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J. W. POWELL, DIRECTOR

SOME INSECTS OF SPECIAL INTEREST

FROM

FLORISSANT, COLORADO

AND OTHER POINTS IN THE

TERTIARIES OF COLORADO AND UTAH

BY

SAMUEL HUBBARD SCUDDER

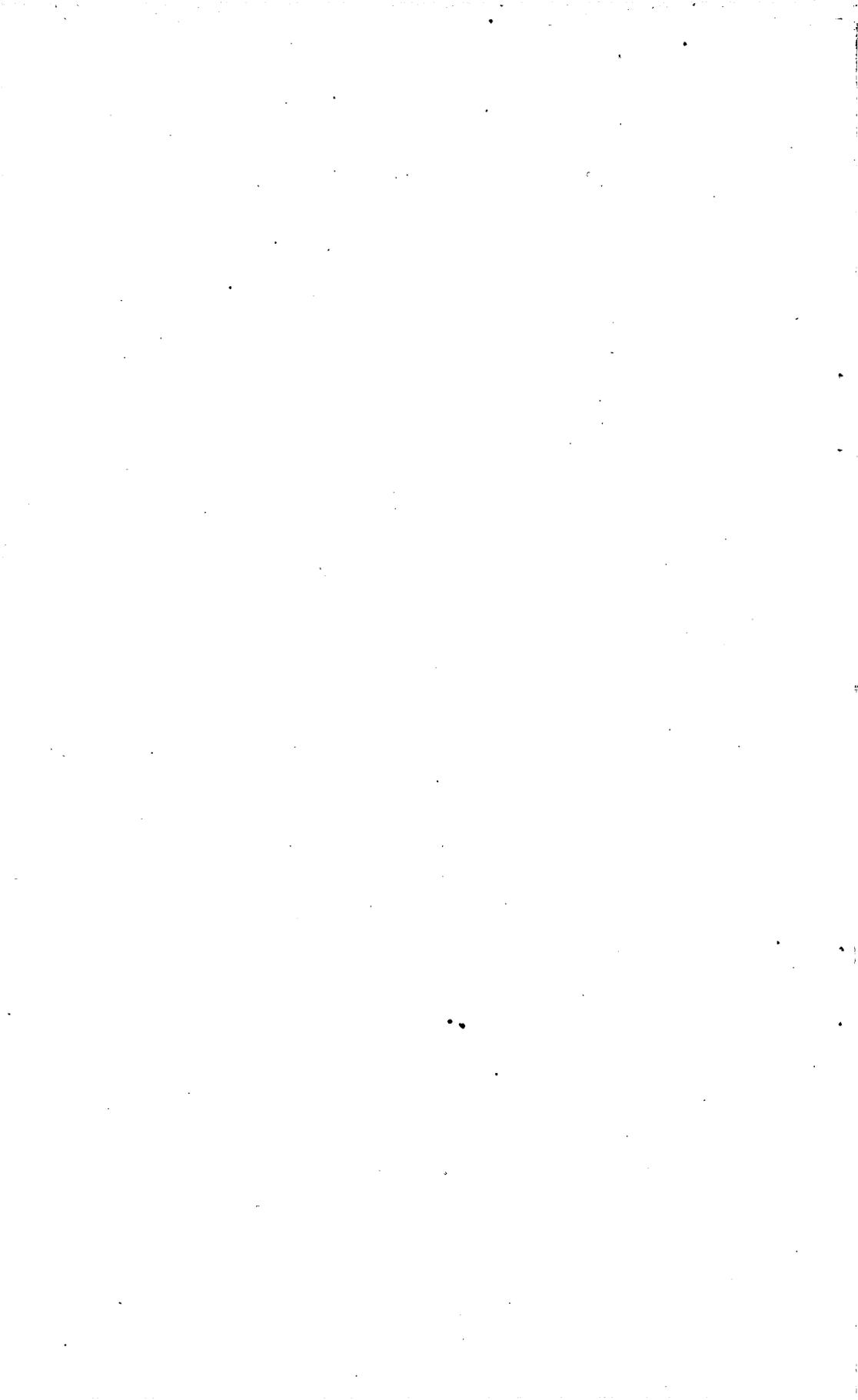


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LETTER OF TRANSMITTAL.

UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF FOSSIL INSECTS,
Cambridge, Mass., July 24, 1891.

SIR : I send herewith a paper upon Tertiary insects for publication as a bulletin of the Survey. The reasons for forwarding it will be found in the brief introductory remarks.

Very respectfully,

SAMUEL H. SCUDDER,
Paleontologist.

Hon. J. W. POWELL,
Director.



SOME INSECTS OF SPECIAL INTEREST FROM FLORISSANT AND OTHER POINTS IN THE TERTIARIES OF COLORADO AND UTAH.

By SAMUEL H. SCUDDER.

INTRODUCTION.

The following pages describe the characteristics of a few Oligocene insects of different orders which, from some peculiarity, have been thought worthy of special study out of serial course, and which would have long to remain unnoticed if they were to await treatment with their immediate allies. Several, indeed, belong to groups already reported on in my Tertiary Insects and elsewhere, and are really on that account the more worthy of notice, as their relation to those already made known can be discussed. Thus the *Trichocnemis* is interesting as the representative of a type hitherto known, both in the present and past epochs as exclusively gerontogeic; the *Stenogomphus* as the first of the *Gomphina* found fossil in this country; the *Cicada* not only for its great size, but for its being the first member of its family known from American rocks, and it was remarked in my Tertiary Insects (p. 239) as a singular thing that we should have found none; the butterfly is of exceptional interest as belonging to a waning type which must have flourished remarkably in Oligocene times if the figures drawn from the few known fossil butterflies are to be regarded as having any weight at all. These all belong to groups already elaborated. The two Coleoptera are interesting, one from its suggestion of the need of reexamination of allied European Tertiary forms, the other from its remarkable structure. The two Diptera surprise us by their departure from the modern types to which they are most nearly allied, and the existence of one of them proves that bot-flies awaited the appearance on the globe of their most cherished victims among the ruminants. And finally the Hymenopteron described below, besides its curious alliance to oriental forms, well illustrates how perfectly preserved are the numerous and varied Tenthredinidæ entombed at Florissant, whereas all previously described fossils of this family have been exceedingly imperfect and unsatisfactory.

GENERA AND SPECIES.

NEUROPTERA—ODONATA.

TRICHOCNEMIS Selys.

TRICHOCNEMIS ALIENA.

Pl. 1, fig. 2.

Nearly allied to the recent *T. didyma* Selys, but easily distinguished from it by the origin of the subnodal, which arises in the nodus itself, from the number of postcubitals, which is eleven instead of seventeen, and from the color of the pterostigma, which is pallid, heavily margined with blackish brown.

Length, 20 millimeters.

The interest attaching to this species is its close alliance to species found in the East Indies and its belonging to a legion, Platycnemis, which is now found only in the Old World, most of its members, indeed, in the tropics. That it belongs in this legion is plain from the origin of the median and subnodal sectors, the former at a point immediately before the nodus (bending strongly upward at its base), from the elongated and regular quadrilateral, from the short pterostigma which surmounts parts of two cellules, but is only equal in length to one, from the entire absence of supplementary sectors, and from the length, straightness, and simplicity of the lower sector of the triangle, which terminates well beyond the middle of the wing. The entire margin of the wing, the length of the lower sector of the triangle, and the relative brevity of the upper side of the quadrilateral, which is about three-fifths as long as that of the lower side, show that it must be referred to Trichocnemis, and that it falls about midway between the subgenera Hemicnemis and Trichocnemis, having close relation to *H. cyanops* from the Seychelles and *T. didyma* from Thibet and Darjeeling by the points of origin of the median and subnodal sectors.

Of further interest is the fact that the legion is already known in the European tertiaries, one species (a mere fragment and referred here with some doubt) in amber, the other, *Platycnemis icarus*, from the Aquitanian of Rott, and that the latter species is so closely allied to our Florissant form as indubitably to fall in the same genus, so that it should be known henceforth as *Trichocnemis icarus*; here also the subnodal arises from the nodus itself; both the median and subnodal have the same abrupt upward curve at the base, and the form of the quadri-

lateral is nearly identical; the number of postcubitals is thirteen. I do not recall any so close relationship between the insects of the Rhenish basin and those of our Oligocene beds.

Florissant, Colorado. One specimen. No. 1660, U. S. Geological Survey.

STENOGOMPHUS (*στενός*, Gomphus, nom. gen.) gen. nov.

Upper side of the triangle a little longer than the interior, scarcely shorter than the exterior, which is bent; both inner and outer triangles subequiangular and subequal, each divided into three or four cells by cross veins uniting at the center; hypertrigonal space without transversals; median space with a single cross nervule, the space itself exceptionally narrow apically, diminishing gradually in width from the middle outward and in no way bent where the lower limb of the inner triangle strikes it; sectors of the arculus arising from the same point and continuing as one stem more than half way to the apex of the median space; three complete rows of cellules, following the triangle as far as below the nodus.

These characters are not combined in any known genus of Gomphoides, to which legion of Gomphina, on account of its aborted membranule, it belongs. From the equality of the two triangles, the length of the upper margin of each, and the exceptional straightness of the postcostal nervule, the upper broad extension of the two triangles gives a peculiar facies to the wing, somewhat as if it were a hind wing, which the empty hypertrigonal space, the three complete series of cellules following the discoidal triangle, and the small number of postcubitals intensify.

It is interesting as being the first discovery of fossil Gomphina in America, and as showing an alliance with the existing New World rather than the Old World types. It seems, on the whole, to be most nearly related to Gomphoides and Progomphus, but differs distinctly from the latter in the origin of the sectors arising from the arculus, from Gomphoides in the free hypertrigonal space, the greater length of the upper side of the triangle; and from both in the straightness of the postcostal vein, and in having three instead of two complete series of cellules beyond the triangle, a character which does not appear to have been found in this legion, but which occurs in *Cacus*, a subgenus in the neighboring gerontogeiic legion *Liudenia*.¹

There appear to be some other peculiarities about it which future comparisons may show to have some special interest. In all recent species of the legion I have seen, one of the cross nervules in the space between the nodal and subnodal sectors is heavier than the others and oblique, but is placed at very varying distances beyond the nodus, always, however, separated from it by from one to three cellules; in

¹ See further observations under the species *S. carletoni*.

Stenogomphus alone is it in direct continuation of the curved base of the nodal sector, and thus forms an integral part of the system or accessory alliance of heavy veins which depend from and form a part of the nodus. Again, the subnodal nervure in all living Gomphina I have seen does not arise directly from the principal sector, but from a bent cross nervule connecting the principal and median sector, or it may be said to be united to the median sector close to its own base by an oblique transversal, while in *Stenogomphus* its origin is direct, the connection with the median being not yet gained. Add to this that the sectors arising from the arculus, the principal and the short sectors, not only arise from one point, but seem to be entirely blended for a distance from the arculus nearly equal to the length of the latter, and we find a series of characteristics of no little interest. The last feature seems to be found, but to a less extent, in *Gomphoides bifasciata*, and still less in *G. brevipes*, in both of which, however, the veins do not blend until past the extreme base, while in *Stenogomphus* they have but a single origin. Besides, the number of postcubitals is exceptionally small, these varying in the entire legion from eight to seventeen, and averaging twelve, though in *Gomphoides* proper, to which *Stenogomphus* is most nearly allied, the average is ten; in *Stenogomphus* there are but seven.

STENOGOMPHUS CARLETONI.

Pl. 1, Fig. 1.

A single fore wing and part of its reverse are all that are known of this dragon fly. The wing is hyaline or very faintly infumated beyond the nodus; the reticulation is testaceous, the principal sector and the main veins above it, with the costal margin, ferruginous, deepening into blackish when bordering the ferrugineo-testaceous pterostigma. This latter is subequal, about four and a half times longer than broad, surmounts less than three unequal cellules, its inner bordering vein subcontinuous with the cross nervule below; twelve antecubitals, seven postcubitals; both triangles subequilateral with crowfoot division into three cells, the upper outer angle of the discoidal triangle perhaps sometimes severed by a cross vein to form a minute fourth cell; outer margin of same triangle slightly bent above, scarcely more than a tenth longer than the upper margin, which in its turn is scarcely more than a tenth longer than the inner margin; of the borders of the inner triangle the lower is the longer, the others subequal.

Length, 39 millimeters; breadth, 8.7 millimeters.

The living species to which this is most nearly allied is unquestionably *Gomphoides stigmata* Say sp., found in Texas. To this conclusion both Baron de Selys and Dr. Hagen, to whom I sent sketches of the neurotation, arrived independently, and Baron de Selys kindly pointed out some peculiarities of that species, which, in view of the structure of *Stenogomphus*, have special interest. One of the two specimens (δ and η)

in his possession has the hypertrigonal space free on one fore wing but not on the other; while on another is found, also on one wing but not on the opposite, the beginning of a series of five or six very small pentagonal cellules between the two rows of tetragonal ones following the discoidal triangle. By the kindness of Dr. Hagen, Mr. Uhler, and Mr. Calvert, I am able to report regarding the structure of fifteen other specimens of this species; in all without exception on both wings there are next the triangle first three cellules (as figured in de Selys's *Monographie des Gomphines*), then two series to a point between the origin of the median nervure and the nodus, increasing to a greater number below the nodus; but in the number of transversals in the hypertrigonal space there is some variation; in all but two specimens the wings are alike on the two sides and show either one or two transversals in this space; but one male has three transversals on the left, two on the right side; and one female one transversal on the left, two on the right. Curiously enough these asymmetrical individuals are from the same lot as those in Baron de Selys's collection, viz, the specimens collected by General (then Captain) Pope on the Pecos river, Texas, in the extreme western part of the State, at the time of the Mexican boundary survey; while all the others but two were collected by Aaron in the extreme southern part of the State, between Laredo, 160 miles inland, on the Rio Grande, and Corpus Christi, on the Gulf coast. The last two are in Mr. Uhler's collection.

Crest of Roan Mountains, Colorado, found by Mr. Carleton E. Davis, of my party, in 1889. One specimen, Nos. 1146 and 1185, U. S. Geological Survey.

HEMIPTERA—CICADIDÆ.

CICADA LINNÉ.

CICADA GRANDIOSA.

Pl. 1, Fig. 3.

A single hind wing, showing the complete neuration, except a fragment of the tip, is all that remains; besides indicating a species of very large size, as large as the largest known American forms in North or Central America, and having also unusual breadth, it differs from them much more than almost any of the genera of Cicadidæ do from each other, and therefore indicates a distinct genus. The neuration in general agrees with that given for *Fidicina* and *Cicada* by Distant in the *Biologia Centrali-Americana*, or for that of an East Indian species of *Fidicina* by Walker (*Cat. Brit. Mus., Homopt., Pl. 1, Fig. 2*), but differs from them all in an unusual peculiarity, the great length of the apical cells, the transverse interlocking of the veins occurring much nearer the middle of the wing than usual; moreover, the upper ulnar vein when it forks (just before its union with the lowest radial) does so by

throwing off an inferior branch from about the center of the wing, while the upper branch, united to the lowest radial, scarcely diverges from the original path of the main stem; and finally, the lower ulnar, when it has run a little more than half its course parallel and close to the sutura clavi, suddenly bends slightly upward and terminates on the outer margin much nearer to the upper radial vein than to the sutura clavi; no trace of the membrane can be seen beyond the marginal vein; the veins are very delicate and the wing immaculate.

Length of fragment, 25 millimeters; probable length of venation in hind wings, 26.5 millimeters; breadth, 10.5 millimeters; probable expanse of fore wings, 115 millimeters.

This is much larger than any of the tertiary Cicadidæ of Europe, none of which have the hind wing preserved.

Florissant, Colorado. One specimen, No. 1850, U. S. Geological Survey.

COLEOPTERA—BYRRHIDÆ.

NOSOTETOCUS (*νόσος, τίτω*) gen. nov.

But a single genus, *Nosodendron* Latr., has hitherto been recognized in the *Nosodendrinæ*, a subfamily distinguished from other *Byrrhidæ* by its prominent head, which is not retracted as in the other subfamilies. In the tertiaries of Colorado, however, and perhaps in those of Europe as well, a genus of *Byrrhidæ* is found in which the head is as prominent as in *Nosodendron*, but differs from it very distinctly in the character of the antennæ, which in *Nosodendron* have a distinct and sharply delimited club formed by the abrupt expansion of the three last joints. In the extinct genus, which from its relation to *Nosodendron* we call *Nosotetocus*, the antennæ enlarge with great regularity, no one joint being greatly larger than the preceding, and the apical joints being considerably less than twice as broad as the narrowest joints of the stem. In other respects it agrees very closely with *Nosodendron*, the form of the head being similar, the antennæ composed of eleven joints, of which the second is longer than the others, and all, excepting perhaps the basal joint, which can not easily be seen, are gently obconic, perhaps depressed. The prothorax is short and the scutellum small. The legs are moderately stout, the tibiæ apparently of similar width throughout.

Three species, differing considerably, are found at Florissant, and it would appear probable from the figures and descriptions of the three species which have been referred to *Byrrhus* from the European tertiaries that they also belonged here. They all appear to have non-retracted heads, and in the case of one, *B. examinatus* Heyd., the antennæ have the same construction as in *Nosotetocus*. A reexamination of the specimens is desirable, as it would be interesting to know if *Nosotetocus* preceded *Nosodendron* in Europe as well as in America. Only one of our species is described here.

NOSOTETOCUS MARCOVI.

Pl. 2, Figs. 2, 3.

Form obovate, about half as long again as broad, the head projecting distinctly beyond the front and breaking the regularity of the form, the curve being emarginate on the anterior sides of the prothorax. The head is comparatively narrow, being scarcely transverse, very regularly rounded and scarcely produced in front. The antennæ are considerably longer than half the width of the body, the apical joint, which is largest and slightly produced at tip, nearly twice as broad as the narrowest part of the stem. The elytra are distinctly though feebly striate and the striæ faintly punctured.

Length, 5.25 millimeters; breadth, 3 millimeters; breadth of head, 1.5 millimeters; length of antennæ, 2 millimeters.

Named for the geologist, Prof. Jules Marcou, of Cambridge.

Florissant, one specimen, No. 110.

COLEOPTERA—CARABIDÆ.

CARABITES HEER.

CARABITES EXANIMUS.

Pl. 1, Fig. 4.

The surface of the elytra is smooth but for the sharp, slender, rather deeply impressed, straight striæ, showing feeble signs of scattered delicate punctures, hardly enlarging the width of the striæ and very obscure. The second stria terminates at the base just as it bends outward opposite the tip of the scutellum, while the third runs into the fourth, and there is no basal stria; the second and fourth are roundly united apically around the tip of the third, and are joined to the united fifth and sixth by a short spur; the first and tenth are united at the very tip of the elytra.

Length of elytron, 9 millimeters; middle width of one, 3 millimeters.

Finding it impossible definitely to place this beetle, which is represented only by the elytra, but these in excellent preservation, I put it temporarily in a magazine genus to indicate its general affinities, for its general aspect is that of a large carabid, which the inferior plica of the outer margin strongly confirms; but there is not a sign of dorsal punctures or foveæ, except a minute puncture at the oblique base of the third stria, and even no ocellate punctures between the ninth and tenth striæ. Of all the tribes possessing such an inferior plica, it seems to agree best with the Pterostichini, but there are here nine perfectly and equally distinct and equidistant striæ besides a tenth marginal stria. The elytra are slender, with a distinct emargination at the tip of the inferior plica and with narrowed base and well-

rounded humeri; the first and third striæ are deflected outward at their base by the tolerably large triangular scutellum.

From the lowest beds on the immediate bank of the White River, Utah, about 5 miles from the Colorado line. One specimen, Nos. 624 and 626, U. S. Geological Survey.

DIPTERA—CESTRIDÆ.

The Cestridæ of the present day live in their early stages beneath the skin or in the glands or cavities of various Mammalia, hardly any of the terrestrial groups being free from their attacks; they principally pursue, however, the Perissodactyla, Ruminantia, and Rodentia, and of these the ruminants are by far the most subject to them, and particularly the Cervidæ and Bovinæ. Now, neither of these dominant families appears to have existed in Oligocene times, when the insect described below flourished, and they have reached their present differentiation and predominance quite despite the attacks of this insect family which was awaiting their advent into the world. Perhaps Palæstrus sought the Tylopoda of the time as its victims.

PALÆSTRUS (*πάλας, οἰστρου*) gen. nov.

A genus of Cestridæ remarkable for the very striking course of the fourth longitudinal vein, which finds no counterpart in living Cestridæ so far as I can find. Nor, indeed, can I discover anything of the sort among the calyprate Muscaria. The only species known is of the largest size, rivaling the largest known living forms, with wings of a rather slender form and immaculate. The costal vein is finely and densely bristled, the costal cell of somewhat unusual width, partly from the rather short auxiliary vein which terminates well before the middle of the wing; the first three longitudinal veins terminate at nearly equidistant intervals in the apical fourth of the wing, the second and third, as normally, with upturned tips; the third longitudinal vein arises from the second at slightly less than a third way from the base; the fourth, instead of running in a straight or gently flexed course, perhaps bent, at the middle transverse vein, is profoundly affected by that vein, which is extremely short and lies about as far beyond, as the origin of the third longitudinal vein before, the tip of the auxiliary vein; in passing toward this middle transverse vein the fourth longitudinal vein runs parallel and near to the straight fifth longitudinal vein as far as the middle of the wing, and then curves strongly upward to strike the transverse vein at a wide angle, is there bent at right angles with itself, and passes in a nearly straight course subparallel to the fifth longitudinal until it meets the hinder transverse vein, when it is again bent, this time upward but at a very broad angle, and reaches the margin just beyond the third longitudinal vein, thus leaving the first posterior cell (barely) open; the anterior basal trans-

verse vein is directly opposite the origin of the third longitudinal vein; the posterior, strongly arcuate, is situated a little within it; the fifth longitudinal vein terminates just beyond the hinder transverse vein, not reaching the margin. The legs are not very long, the femora remarkably stout, the tibiæ straight, the tarsi of the same length as the tibiæ.

This genus seems to be most nearly allied to *Hypoderma*, which is found all over the world and attacks various kinds of cattle, but especially Cervidæ, but the whole course of the fourth longitudinal vein is materially different.¹

A single species is known, from Florissant.

PALÆSTRUS OLIGOCENUS.

Pl. 2, Figs. 1, 4.

The single imperfect specimen that has been found has been so fully described under the genus that little is left to be said. The remains consist of the rotund thorax, the wings, excepting the membranous hind margin, the hind legs and the middle femora; the tegulæ are obscure, but appear to be normal. The wing is hyaline. The basal joint of the abdomen seems to be represented by a detached piece beside a leg, perhaps a fore leg; if so, it is of great size relatively to the thorax, the hinder margin being broader than the thorax; it is blackish brown like the thorax, with the hind margin lighter. The legs, and especially the femora, are delicately bristled; the tibiæ are scarcely in the least enlarged in the middle, and the tarsi are about two-thirds as stout as the tibiæ.

Length of wing, 16 millimeters; breadth of thorax, 7 millimeters; of base of first abdominal segment, 5.5 millimeters; of apex of same, 8 millimeters; length of hind femora, 4.75 millimeters; tibiæ, 5 millimeters; tarsi, 5 millimeters.

Florissant; Colorado. One specimen, Nos. 13703 and 14086.

DIPTERA—MYCETOPHILIDÆ.

Subfamily MYCETOPHÆTINÆ.

This new group is remarkable for combining in the neuration of the wing characters which are found only in distinct groups among living forms. It may be defined as follows: The vena media arises at the base of the wing from the vena postica, but is apparently also united by a cross vein close to its base with the radius. The transverse median vein elongate, very oblique. The humeral cell very slightly enlarged in the middle. The brachial vein present and very much elongated,

¹It may be remarked, as a precaution to younger students, that in all the figures of *Hypoderma*, and, indeed, many other genera in Brauer's *Monographie der Oestriden*, a single vein is made to do duty for both first and second longitudinal veins.

both cubital cells open and elongate. The lower discoidal vein originating in the vena postica, but also connected at its base by a cross vein with the vena media, a cross vein which does not exist in the other groups of Mycetophilidæ. The vena axillaris complete.

This group seems to stand between the Mycetobinæ and Sciophilinæ.

MYCETOPHÆTUS (*μύκης, φοιτάω*) gen. nov.

Wings with the form of those of Sciophila, the auxiliary vein terminating in the margin a little beyond the middle of the wing and a little beyond the base of the brachial vein; the marginal vein extending to or almost to the tip of the wing where the cubital meets it; the fourth posterior cell arises as far back as the inner cubital cell; the third posterior is divided into two, a basal and an apical, the latter as long as the fourth posterior; the axillary is also divided into two, an anterior and a posterior, the former much the narrower and narrowing apically. Legs long and slender, the fore femora considerably longer than the thorax, the tibiæ longer than the femora, both abundantly spinous. Abdomen eight-jointed.

At least one species occurs at Florissant.*

MYCETOPHÆTUS INTERMEDIUS.

Pl. 2, Fig. 5.

Head and thorax dark, the abdomen much lighter, the legs nearly or quite as dark throughout as the thorax; wings hyaline, but faintly fuliginous in the upper half, especially beyond the middle. The brachial vein arises shortly beyond the transverse median vein, and in its basal half runs parallel to, and close beside, the cubital, but afterwards diverges a little from it and strikes the margin a little nearer the radius. The second posterior cell is long—nearly as long as the hinder cubital cell and broad from the base. The abdomen is slender and tapering.

Length of body, 7.5 millimeters; wing, 5.5 millimeters; femora, 2 millimeters.

Florissant, Colorado. One specimen, Nos. 5937 and 7391.

LEPIDOPTERA—NYMPHALIDÆ.

Subfamily LIBYTHEINÆ.

In my paper on the fossil butterflies of Florissant, published in the Eighth Annual Report of the U. S. Geological Survey, I described an interesting form under the name of *Prolibythea*, and called attention to the strangeness of the occurrence, in a fossil state, of a butterfly belonging to the subfamily *Libytheinæ*. Indeed, it may be acknowledged

to be much the most interesting of any of the fossil butterflies yet discovered; for when we recall the fact that among existing butterflies the Libytheinæ are by far the most poverty-stricken subfamily known, the occurrence, among the extremely few (less than twenty) fossil butterflies that have been found in any part of the world, of one belonging to this subfamily has a special significance. The existing members are only about a dozen at the most, and, curiously enough, are scattered at the four quarters of the globe. No other subfamily has anywhere nearly so restricted a representation, the *Acræinæ*, which perhaps come nearest to them in this respect, numbering at least ten times as many, while the numerical proportion of the Libytheinæ to the total number of known butterflies is not far from 1 to 1,000. How much more significant this is, and how much more clearly it proves the living Libytheinæ to be remnants of a waning type, as I have called them,¹ is shown by the occurrence in the beds of Florissant of still another member of this restricted subfamily, so that the Libytheinæ now form more than 10 per cent of fossil butterflies, instead of one-tenth of one per cent, as among living forms. I am indebted to Mr. S. H. Long, of Florissant, Colorado, for the opportunity of studying the most interesting specimen here described.

As will be seen, it is most nearly related to the fossil species previously found in the same beds, *Prolibythea vagabunda*. It is of precisely the same large size, has the same relatively short palpi, somewhat similar antennæ, a similar but not so marked costal lobe at the extremity of the hind wings, and a neuration agreeing very closely with it; so closely, indeed, that it would be regarded by many as a member of the same genus. It differs strikingly, however, in the greater breadth of the wings and in the structure of the antennæ and palpi, and in most of its points shows closer affinities with the European Libythea than with the African Dichora, instead of the opposite, as in *Prolibythea*. These and other distinctions seem to be sufficient to warrant its generic separation from previous known fossils, and I accordingly describe it under the following name:

BARBAROTHEA (*βάρβαρος, θέα*) gen. nov.

Antennæ slender, the club so gradually incrassated as to be difficult to determine its origin, composed of about one-fourth of the total number of joints, but little more than one-fourth the length of the whole antenna, and less than twice as broad as the stalk, terminating very abruptly, a single joint, or at most two, being concerned in its apical diminution in size; the whole antenna scarcely more than three-fifths the length of the wing. The apical joint of the palpi not more than three times longer than broad, only a little more than two-thirds the length of the second joint. Fore wings a little more than one-half as

¹ See *Butt. N. Engl.*, i: 759.

long again as broad, subtriangular, the costal margin regularly and gently arched; the apical margin produced in the upper half of the wing, roundly and not at all prominently angulated at the tip of the lowest subcostal nervule, the last two superior subcostal nervules originating far apart, the outer at a little more than midway between the tip of the cell and the apex of the wing; the third about midway between the second and fourth. Hind wing of very nearly equal length and breadth, the costal margin as in *Prolibythea*, but with less pronounced apical lobe, the outer border very regularly arcuate and crenulate, not at all produced in the subcostal region, the lowest median nervule widely distant from the submedian and terminating in a distinct but rounded lobe; cell closed by a transverse vein, which strikes the median barely beyond its last furcation.

Of the pattern of the wings little can be made out, but the under surface of the fore wings would appear to be almost uniformly dark, with no oblique patch depending from the costal margin, excepting such as is indicated by a narrow, very oblique, darker, abbreviated bar just beyond the apex of the cell. The hind wing would appear to have been darker beneath than the fore wing, showing large patches of a deeper tint outside the cell on either side, in the basal third of the wing.

In the general proportion of the wings *Barbarothea* would appear to be more nearly related to *Libythea* than to any other of the genera of *Libytheinæ*, living or fossil, but in the possession of a tail or lobe to the lowest median nervule of the hind wings and of a rounded angulation at the lowest inferior subcostal nervule of the fore wing, it approaches more nearly the African *Dichora*. Possibly it may be found in both these respects, as it certainly is in the former, closer to *Prolibythea*, since the actual outline of the fore wing in that genus is partly conjectural, the only specimen having a broken tip; but the absence of the falcation so prominent in all recent *Libytheinæ* will be remarked. In the origin of the outer superior subcostal nervules it also approaches more closely *Dichora* than any other genera, unless it be again *Prolibythea*. In the form of the hind wing it is unique; the costal lobe, however, closely resembles that of *Prolibythea*, but the extreme breadth of the wing as related to its length separates it widely from that and from all other genera of *Libytheinæ*. In the structure of the antennæ it seems to stand midway between *Libythea* and *Prolibythea*, having the slender form and brief club of *Prolibythea*, but the abrupter tip and slighter distinction between club and stalk, which belongs to *Libythea*. In the brevity of the apical joint of the palpus, however, we find a marked departure from the ordinary condition of things in *Libytheinæ*, since here only, in this subfamily, is the apical joint, though relatively longer than in most butterflies, shorter than the middle joint.

BARBAROTHEA FLORISSANTI.

Pl. 3, Figs. 1-5.

The single specimen which has been found shows the side view of a butterfly remarkably well preserved, better preserved, indeed, than any known, with the sole exception of *Prodryas*, from the same beds. But, unfortunately, it is somewhat confused by the mixture of veins and markings of the underlying wings, the margins of which do not altogether coincide. Moreover, the stone upon which it chanced to be preserved is of much more irregular surface than was the case with *Prodryas*, rendering many points obscure which one would wish to see. Thus, though the form of the scales, at least upon the fringe, can be determined, no striation is visible, and where the wings have slipped past each other to a slight extent, the relation of the nervures to the margin can not always be determined with perfect accuracy. Both of the antennæ are preserved, one perfectly, as also are the palpi, the drooping tongue and part of the legs. The length of the body is only faintly and probably indicated by the discoloration of the surface. The fore wings, the outline of which where overlapped by the hind wing is not everywhere altogether clear, have the costal margin very regularly and gently convex, falling, however, with greater rapidity just before the apex. The outer margin is slightly produced in the subcostal region in a broad swelling between the tip of the subcostal nervule and of the uppermost median nervule; below this the outer margin is not clear. In the hind wing the costal margin is altogether as in *Prolibythea vagabunda*, except that the apical lobe is less pronounced; there is no such emargination of the outer border at the extremity of the costo-subcostal interspace, the outline between the tips of the costal nervule and the lowest median nervule being almost the segment of a circle, apart from the slight and regular crenulation of the wing; this crenulation is most marked in the lobe next the anal angle, and is everywhere produced by the slight projection of the tips of all the nervules; but the tip of the lowest submedian nervule appears to terminate in an emargination and not a projection of the border. The sketch of the neuration (Fig. 1) represents the wing precisely as it appears upon the stone, but as a vein is plainly seen running to the tip of the prominent lobe below this, it is perfectly plain that here the nervure of one wing and the border of another underlying it are delineated. It seems, however, nearly impossible to distribute the two quite properly from the specimen, and it has accordingly been drawn in this way to call attention to this point in future specimens that may be obtained. The markings of the wing, as stated above, under the generic description, are altogether obscure, with very slight exceptions, but it is impossible to mark definitely the limits of the various darker clouds; they are best shown by reference to the plate. The antennæ are composed of about forty-four joints, of which eleven or twelve form

a very slightly enlarged club, which is only a little more than half as broad again as the stalk. The whole club shows the separation of the naked surface from that covered by the scales in a very remarkable manner, as is shown best in Fig. 3, where it is most enlarged; and this drawing also shows equally well the three slender carinæ, extending not only upon the club, but upon the stalk as well, certainly throughout its whole apical half, and probably throughout the whole; the joints of the club are nearly half as broad again as long, while the proportions of those of the stalk are reversed to almost exactly the same degree. The basal and middle joints of the palpi are furnished abundantly with moderately long, stiff, projecting hairs, which are directed forward, while on the apical joint these are entirely absent, excepting at the extreme base, or better may be described as entirely recumbent. It would appear to be somewhat doubtful which of the legs are represented upon the stone. One pair is shown, one of them imperfectly, the other almost complete, which would be regarded as the front pair but for their excessive length. They are simple and normal in structure throughout and abundantly and almost equally clothed with fine and crowded spines upon the under surface throughout the tibia and tarsi. The dark portion seen between the base of these legs and the tip of the slender, rather brief tongue can not be regarded as a pair of legs, but only as the clothing of the chest.

Length of body (doubtful), including the palpi, 26 millimeters; last joint of palpi, 2.5 millimeters; middle joint, 3.25 millimeters; antennæ, 12 millimeters; club of same, 3.5 millimeters; width of stalk, 0.25 millimeters; of club, 0.4 millimeter; length of tongue, 5 millimeters; length of fore wing, 28.5 millimeters; breadth of fore wing, 16.5 millimeters; expanse (estimated), 61 millimeters; length of hind wing, 22 millimeters; breadth, 21.5 millimeters; length of (middle?) tibiæ and tarsi, 6.5 millimeters.

Florissant. One specimen; S. H. Long.

HYMENOPTERA--TENTHREDINIDÆ.

ATOCUS (*ἀτοκος*) gen. nov.

In its slender parallel-sided form this genus has all the aspect of a *Sirex*, but not only is there no extension of the prothorax, but the large head is closely appressed to the thorax. The head is large, rounded subtriangular, broadest posteriorly. The ocelli are apparently only two in number, rather large, situated just at the inner base of the antennæ; these are fourteen-jointed, the first joint very large, twice as stout as, and very much longer than the succeeding, which are simple, longer than broad, and continually diminish in size. Wings with two marginal cells, separated almost beneath the middle of the stigma; four submarginal cells, the first small and nearly circular, the remainder widening and enlarging outwardly, and excepting the apical

much longer than broad; first discoidal cell hexagonal, about as long as broad, and but little larger than the first submarginal cell; second discoidal cell of exceptional shape, being oblique and much higher than long, its inner margin beneath the middle of the first discoidal cell, while the third brachial cellule thus made of unusual length is partially or completely divided into two nearly equal parts by a spurious veinlet from the vein above, somewhat as in *Cephaleia*.

Except for the simple antennæ this curious genus seems to have some relationship to the oriental *Tarpa*, and I can not find anything nearer to it unless it be *Cephaleia*. It is a striking form.

A single species occurs at Florissant.

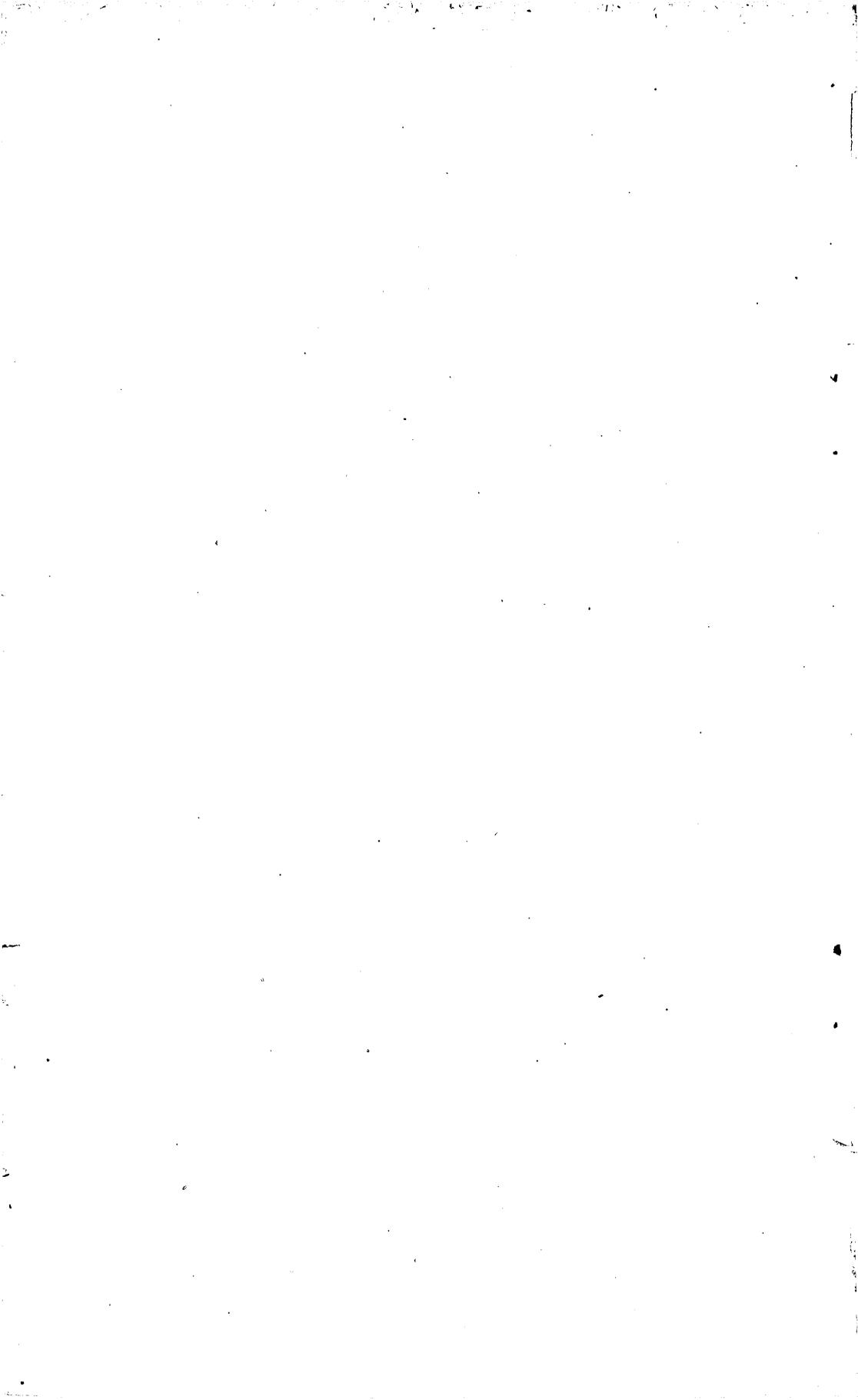
ATOCUS DEFESSUS.

Pl. 1, Fig. 5.

The whole body is uniformly dark, the wings without markings except the fusco-fuliginous stigma; the antennæ are about half as long again as the width of the head, and beyond the first joint taper so as to be about half as broad at apex as at second joint; the outer is about twice as long as the inner marginal cell which lies wholly beneath the stigma, and is about as broad at base as at apex; the first submarginal cell on the other hand lies almost wholly before the stigma, and has as much an appearance of belonging to the marginal as to the submarginal series; the cross veins at the outer sides of the first submarginal and first and second discoidal cells form a pretty regular zig-zag across the middle of the wing.

Length of body, 10.5 millimeters; antennæ, 3.25 millimeters; fore wings, 7.5 millimeters.

Florissant, Colorado. One specimen, No. 11983.



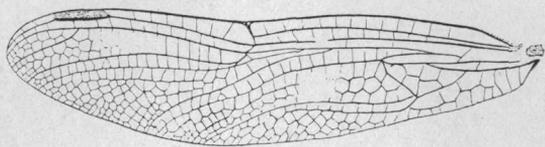
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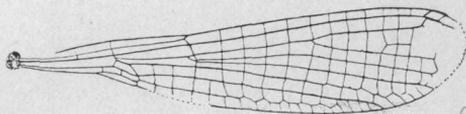
PLATE I.

EXPLANATION OF PLATE I.

- Fig. 1. *Stenogomphus carletoni*; ♀.
2. *Trichocnemis aliena*; ♀.
3. *Cicada grandiosa*; ♀.
4. *Carabites exanimus*; ♂
5. *Atocus defessus*; antenna, much enlarged.
6. *Atocus defessus*, complete; ♀.

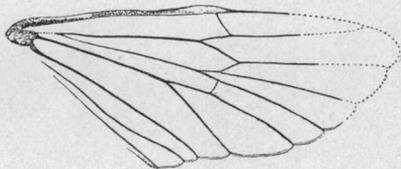


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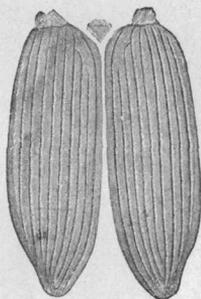


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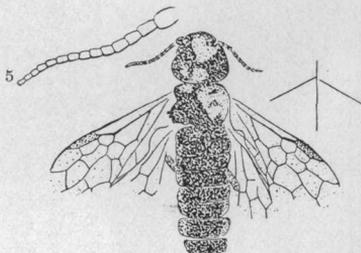
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PLATE II.

EXPLANATION OF PLATE II.

- Fig. 1. *Palæstrus oligocenus*, body and wings; ♂.
2. *Nosotetocus marcovi*; ♀.
3. The same, the antennæ further enlarged; $\frac{1}{2}$.
4. *Palæstrus oligocenus*, basal joint of abdomen and leg; ♀.
5. *Mycetophætus intermedius*; ♀.

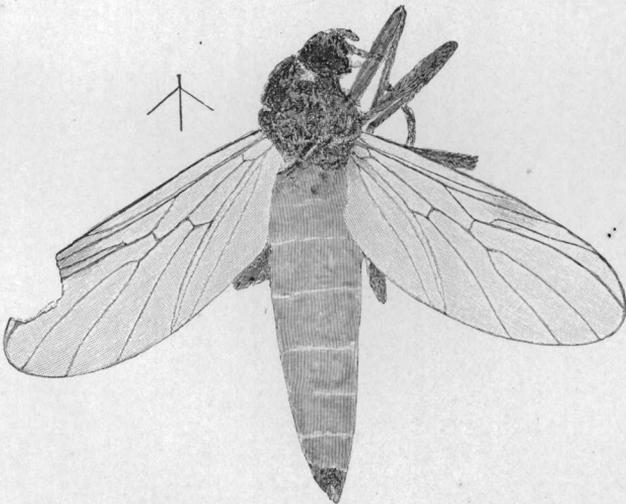
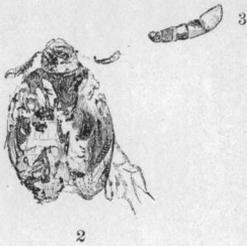
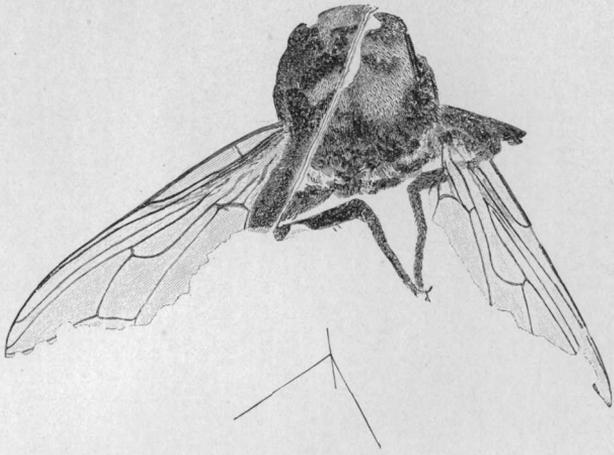
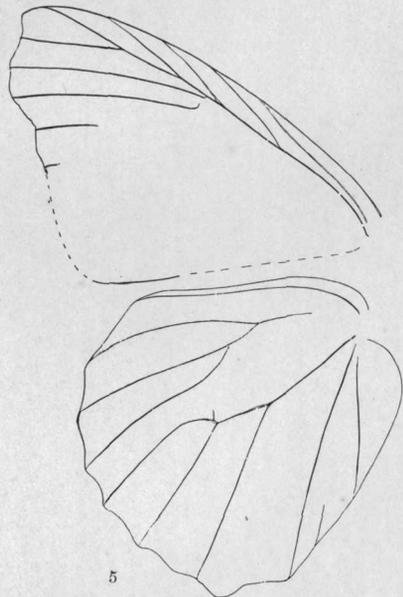
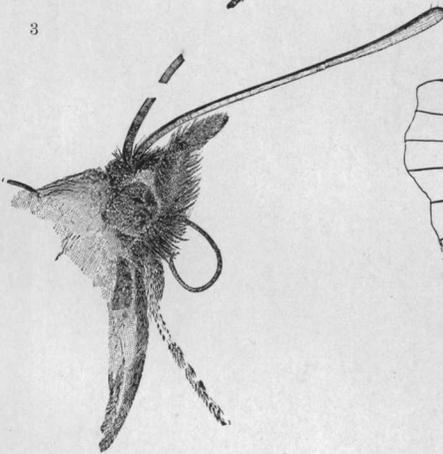
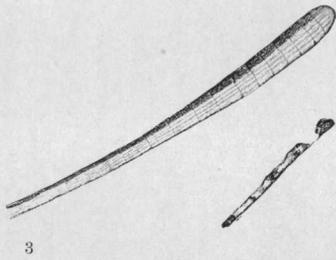
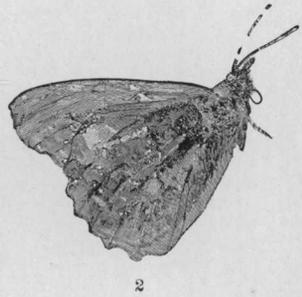
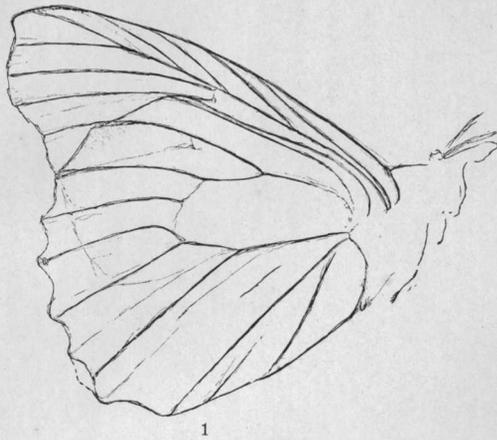


PLATE III.

EXPLANATION OF PLATE III.

- Fig. 1. *Barbarothea florissanti*, outline and neuration in the position in which it is preserved; †.
2. The same, its general appearance on the stone; †.
 3. The same, right antenna, much enlarged; †.
 4. The same, sketch of head and appendages except wings, enlarged; †.
 5. The same, the neuration, as far as preserved, that of each wing separated; †.



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