal process more resembles that in the Dodo than the Vulture's does, but it is not so broad."

To return to our comparison of the foot of the Dodo with that of the pigeon. The articulating surface resembles that of the pigeons except in those points in which we should expect it to differ; it is more deep and strongly marked, which difference would be necessary on account of the much greater weight it has to sustain, and the much greater importance that no dislocation should take place, the bird having no other means of locomotion. The general shape and proportions of the foot are almost the same as those of some pigeons, the toes being shorter and stouter. The arrangement of the scales closely resembles that upon the foot of the *Vinago Capellei*. The claws are much like some of the ground doves, and not at all like those of any rapacious bird. The sole of the foot has none of the prominent rough callosities which we see on the feet of all Raptores; and in this, again resembles the pigeons. The ends of the toes have not the enlargement for the reception of the claws which we see in all rapacious birds, but are precisely like those of the pigeons.

Some facts mentioned in the accounts of the bird, given by the early authors, strongly corroborate my views with regard to it. In the account of a voyage to the East Indies by Jacob Van Neek and Wybrand Van Warwijk, in 1598, they say, in speaking of this bird, that the meat of the breast was very good eating, though not so good as that of turtle-doves.

De Bry, 1601, in his Descriptio Insulæ Do Cerne a nobis Mauritius dictæ, says, speaking of the Dodos, "Their bellies and breasts were nevertheless of a pleasant flavor, and easy of mastication."

Clusius, 1605, says, "They reported that it is covered with thin and short feathers, and wants wings, instead whereof it hath only four or five long black feathers; that the hinder part of the body is very fat and fleshy, wherein for a tail were four or five small curled feathers, twirled up together, of an ash color." They also reported that they found stones in the stomach, speaking of which he says, "and no wonder, for all other birds, as well as these, swallow stones to assist them in grinding their meat." Clusius considered it gallinaceous, and called it "Gallinaceus Gallus peregrinus."

In the account of a voyage made by Jacob Heemskerk and Wolfert Harmansz, in the years 1601, 1602, 1603, published in 1648, "mention is made of the Dod-eersen which had small wings but could not fly, and were so fat that they scarcely could go."

Thomas Herbert, 1634, says, "His body is round and extremely fat, the slowness of his walk agrees with his corpulence. The stomach has great activity, and digests easily stones and iron."

Bontius, 1658, says, "it is a slow-paced and stupid bird, and which easily becomes a prey to the fowler. The flesh, especially of the breast, is fat, esculent, and so copious that three or four Dodos will sometimes suffice to fill an hundred seamen's bellies. If they be old, or not well boiled they are of difficult concoction, and are salted and stored up for provision of victual. There are found in their stomachs stones of an ash color, of divers figures and magnitudes."

Among those who have written upon the Dodo in more modern times, since its apparent extinction, M. de Blainville is perhaps the most full and complete in his examination of the question as to the place it should occupy in the animal kingdom; and although he arrives at the conclusion that it should be classed among the Vulturidæ, yet I shall quote some passages from his article, as they favor, I think, very strongly my view of the subject. In speaking of the form of the bird he says, "The body in front, where it joins the neck, forms a sort of large swelling as if it had a crop in the interior." Again he says, "And as we have seen that the stomach constantly contains stones, it is probable that this bird was provided with a gizzard." Still again, he says, "None of the authors quoted have said anything about the kind of food of the Dodo. The existence of stones in the gizzard would nevertheless lead us to suppose that they were granivorous." Some of the reasons which he gives for not putting them among the gallinaceous birds are "the form of the bill," "the strength and curve of the nails," "the strength and shortness of the feet," and "the scaly covering of the tarsi" and "the absence of spurs."

In summing up this evidence we see

1st. That the flesh of the Dodo was good to eat, and sometimes used for provisioning ships. This would not be the case if they were vultures.

2d. That though entirely incapable of flight, or even of rapid motion, yet they were very fat; which certainly could not be the case if they were Vultures or any other Rapacious bird; whose character necessarily implies that they feed on animal substances, for we cannot imagine that such an unwieldy bird, requiring such a large amount of food could by any possibility procure sufficient animal substance for its support.

3d. It is evident, even by the admission of M. de Blainville, that they had gizzards, which is not the case with any rapacious bird.

4th. That though M. de Blainville's objections to classing them among the true Gallinaceous birds may *perhaps* be sufficient, yet that they do not hold in classing them with the Columbidæ.

Taking the historical evidences in connection with those drawn from the form of corresponding parts, I think it very clear that the Dodo was a gigantic pigeon, and that as its general shape, feathering, &c. resemble more strongly the young, than the adult pigeon, we may perhaps be allowed to surmise that it properly belongs to an earlier epoch than the present, and has become extinct because its time was run.[1]

[1] Since the above was in the hands of the printer I have seen an article, in the Year Book of Facts for 1848, reporting some remarks made by Mr. Strickland before the Oxford Association, in which he expresses his opinion that the Dodo belonged to the Pigeons, and that it was closely allied to the Fruit Pigeons. S. C.

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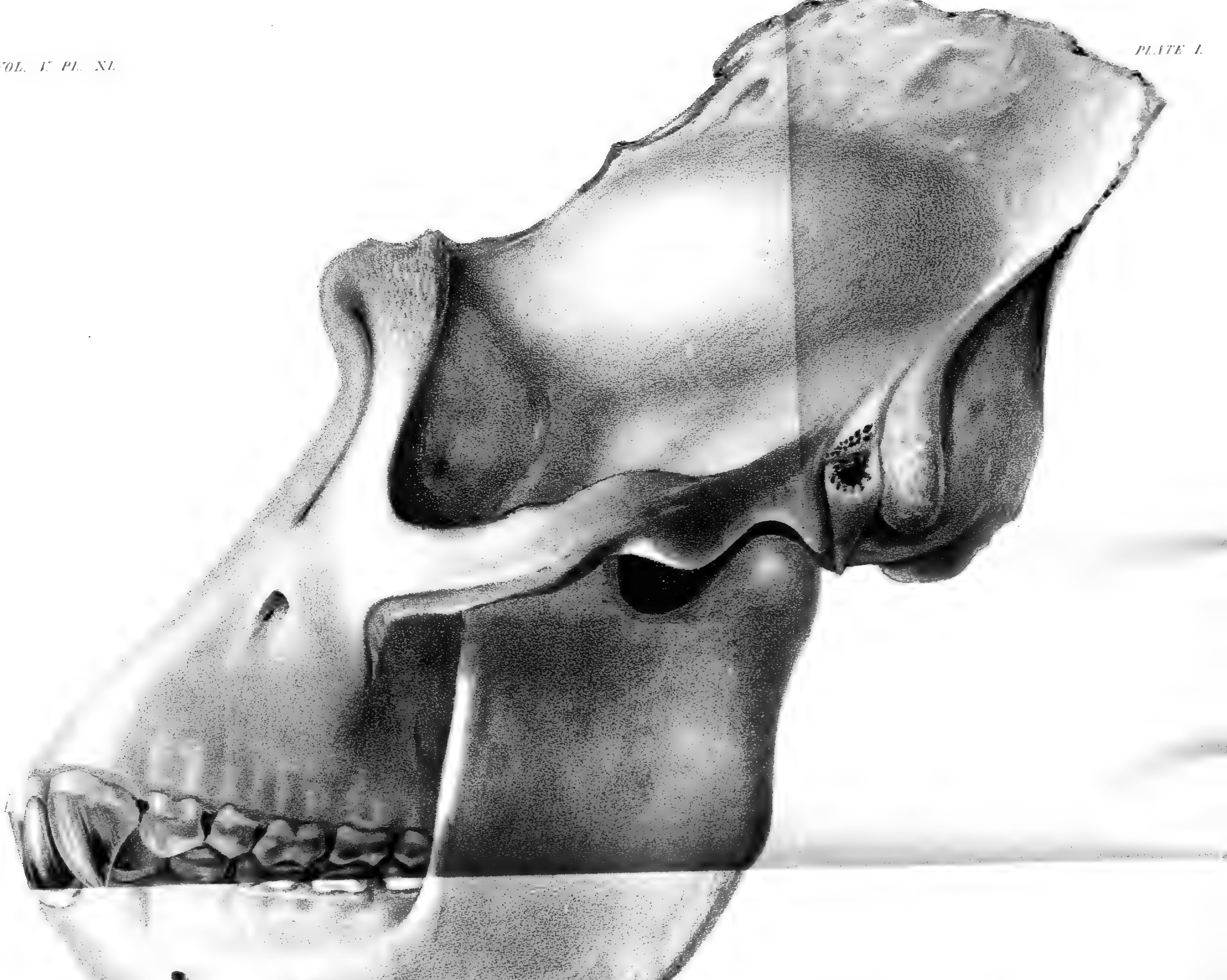

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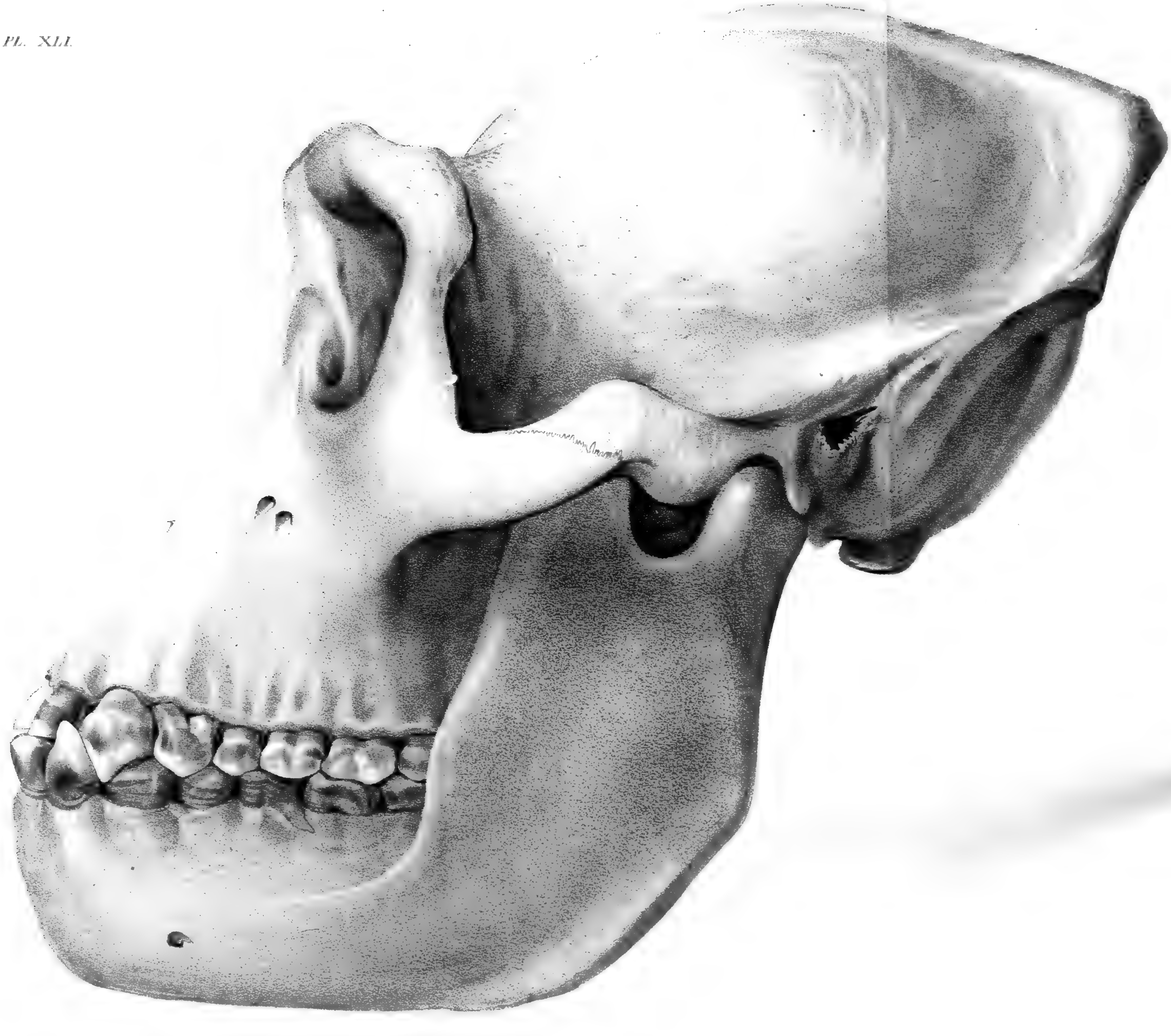

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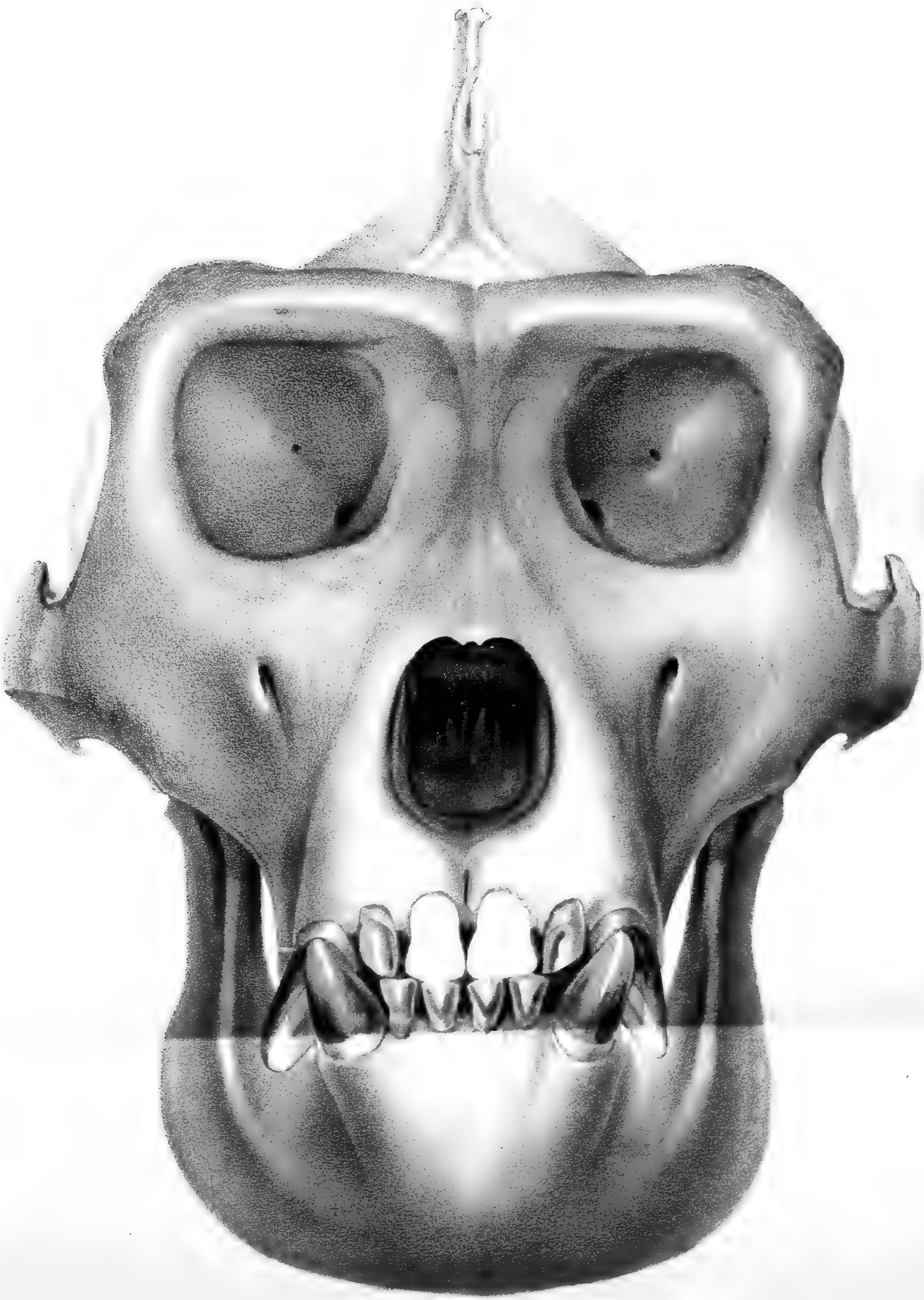

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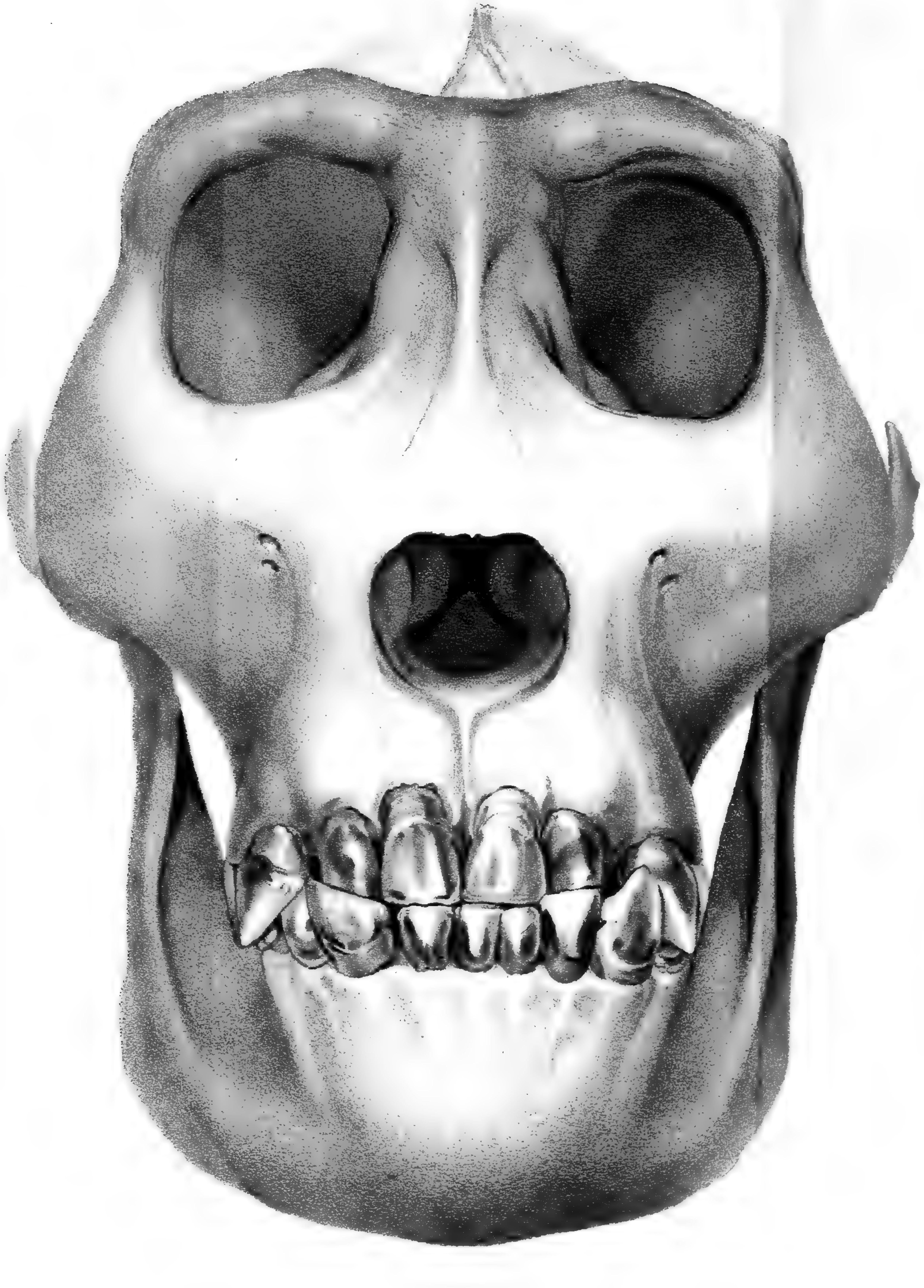

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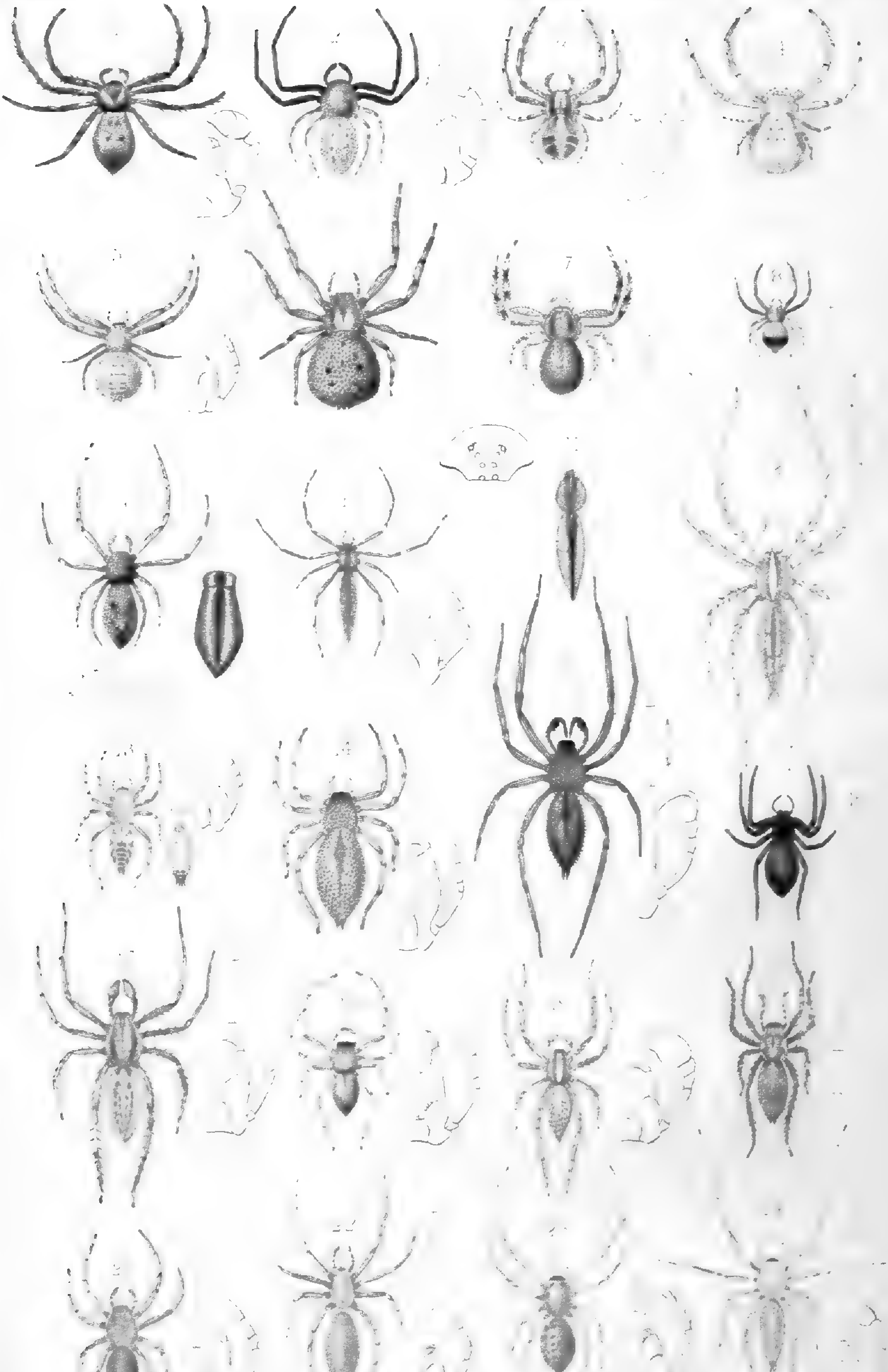

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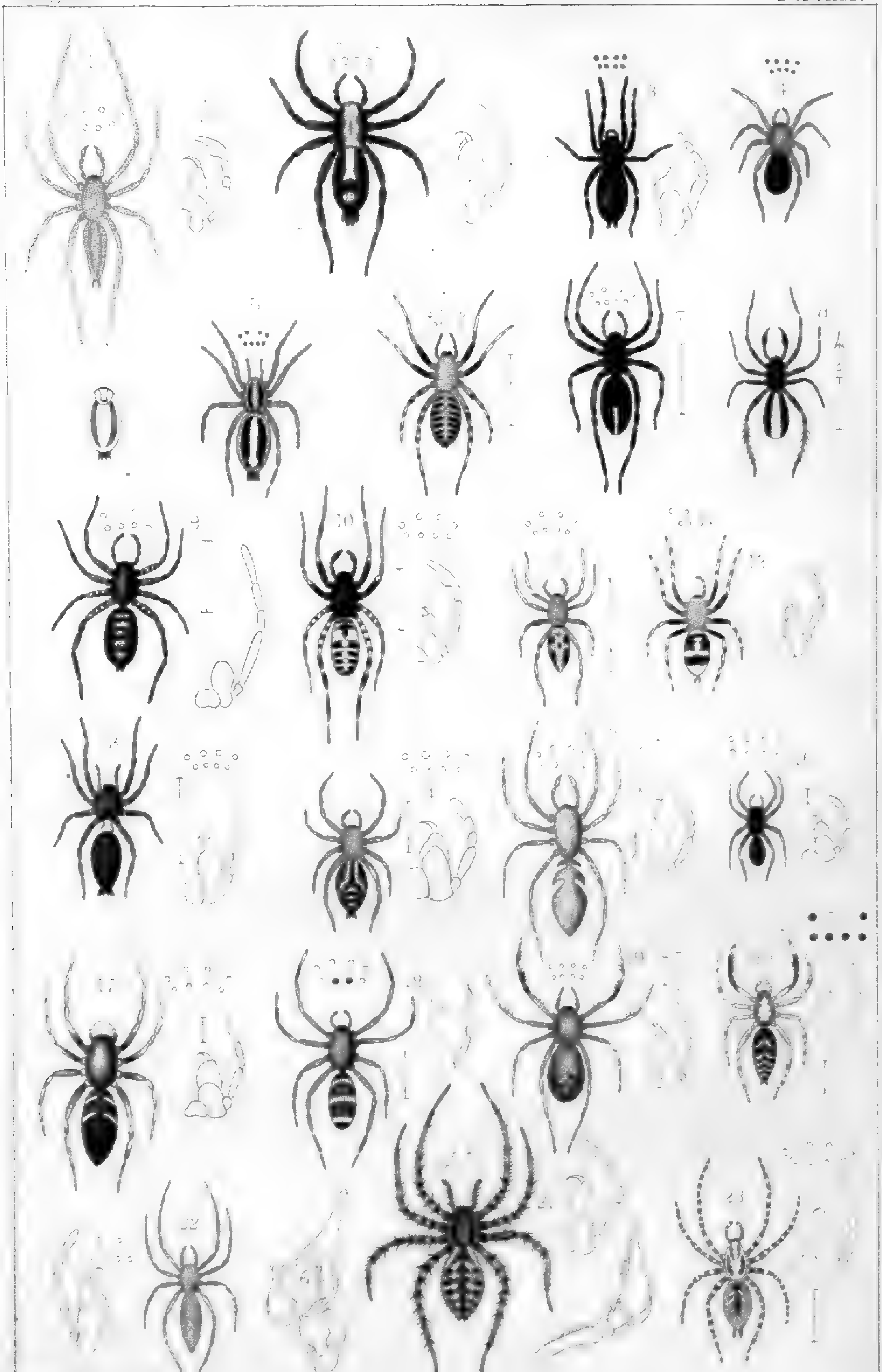

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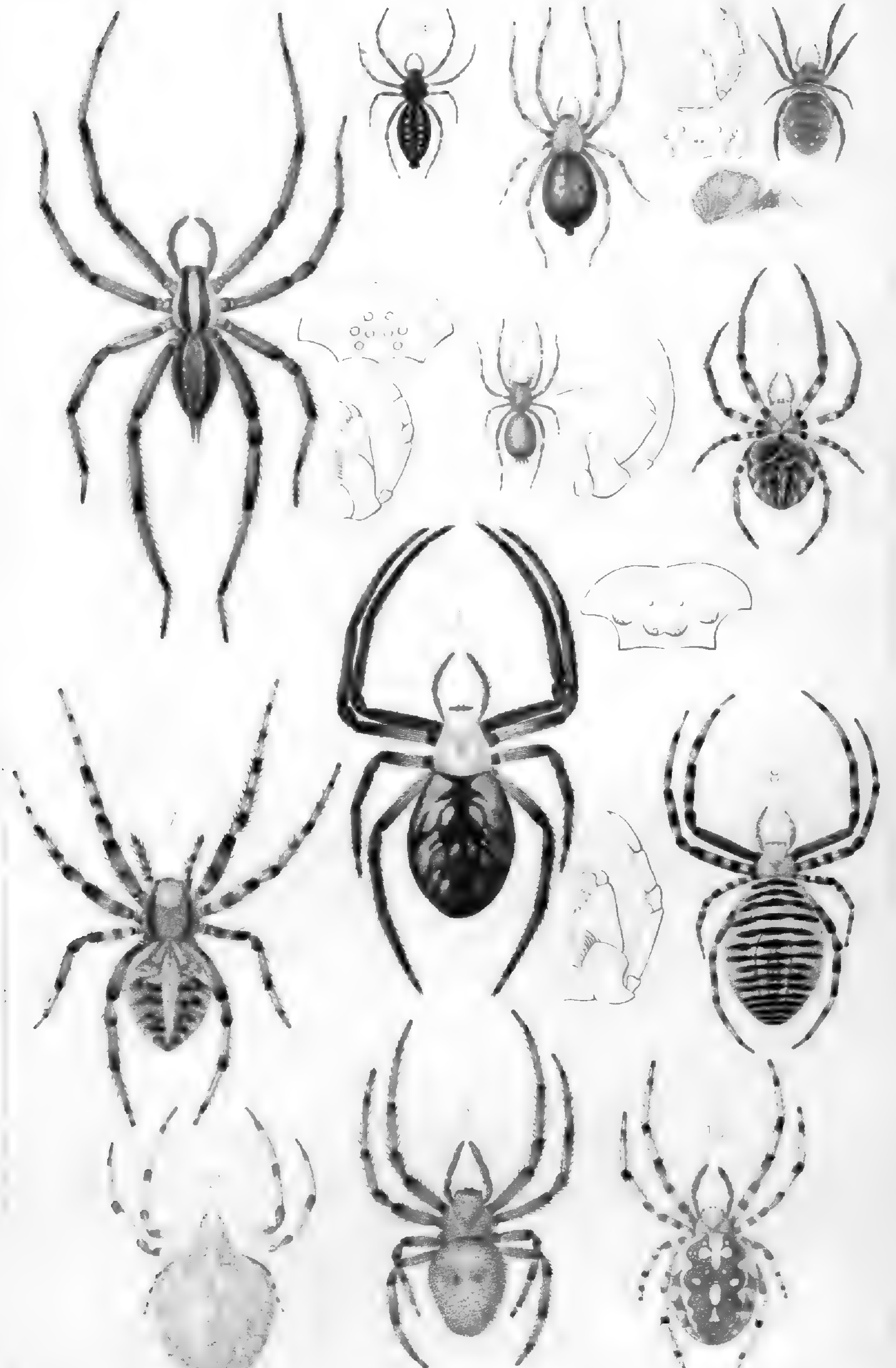

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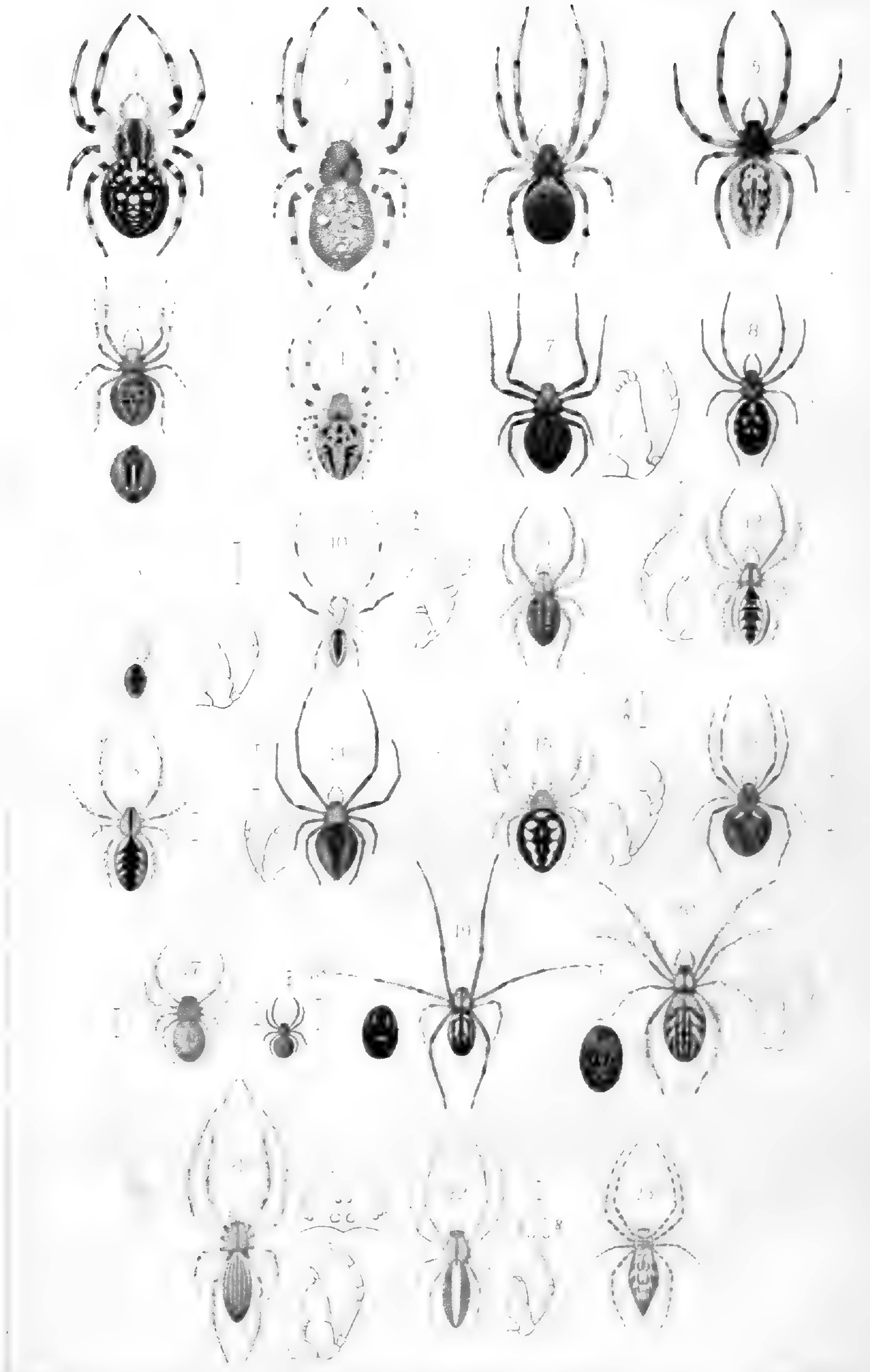

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