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GEOLOGICAL SURVEY
OF
NEW JERSEY.

DEPARTMENT OF THE INTERIOR

MONOGRAPHS

OF THE

UNITED STATES GEOLOGICAL SURVEY

VOLUME XXI

WASHINGTON
GOVERNMENT PRINTING OFFICE
1893

UNITED STATES GEOLOGICAL SURVEY

J. W. POWELL, DIRECTOR

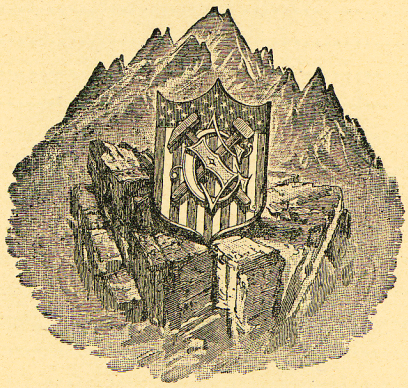
TERTIARY RHYNCHOPHOROUS COLEOPTERA

OF THE

UNITED STATES

BY

SAMUEL HUBBARD SCUDDER



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LETTER OF TRANSMITTAL.

UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF FOSSIL INSECTS,
Cambridge, Mass., December 31, 1891.

SIR: I have the honor to transmit herewith the manuscript of and drawings for a report upon the Tertiary Rhynchophorous Coleoptera of the United States, the first of a series upon the fossil insects of this country, in continuation of my report upon the Tertiary insects of North America, which forms Volume XIII of the Reports of the U. S. Geological Survey of the Territories, under Dr. F. V. Hayden.

Very respectfully, yours,

SAMUEL H. SCUDDER,
Paleontologist in charge.

Hon. J. W. POWELL,
Director U. S. Geological Survey, Washington, D. C.

PREFACE.

When, in January, 1886, the Division of Fossil Insects of the U. S. Geological Survey was established, and I entered upon my duties therein, I had still on hand in an incomplete condition a report upon our Tertiary insects for the U. S. Geological Survey of the Territories, under Dr. F. V. Hayden, the plates for which were already finished. This work, which was completed early in 1890, contained a full account of all the Tertiary insects of our country known up to within a few years, as far as regarded the lower orders; but the higher orders, and especially the Coleoptera, Diptera, and Hymenoptera, which comprised those richest in material, were left nearly untouched, only the earlier found specimens in the Green river beds, and which had already been engraved on the plates, being included, leaving the far richer fauna of Florissant, Colorado, entirely untouched.

The elaboration of this immense amount of material, enlarged by additions from other localities, including some new and rich, was begun immediately upon the completion of the Hayden report, and the present work is a first instalment toward a history of our fossil Coleoptera. In the division treated are included 193 species, all but one of which come from the older Tertiaries, while there have been described (or merely indicated) from the European Tertiary rocks only 150 species, of which 9 come from the Pleistocene. Our older Tertiary rocks, therefore, are found to have already yielded nearly 28 per cent more forms than the corresponding European beds. It is altogether probable, such is the extent and richness of the fresh-water Tertiary deposits of the West, that this proportion will be largely increased in the future, particularly as the exploitation of our Tertiary insect deposits has been merely begun; the number of persons who have been engaged in any field-work upon them may be counted upon one's fingers, and no naturalist besides myself has yet undertaken their study.

S. H. S.

TERTIARY RHYNCHOPHOROUS COLEOPTERA OF THE UNITED STATES.

By Samuel H. Scudder.

INTRODUCTION.

Although it is evident to any student of fossil insects that even in Tertiary deposits we possess but a mere fragment of the vast host which must have been entombed in the rocks, it is nevertheless true that we have already discovered such a variety and abundance of forms as to make it clear that there has been but little important change in the insect fauna of the world since the beginning of the Tertiary epoch. In the earlier Tertiaries we not only possess in profusion representatives of every one of the orders of insects, but every dominating family type which exists to-day has been recognized in the rocks; even many of the families which have now but a meager representation have also been discovered, and though many extinct genera have been recognized, no higher groups, with a single exception or two, have been founded upon extinct forms. This is one of the most striking and prominent facts which confront the student of fossil insects. It is the more striking from the delicacy, the tenuity, and the minuteness of many of the forms which have been entombed; and the statement may be enforced by the further fact that the parasitic groups—those which are entomophagous—are represented, as well as many of those which in the present time show peculiar modes of life. Thus we have representatives of such microscopic parasitic insects as Myrmar, strepsipterous insects have been discovered, the viviparity of the ancient Aphidæ has been shown probable, the special sexual forms of ants and white ants were as clearly

marked as to-day, and the triungulin larva of Meloe has been found inclosed in amber, showing that the phenomenon of hypermetamorphism had already been developed.

The insects of the Tertiary period, therefore, afford no such interesting series as may be found in the study of Tertiary mammalia, nor as can be found in the study of the insects themselves in Paleozoic rocks. Nevertheless, a few interesting features have been pointed out which seem to stand, in some measure, as exceptions to what has been stated. Thus, in my recent work on our Tertiary insects,[1] I called attention to some remarkable features in the fossil plant-lice of our Tertiaries, especially the great length and slenderness of the stigmatic cell—a feature which affects the whole topography of the wing, and is found also in the only Mesozoic plant-louse known, but which, nevertheless, can not be regarded as of significant taxonomic importance, since it occurs equally in both the Aphidinæ and Schizoneurinæ, the two principal subfamilies of that group, both to-day and formerly. So, too, in treating in the same place of the Pentatomidæ, I pointed out that the scutellum was universally shorter in all our Tertiary forms, whether belonging to the subfamily of Cydninæ or Pentatominæ. I may further add the unpublished fact that it is a peculiarity of the Tertiary Staphylinidæ of this country that the antennæ and legs are measurably shorter than in modern types; this is most marked in cases where the living and extinct species of the same genera are compared. But in neither of these cases, any more than in the Aphidæ, can we regard these peculiarities as any ground for separating the fossil from the recent forms as distinct groups. No doubt we shall some day be able to correlate these differences and point out their precise significance, which at present is not clear, but it is certain that they do not afford ground for maintaining that we are here dealing with extinct groups any higher than genera, or, at most, than tribes.

Yet in one or two instances extinct groups of a higher grade may be found. Thus, in the work already alluded to, and previously, I have drawn attention to a strange type of fossil Thysanura—Planocephalus—for which it seemed necessary to frame a new suborder, and, though its

[1] Tertiary Insects of North America, Reports U. S. Geological Survey of the Territories, Vol. XIII, 4°, 1890.

possible reference elsewhere has been suggested, this suggestion will hardly stand the test of investigation, and the matter remains where I left it; and in the present work attention is directed to another group—the Coleopterous family Rhynchitidæ—in which it has been found necessary to establish a new subfamily group for an abundant and varied series of insects from our Tertiaries.

In studying the Rhynchophorous Coleoptera, I have, for the first time, made use of all the material which has been collected in the most recent as well as in former years; and have been able, therefore, to do justice to the other localities of fossil insects, as well as the now famous locality of Florissant, Colorado, and I find that there is no family of American Rhynchophora paleontologically more interesting than the Rhynchitidæ. In point of numbers alone the species of this group form more than 10 per cent of the fossil Rhynchophora of North America, while in the existing fauna the Rhynchitidæ comprise less than 2½ per cent of all the Rhynchophora. Our recent Rhynchitidæ are separated by Le Conte and Horn into two subfamilies, one of which comprises the bulk of the family, while a single species is separated to form the other, the Pterocolinæ. This differs from the Rhynchitinæ, among other things, by the antennæ being inserted much nearer the eyes, by the wide separation of the fore and middle coxæ, and by the broad side pieces of the metasternum. The Pterocolinæ are not represented among the fossils, but all the genera of Rhynchitinæ now existing in our fauna are recognized, as well as a new generic type. These, however, are but a mere fraction of the fossil Rhynchitidæ, the bulk of them being separated as a new subfamily—the Isotheinæ, a subfamily characterized by the moderate separation of the fore and middle coxæ, and by the insertion of the antennæ, which is before the middle of the basal half of the straight and porrect beak. These characters show an approach to the Pterocolinæ rather than to the Rhynchitinæ, but they have narrow metasternal side pieces. This subfamily, thus clearly distinguished, is, for Rhynchitidæ, exceptionally rich in forms, since it contains no less than seven genera and thirteen species, about equally divided between two distinct tribes, all extinct. This brings the total number of fossil American Rhynchitidæ up to four-fifths that of

the existing forms, a proportion which altogether surpasses that yet found in any other family of insects. The abundance and variety of the Rhynchitidæ may, therefore, be looked upon as the most striking feature in the Tertiary Rhynchophorous fauna of North America.

The relative representation of the different families of Rhynchophora in the American and European Tertiaries, as well as their representation in America to-day (according to Henshaw's catalogue of 1885), is set forth succinctly in the following table:

Comparative view of recent and fossil Rhynchophora.

Families.	In Numbers.			In Percentages.		
	Recent North American.	Tertiary North American.	Tertiary European.	Recent North American.	Tertiary North American.	Tertiary European.
Rhinomaceridæ	5	.....	.....	0·5	.....	.....
Rhynchitidæ	25	20	5	2·3	10·3	3·3
Attelabidæ	5	.....	1	0·5	.....	0·7
Byrsopidæ	1	.....	7	0·1	.....	4·7
Otiorhynchidæ	115	47	17	10·7	24·3	11·3
Curculionidæ	640	100	100	59·4	51·8	66·7
Brenthidæ	5	.....	.....	0·5	.....	.....
Calandridæ	82	10	7	7·6	5.2	4·7
Scolytidæ	163	5	7	15·1	2·6	4·7
Anthribidæ	37	11	6	3·4	5·7	4·0
Total	1,078	193	150	100·1	99·9	100·1

This table shows better than any words some striking features in the American Tertiary fauna, when compared with that now existing in North America, and, indeed, to a certain extent and in much the same direction when compared with the European Tertiary fauna. These peculiarities consist in the extraordinary development of the Rhynchitidæ, already alluded to; the great preponderance of the Otiorhynchidæ, due to its remarkable development in localities other than Florissant, and the meager showing of the Scolytidæ, this last also seen in the European Tertiaries, and undoubtedly resulting from the habits of life of these insects as subcortical feeders on trees, which would prevent their deposition in places where their fossil remains could be preserved. The reduction in this direction is, indeed, so great as to effect a very slight lessening of the

relative numbers of the Curculionidæ, which here, as in the living fauna, easily hold the first place. The other relative differences between the Tertiary and existing faunas in America are but slight, the Calandridæ of the Tertiaries losing about as much as the Anthribidæ gain in relative numbers when compared with the existing fauna. As compared with the European Tertiary fauna the American shows the same excess in the relative numbers of Rhynchitidæ and Otiorhynchidæ as it does when compared with the recent American fauna; but both the Curculionidæ and the Scolytidæ gain in relative importance in the European Tertiaries, whose chief peculiarity, however, consists in the considerable development of the small family Byrsopidæ. The Rhinomaceridæ and Brenthidæ alone, small groups, do not occur in either Tertiary fauna, and the Attelabidæ and Byrsopidæ are also absent from the American.

To bring the differences to view in another way and consider only the families represented in the American Tertiary fauna, we may mark their relative position in the scale of numbers as in the following table:

Relative importance of the families of Rhynchophora.

Families.	Place as to numbers.		
	Recent American.	Fossil American.	Fossil European.
Rhynchitidæ	6	3	6
Otiorhynchidæ	3	2	2
Curculionidæ	1	1	1
Calandridæ	4	5	3–4
Scolytidæ	2	6	
Anthribidæ	5	4	5

This shows by a different method the same fact: That the recent American Rhynchophorous fauna agrees better in its broad features with the Tertiary fauna of Europe than with the Tertiary fauna of America.

Of the 66 old genera to which the fossil species of Rhynchophora are here referred, including 136 of the 193 species, 6 may be regarded as cosmopolitan or nearly so; 15 as gerontogeic and especially European, though often having a few American species among them; 16 as characteristic of the northern hemisphere in general, while the remainder are about equally

divided between those which are predominantly North American and those which are tropical American, but often extend to our southern borders. Of the 31 new genera (with 57 species) little can be said in this particular, but nearly half of them may be regarded as most closely allied to American and especially tropical American types; so that on the whole the American, and especially the tropical American, type predominates. It should be remarked, however, that the resemblance of the fauna to that of temperate North America is undoubtedly greater in appearance than in reality and will very probably be changed to some extent when the various species here recorded are better known; for, in default of characters which if preserved might materially change the alleged affinities of the various forms, it has seemed advisable to refer most of them to existing genera, and my opportunities for examining tropical and subtropical types have been very limited. Where characters of real importance exist, the insects generally show the prevalence of structural differences, often considerable, from modern forms.

The number of new genera here proposed is certainly greater than has been usual in the study of Tertiary insects, but this I believe to be a necessity if we are to apply the same methods to their study that we do to the study of modern insects; nor is the number surprising, since not a single species is found in our Tertiary deposits which can possibly be referred to an existing form or even to any of those which have been described from the European Tertiary rocks; and I am convinced that the actual difference between the older Tertiary and existing types is far better expressed by the separation of the former from the latter in generic nomenclature whenever, the characteristics being sufficiently preserved, they show any such differences as among modern types are regarded as warranting generic separation. It must be confessed, however, that among the fossils the Coleoptera are far less apt to have those characteristics of their structure which are seized upon for generic disassociation sufficiently preserved to warrant great certainty or insure exactitude and that those orders which display wing neuration afford far better means of judgment, on account of the commonly better preserved remains of just those parts which are largely relied upon for generic discrimination.

The localities at which the species described below have been ob-

tained are but four, if we except a couple of beetles, *Otiorhynchites fossilis*, found at Fossil, Wyoming, and *Hylastes squalidens*, from the Pleistocene beds of Scarboro, Ontario. These four localities are Florissant in central Colorado, the crest of the Roan mountains near the head of East Salt creek in western Colorado, the buttes bordering the White river near the Colorado-Utah boundary, and Green river city, Wyoming. All of these localities, except the Roan mountains, were described in more or less detail in my Tertiary Insects of North America. The Roan mountain beds are apparently merely an extension of those found on the White river, 50 miles distant, but here confined to the very crest of the range. Fossil insects are found at several points, but only in one spot have they been obtained in any remarkable number; here, however, in extreme abundance. As this spot was 5 miles distant from our camp and our time and supplies were limited, no great number of specimens were brought away, but enough was seen to warrant the belief that a prodigious number of specimens might be obtained there.

The detailed study of the fossil Rhynchophora has made very clear and specific one point which impressed me in general while working in the field, and that is the wide difference between the character of the fossils obtained at Florissant and those obtained at any of the other localities (perhaps excepting Elko, Nevada, of which little is known) in the Rocky mountain region. The Hymenoptera which abound at Florissant almost disappear in the other localities, while the Coleoptera, which hold a third place at Florissant, form the larger proportion of the mass in the other deposits. To test the opinion formed by the cursory examination of specimens in the field, I have counted the specimens obtained in each of the different localities visited during a single summer, and find the opinion amply confirmed.

The first set of columns in the accompanying table shows the total number of specimens (regardless of species) obtained during this season's work, separated by orders, (1) in all localities; (2) at Florissant alone; and (3) in the other localities, excluding Florissant; and the second set of columns the same figures reduced to percentages. Nothing could well be more striking than the contrasts in the Hymenoptera and Coleoptera.

Relative abundance of the orders of insects in different western deposits.

Orders.	Number of specimens.			Percentages.		
	All localities.	Florissant.	Other localities.	All localities.	Florissant.	Other localities.
Hymenoptera	277	243	34	15.2	34.5	3.0
Diptera	432	184	248	23.7	26.1	22.2
Coleoptera	806	104	702	44.3	14.8	63.0
Hemiptera	185	86	99	10.0	12.2	8.9
Orthoptera	19	2	17	1.0	0.3	1.5
Neuroptera	90	75	15	5.0	10.6	1.3
Arachnida	11	11	.....	0.6	1.5	.....
Total	1,820	705	1,115	99.8	100.0	99.9

Now, when we come to examine the species of Rhynchophora, we shall find that while the three localities in western Colorado and Wyoming share a number of forms in common, not a single species found at Florissant occurs in either of the others. To give the precise figures: From Florissant 116 species have been obtained; from the Roan mountains 40, of which it shares 6 with Green river and 7 with White river, besides 6 others common to all three localities, together nearly half its fauna (19 sp.); from the White river 23 species, of which it shares 2 with Green river and 7 with the Roan mountains, besides the 6 common to all, or nearly two-thirds its fauna (15 sp.); and from Green river 39 species, of which it shares 2 with White river and 6 with the Roan mountains, besides the 6 common to all, or more than one-third its fauna (14 sp.). These facts, with the field evidence, appear to show that the three principal localities in western Colorado and Wyoming are deposits in a single body of water, the ancient Gosiute lake, as it was called by King. The absolute separation, in specific forms, between the fauna of these deposits and that of Florissant must be indicative of a distinction greater than that of mere geographical position, for the Roan mountains are about equally distant from Green river and Florissant. It is clearly an indication of a difference in age, though they have usually been regarded as occupying similar horizons. In the following pages I have referred to the species regarded as belonging to the Gosiute lake as the GOSIUTE FAUNA whenever it has been desirable to speak of them in common; and in contrast I have called the fauna of Flo-

rissant, the Florissant or LACUSTRINE FAUNA. Which of them is the older can not be determined until their faunas have been more completely studied; and even then, for lack of sufficient comparisons elsewhere on the continent, it may be impossible from the insect remains alone to reach any positive conclusions. When the structure of the Green river beds has been more completely studied, their age can doubtless be determined with much accuracy; and a similar result may be reached when the age of the orographic movement shall have been determined which brought about the emptying and desiccation of the ancient Florissant lake. With these time elements given, the extent of the insect remains in the Gosiute and Lacustrine faunas is such that the relations of deposits hereafter discovered may quickly be made clear.

The difference between the Gosiute and Lacustrine faunas is shown to be much more remarkable when we examine the larger groups. Thus, of the 66 genera found at Florissant, only 18 occur also in the Gosiute fauna, which contains, besides, 31 genera not found at Florissant, and there are even a number of tribes which, as far as we yet know, are entirely confined to one or the other fauna.

Besides the beetles described or enumerated in this work, no fossil Rhynchophora have been described from any formation, Tertiary or pre-Tertiary, on the American Continent, with the single exception of a species of Curculionidæ which I have called *Hylobiites cretaceus*[1] and which was discovered in the Pierre shales of the Assiniboine river, northwestern Manitoba, by Mr. J. B. Tyrrell, of the Canadian Geological Survey, in 1888.

In conclusion, the following statements may be made regarding the Rhynchophorous fauna of the American Tertiaries in general:

(1) The general facies of the fauna is American, and somewhat more southern than its geographical position would indicate.

(2) All the species are extinct, and though the Gosiute lake and the ancient lacustrine basin of Florissant were but little removed from each other, and the deposits of both are presumably of Oligocene age, not a single instance is known of the occurrence of the same species in the two basins.

(3) No species are identical with any European Tertiary forms.

[1] Cont. Can. Paleont., II, 30–31, pl. II, fig. 5.

(4) A very considerable number of genera are extinct, often including a number of species.

(5) Existing genera which are represented in the American Tertiaries are mostly American, not infrequently subtropical or tropical American, and where found also in the Old World are mostly those which are common to the North Temperate zone. A warmer climate than at present is indicated.

(6) There are no extinct families, but in one instance an extinct subfamily with numerous representatives.

(7) The Tertiary European fauna is nearer than our own Tertiary fauna to the existing American fauna in the relative preponderance of its families, subfamilies, and tribes.

These conclusions are almost identical, word for word,[1] with those reached from a study of the Tertiary Hemiptera of the United States, although in that study a far more meager representation of the Gosiute fauna was at hand.

Besides a number of specimens which could not be definitely placed, there have been examined in the preparation of this monograph 753 specimens of Rhynchophora, of which 431 come from Florissant and 320 from the Gosiute fauna.

Three of the plates which accompany this monograph were put upon stone many years ago and before a careful study of the material. Consequently several species appear on them which are not Rhynchophora at all. These have all been described, and the descriptions will in due time and place be published, but in this volume only the names are given, in the Explanation of Plates I and II.

In the enumeration of the specimens at the end of the specific descriptions, the numbers of the obverse and reverse of the same specimen are always connected by "and" without any intervening comma, and this typographical method is employed only in expressing this relation.

My warm thanks are due to Mr. Samuel Henshaw, of Cambridge, for liberal aid with his collection and by his personal knowledge of living forms, both of which have been of the greatest service to me.

[1] Proc. Bost. Soc. Nat. Hist. Vol. XXIV, pp. 564–565.

DESCRIPTIONS OF SPECIES.

Family RHYNCHITIDÆ.

There is no family of American Rhynchophora paleontologically more interesting than the Rhynchitidæ. In point of numbers the species of this group form 10⅓ per cent of the fossil Rhynchophora of North America, while the recent species comprise less than 2½ per cent of the existing fauna. They were also vastly more numerous, both absolutely and relatively, than in Europe, where they compose only about 3·3 per cent of the Tertiary Rhynchophora.

In keeping with this fact of their numerical importance is that of their variety of type. Our existing native species have been grouped in two subfamilies, one composed of three genera, the other of one. All these genera, excepting Pterocolus, the type of the Pterocolinæ, are recognized among our fossils, but they include a mere fraction of the fossils, which embrace, besides a new generic form of Rhynchitinæ, an entirely new subfamily of Rhynchitidæ with two tribes, seven genera, and thirteen species, about equally divided between the two tribes. The total number of fossil species in America is therefore fully two-thirds that of the existing forms, a proportion which altogether surpasses that found in any other family of insects. Nor is there any other family of fossil insects where it has been found necessary to establish a distinct subfamily group for an entire series of new forms. The abundance and variety of Rhynchitidæ may therefore be looked upon as the most striking feature in the Tertiary Rhynchophorous fauna of North America. Of the twenty species found in our Tertiaries, three quarters are found exclusively at Florissant.

Subfamily RHYNCHITINÆ.

Each of the three genera of Rhynchitinæ now found in North America appears to be represented in our Tertiaries, two of them by a single species each at Florissant, Eugnamptus by two species at Green river; and besides

these, an extinct genus, Masteutes, has two representatives at Florissant. The actual number of species is therefore a little greater than in the European Tertiaries where four species have been referred to Rhynchites (some of which, as will be pointed out later, will probably be found to belong rather to the Isotheinæ) and one to an extinct type, Antliarhinites.

MASTEUTES (*μαστευτής*), gen. nov.

This genus is founded principally upon the first of the two species here described, the other being insufficiently preserved to be sure of its position. The head is here of small size, conical, with circular or transverse eyes, the antennæ attached to the middle of the rostrum, about as long as the prothorax, and consisting of similar, equal, slender joints perhaps twice as long as broad, excepting the last three, which form an elongate oval club fully twice as broad as the preceding and itself more than twice as long as broad. The prothorax is large, tumid, well rounded, and scarcely narrower than the base of the elytra. These have longitudinal markings and apparently cover the pygidium.

Two species occur, both at Florissant.

Table of the species of Masteutes.

Rostrum much shorter than the prothorax ..... *rupis.*
Rostrum as long as the prothorax ..... *saxifer.*

MASTEUTES RUPIS.

Pl. III, Fig. 29.

The dorsal view is seen in the only specimen we have. The head and rostrum, the latter hardly longer than the head, are very delicately granulate. The prothorax is coarsely and densely granulate, as are also the fore femora; the prothorax is tumid, largest in the middle and with convex sides, the base a little narrower than the elytra. The position of the fore coxæ can be seen through the body, showing them to be separated by about one-third or one-fourth of the diameter of one of the coxal cavities. Elytra with nine visible series of sharp granulate carinæ, the granulations indistinct, but of the same size as those on the prothorax, though elongate; there are also marks of the interspaces having been clothed sparsely with short hairs.

Length of body, excluding rostrum, 4·75 mm; of rostrum as seen from above, 0·75mm; breadth of thorax, 1·9mm; next base of elytra, 2·5mm.

Florissant, Colorado. One specimen, No. 4433.

Masteutes saxifer.

Pl. viii, Fig. 4.

This species is placed here with hesitancy on account of the great length of the snout, but its general resemblance to the other species seems otherwise considerable. The head is very delicately and faintly granulate, as is also the rostrum, which is very gently arcuate, and slightly longer than the prothorax. The head, however, shows somewhat of a transverse arrangement of the granulations, giving a subcorrugate appearance. The prothorax has a similarly delicate, circular, but more distinct and densely crowded granulation. The sculpture of the elytra is vaguely preserved, but appears to be much as in the preceding species.

Length of body, excluding rostrum, 6mm; height, 2mm; length of rostrum, 2·5mm.

Florissant, Colorado. One specimen, No. 13641.

AULETES Schönherr.

This genus, of which five species are recognized in the United States, is otherwise known principally from southern Europe and the Mediterranean district, but a couple are found in Tasmania. They are insects of small size, closely allied to Rhynchites. They have not before been recognized in a fossil state, and but a single specimen has been found at Florissant, Colorado.

Auletes wymani.

Pl. iv, Fig. 4.

A species agreeing very nearly with our *A. ater* Le C., except in the apparently stouter thorax, striate elytra, and slenderer antennal joints. Head transversely striate and faintly punctured, with moderately small circular eyes; beak considerably shorter than the head and prothorax,

almost straight, stout, striate throughout; antennæ inserted at the middle of the beak, which they nearly equal in length, the club composed of three joints, fusiform-ovate, three times as long as broad and more than twice as broad as the joints of the stalk, which are elongate and hardly enlarged apically. Prothorax a little longer than the height of the head, scarcely rounded above longitudinally, coarsely and sparsely punctured. Elytra evidently broader than the thorax, but not greatly, very convex, deeply and coarsely striate.

Length, excluding beak, 3·35^{mm}; beak, 1·1^{mm}; antennæ, 0·9^{mm}.

Florissant, Colorado. One specimen, No. 12051.

Named in memory of my former instructor and respected friend, the distinguished anatomist and paleontologist, Jeffries Wyman.

EUGNAMPTUS Schönherr.

Excepting a single Indian species of peculiar appearance, all the members of this slender type of Rhynchitidæ come from North America, where we have 5 species, mostly occurring in the southern and western states. They have been found fossil only in this country, at Green River, Wyoming, where we have two species (neither of them referred here with any great confidence).

Table of the species of Eugnamptus.

Elytra without punctures in the striæ	*grandævus.*
Elytra with punctures in the striæ	*decemsatus.*

EUGNAMPTUS GRANDÆVUS.

Pl. IV, Fig. 9.

Sitones grandævus Scudd., Bull. U. S. Geol. Geog. Surv. Terr., II, 83–84 (1876).
Eugnamptus grandævus Scudd., Tert. Ins. N. A., 481–482, Pl. viii, Fig. 20 (1890).

Although no additional specimens of this species have been found since those described in my Tertiary Insects, the original description and figure were of so inferior a specimen that I have here added a figure of one of the two additional specimens described subsequently.

Green River, Wyoming, F. C. A. Richardson, L. A. Lee, A. S. Packard.

EUGNAMPTUS DECEMSATUS.

Eugnamptus decemsatus Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., IV, 764–765 (1878); Tert. Ins. N. A., 482, Pl. VIII, Fig. 12 (1890).

The single specimen from which the species was described is still the only one known.

Green river, Wyoming. S. H. Scudder.

RHYNCHITES Herbst.

A numerous group of nearly cosmopolitan distribution, though much richer in the northern than in the southern hemisphere. We have more than a dozen species in the United States, occurring mostly in the West, but it is far more abundant in the Old World. Four fossil species have been described from the European Tertiaries, two each from Rott and Oeningen, and a single species is described below from Florissant. The last does not agree well with any of the European fossils, but is perhaps nearest to *R. silenus* Heer, from Oeningen, which is a much slenderer insect, and the only one which approaches ours in the length of the snout. As will be seen further on, it is quite probable that some of the European forms referred to Rhynchites will have to be placed in the subfamily Isotheinæ. According to Lacordaire, the beetles of this genus frequent by preference flowers and the leaves of trees.

RHYNCHITES SUBTERRANEUS.

Pl. IV, Fig. 12.

The head is smooth, except for a slight transverse wrinkling, and, with the beak, which is very long, straight, and moderately stout, as long as the elytra. The eyes are rather small, circular, situated just next the base of the beak. The antennæ are inserted just before the middle of the beak and are about three-fourths its length. Their structure is exceedingly similar to that of our living *R. bicolor* Fabr., the club appearing as if made up of four joints, of which the last three are two or three times broader than those of the stalk and perhaps half as broad again as long, with rounded sides, while the basal joint of the club is cuneiform, truncate at

each end, as broad as long, and preceded by long and slender joints, that just preceding the cuneiform joint a little enlarged at the apex. Thorax poorly preserved, but apparently a little granulated. Elytra too poorly preserved for definite description, not very strongly arched. Hind tibiæ scarcely stouter than the antennal club. Abdominal joints very sparsely granulate.

Length, exclusive of rostrum, 5·2^{mm}; of rostrum, 2·85^{mm}: of antennæ, 2·1^{mm}.

Florissant, Colorado, one specimen, No. 13682.

The species does not appear to agree well with any of the described fossil species of Rhynchites most of which, indeed, as already stated, must be removed from the genus; and from our modern species it appears to differ in its relatively much broader thorax.

Subfamily ISOTHEINÆ.

The genera belonging here, and especially those of the first tribe, have all the aspect of Calandridæ, with their elongate form, porrect rostrum, and subconical head; but the relatively great head, ungeniculated antennæ, the loose club of the same, the four-jointed tarsi, and the subequal, completely delimited segments of the abdomen prevent the possibility of any such reference.

They are peculiar among Rhynchitidæ for the moderate separation of the fore and middle coxæ and the insertion of the antennæ, which is before the middle of the basal half of the straight and porrect beak. These characters show an approach to the Pterocolinæ rather than to the Rhynchitidæ, but they have narrow metasternal side pieces. It seems fitting, therefore, that they should be separated as a distinct subfamily.

To judge only from the descriptions and figures of the species of fossil Rhynchitidæ already described it is highly probable that several of them also may fall in this same subfamily, for the two species of Rhynchites described from Rott by Heyden, *R. hageni* and *R. orcinus*, have the antennæ attached at the very base of the rostrum, showing, at least, that they can not properly be placed in Rhynchites, and the same is the case with the

remarkable form found at Oeningen, for which Heer has proposed the name Antliarhinus, on account of the rostrum "of a hair-like fineness."

The occurrence of other Rhynchophora, which must plainly belong to the Rhynchitidæ, but which share with Pterocolus some characteristics otherwise peculiar to it, is distinct evidence that Le Conte was correct in separating Pterocolus from the genera with which it had been formerly associated and placing it in the Rhynchitidæ.

There appear to be two groups of genera belonging to this subfamily, which provisionally may be regarded as tribes. They may be separated as follows:

Table of the tribes of Isotheinæ.

Large species normally of an elongated form with straight dorsum, the head generally of considerable length and the rostrum always rigidly straight ..... *Isotheini.*

Small species normally of a plump and compact form, with well-rounded dorsum, the head shorter. the rostrum either straight or gently curved ..... *Toxorhynchini.*

Tribe ISOTHEINI.

The members of this tribe are peculiar for their considerable size, the elongate, more or less parallel-sided form, there being scarcely any if any diminution in breadth forward before the middle of the prothorax; sometimes, however, they are stout, but then do not have so arched a body as in the succeeding tribe; the head is usually of exceptional length, and the rostrum always rigidly straight and porrect, and usually long and slender

Table of the genera of Isotheini.

Body elongate, fully two and a half times longer than broad or high; rostrum directed nearly straight forward; joints of club of antennæ larger at apex than at base.

Ninth and tenth antennal joints only a little larger at apex than at base. Third ventral segment of abdomen as long as the second ..... *Paltorhynchus*

Ninth and tenth antennal joints twice as broad at apex as at base. Third ventral segment of abdomen shorter than the second ..... *Isotheus*

Body stouter, but little more than twice as long as broad or high; rostrum more or less declivent; joints of antennal club not enlarged apically ..... *Trypanorhynchus*

PALTORHYNCHUS (*παλτὸν, ῥύγχος*) gen. nov.

Closely allied to Isothea, described below, differing from it in the general form of the body and the structure of the antennæ. The form is distinctly parallel-sided throughout nearly the whole of its extent, being broadest at the middle of the prothorax. The rostrum is slender and twice as long as the rest of the head, straight and porrect, and yet together with the head not much, if any, over half as long as the rest of the body. Antennæ of the same length as in Isothea, the first and second joints subequal, scarcely if at all stouter, and certainly shorter than joints 3–8, which are subequal, two or three times longer than broad, 9–11 forming an elongate ovate club not very deeply annulate, its basal joints at least only a little broader at apex than at base. Eyes moderately large, lateral, not prominent. Legs rather short and not stout. Third ventral segment of abdomen as long as the second.

Dr. J. L. Le Conte, who, many years ago, cursorily examined one of the specimens of this genus, remarked to me that it was a "very strange" insect.

Three species occur in Colorado, one of them not uncommonly.

Table of the species of Paltorhynchus.

A large species, with coarse sculpture; elytra with a deep, median, longitudinal sulcation ..... *narwhal.*

A species of medium size with delicate sculpture; elytra with no conspicuous sulcation ..... *rectirostris.*

A small species, with subdued sculpture; elytra with a pair of longitudinal sulcations, one median, the other subsutural ..... *bisulcatus.*

PALTORHYNCHUS NARWHAL.

Pl. 1, Figs. 9, 10, 18.

A very striking species, with its auger-like beak, coarse sculpture, and deeply grooved elytra. The head besides being granulate is transversely corrugate. The prothorax, which is fullest in the middle, is coarsely granular, the granules circular, and distant from one another by rather less than their own diameter, the middle of the sides with a rather coarse arcuate

prominent ruga, followed beneath by a corresponding sulcation, adding to its distinctness, fading out before attaining the posterior margin. Elytra with similar, but even larger and sometimes more distant circular granules, showing a tendency, especially on the sutural half, to a longitudinal arrangement; a little within the middle of each elytron and parallel to the suture is a deep, straight sulcation, scarcely fading before reaching either extremity of the elytra, and another, perhaps weaker, originating not very far from the same point and becoming submarginal.

Length of body, including rostrum, 10–11^{mm}; of rostrum, 2·5–2·75^{mm}; breadth of body, 2·6–2·9^{mm}.

Florissant, Colorado. Four specimens, Nos. 463, 12247 and 12248, and from the Princeton collection, Nos. 1.580, 1.847.

Paltorhynchus rectirostris.

Pl. iv, Fig. 8.

A smaller species than the last, with more subdued sculpture, heavier and coarser antennæ, and relatively longer beak. Head transversely and regularly corrugate, with a few independent granulations above. Prothorax not very coarsely, and not prominently granulate, the surface uniform without a lateral ruga. Elytra feebly striate, with scattered dull granulations larger and more distant from each other than those on the prothorax.

Length of body, including rostrum, 7·25^{mm}; of rostrum, 2^{mm}; height of body, 3^{mm}.

Florissant, Colorado. One specimen, No. 7714.

Paltorhynchus ? bisulcatus.

Pl. viii, Fig. 3.

The imperfection of the specimens does not permit certainty in generic location of this species, and it is placed here only because of the general resemblance of the surface sculpture of the elytra, which is somewhat remarkable. One of the specimens shows only the fragment of an elytron, the other the dorsal view of the prothorax and elytra. The prothorax, not perfect, is faintly, distantly, and coarsely punctate, and shows a pair of longitudinal striæ close beside the middle line. The elytra are together about

half as long again as their greatest width, punctate like the prothorax, but the puncta here with a longitudinal arrangement, and besides each elytron has two rows of conspicuous punctate striæ, one near the middle of the elytron fading apically, the other nearer the sutural margin than the median stria, and meeting next the tip of the elytron the apex of a slight submarginal ridge.

Length of elytra, 2·75^{mm}.

Roan mountains, western Colorado, from the most prolific insect bed, just beneath the topmost layers. Two specimens, Nos. 295, 303, U. S. Geological Survey.

ISOTHEA (*εἰσωθέω*), gen. nov.

The head in this genus is of exceptional length, being slightly longer than the rostrum, and with it two-thirds as long as the rest of the body; it tapers regularly, but with full sides, to the rostrum which is stout, fully one-fourth the breadth of the head. Antennæ almost as long as the greatest width of the body, fully a third longer than the beak, joints 1–2 subequal, slightly shorter and a little stouter than those succeeding, 3–5 longest, 6–8 about half as long as 1–2, 9–11 large and broad, forming an open club, of which 9–10 are twice as broad at apex as at base, subtriangular and truncate, the terminal joint obovate. Eyes large, lateral, not very prominent. Legs somewhat shorter than in Rhynchites, but with identical form, including the tarsal joints, unless the penultimate joint is more deeply bilobate. Structure of elytra indeterminable. Third ventral segment of abdomen distinctly shorter than the second.

The form of the body in this genus is somewhat elongate but not parallel-sided, showing a somewhat oval outline and being broadest in the middle of the abdomen.

A single species occurs at Florissant.

ISOTHEA ALLENI.

Pl. IV, Fig. 2; Pl. VIII, Fig. 1.

The specimen, admirably preserved in most of its details, lies upon its back, so that the sculpturing of the elytra can not be determined. The head is transversely and rather delicately striate, the striæ turning some-

what forward at the base of the rostrum. The prothorax is delicately granulose, as are also the hind femora.

Length of body, including rostrum, 7·5^{mm}; of head and rostrum, 3^{mm}; of antennæ, 2·1^{mm}; breadth of abdomen, 2·3^{mm}.

Florissant, Colorado; one specimen, No. 1058.

I name this species for my friend and fellow-student, Mr. J. A. Allen, of the American Museum of Natural History, New York.

TRYPANORHYNCHUS (*τρυ'πανον, ῥυ'γχος*), gen. nov.

The form of the body is here more plump than in the preceding genera, and the rostrum, instead of being thrust straight forward, is directed more or less obliquely downward. The head is large at base, rapidly tapers, with a full outline, and, with the rostrum, is fully two-thirds as long as the elytra; the rostrum is stout, rigidly straight, longer than the head; the eyes are moderately large, more or less oval, almost or quite longitudinal, situated next the base of the rostrum; the antennæ are inserted a little beyond the base of the rostrum, and in the only specimen in which they can be made out the basal joints are destroyed; the antennæ are about as long as the rostrum, the fourth and fifth joints cylindrical, a little enlarged apically, more than twice as long as broad; the sixth to the eighth about two-thirds as long as the preceding and more distinctly enlarged, and also more or less truncate apically; the succeeding joints form a long and slender, oval, loose club twice as broad as the stalk and four or five times as long as broad, the joints subequal. The prothorax is simple, tumid, and, with the elytra, shows a well-arched back. The legs are of moderate length, the fore femora only a little enlarged apically.

Three species occur in the western Tertiaries, all at Florissant.

Table of the species of Trypanorhynchus.

Larger. Rostrum much shorter than head and thorax together, enlarged in its apical half; longer axis of eye set at an acute angle with the rostrum . . . . . *corruptivus.*

Smaller. Rostrum nearly or quite as long as head and thorax together, tapering throughout; longer axis of eye almost identical with that of rostrum . . . . *depratus.*

Smallest. Rostrum of the length of the prothorax only, equal throughout or possibly tapering at base; longer axis of eye inclined slightly from that of rostrum . . *sedatus.*

Trypanorhynchus corruptivus.

Pl. iv, Fig. 7.

The head tapers rapidly from the base and is rather heavily and transversely corrugate, broken into granulations to a slight extent around the eyes, which are very regularly broad-ovate, the longer axis at a slight angle with that of the rostrum; the latter moderately stout, enlarged in the middle of the apical half, a third longer than the head. Thorax heavily granulose, the granules taking on transverse sinuous courses on the sides, so as to appear almost more corrugate than granulate, but completely irregular above. Elytra with series of punctate striæ.

Length over the back from tip of rostrum to tip of elytra, 12^{mm}; height of body, 3·5^{mm}.

Florissant, Colorado. Five specimens, Nos. 8342 and 8617, 11250, 11275, 13636, 13658.

Trypanorhynchus depratus.

Pl. iv, Figs. 5, 10.

Head tapering rather less rapidly than in the other species, but with the same transverse corrugations and with the same beads around the eyes; these are more elongate than in *T. corruptivus*, and their longer axis is almost or quite identical with that of the rostrum; rostrum slender and tapering uniformly throughout, about two-thirds longer than the head. Thorax densely granulate throughout, on the sides as above. Elytra obscure, but apparently as in the other species.

Length over the back from tip of rostrum to tip of elytra, 9^{mm}; height, 2·5^{mm}.

Florissant, Colorado. Three specimens, Nos. 9705, 13596, and, from the Princeton collection, 1.867.

Trypanorhynchus sedatus.

Pl. ii, Fig. 23.

The head is strongly arched and very distantly and finely punctate; eye rather long-oval, the longer axis pointing a little above the rostrum;

this is rather slender, apparently equal or a little stouter at base than in the middle, of the length of the prothorax, and with the slightest possible arcuation. Prothorax densely but not very coarsely punctate (granulate by reverse), with the slightest possible indication of a somewhat irregular transverse disposition. Elytra rather coarsely punctate-striate, the interspaces also punctate, but more finely and less conspicuously.

On account of its small size, the punctate head free from transverse corrugations, and the obscurity attaching to the rostrum by its inflexed position and not perfectly clear preservation, I have had some doubt about placing this insect here, but the position of the rostrum seems to be due to the excessive bending of the head, as shown by the longitudinal wrinkles behind the summit, which appear to belong to the softer membrane naturally concealed, and if this be conceded, there seems to be no valid reason for refusing it a place here.

Length over the body from tip of rostrum to tip of elytra (restoring the head to an assumed natural position), $5{\cdot}2^{mm}$; length of rostrum, 1^{mm}; height of body, $1{\cdot}5^{mm}$.

Florissant, Colorado. One specimen, No. 8515.

Tribe TOXORHYNCHINI.

The members of this tribe have commonly a plump, arched body, rarely elongate, and are usually of small size, though the largest are nearly as large as the smallest of the Isotheini, excepting *Trypanorhynchus sedatus;* the head is usually shorter, the rostrum straight or gently curved, usually of considerable length, and always porrect.

Table of the genera of Toxorhynchini.

Rostrum straight, rod-like ..... *Docirhynchus.*
Rostrum gently curved.
Head excluding rostrum almost as long as the prothorax.
Body elongate, relatively slender, much more than twice as long as high *Teretrum.*
Body compact, rounded, stout, scarcely twice as long as high.. *Toxorhynchus.*
Head excluding rostrum very much shorter than prothorax ..... *Steganus.*

DOCIRHYNCHUS (δοκὶς, ῥύγχος), gen. nov.

A genus of Rhynchitidæ comprising beetles of smaller size and plumper form than the others in the subfamily of Isotheinæ, in which, on account of its general resemblance to them and the character and insertion of the antennæ, it appears to fall. Of the separation of the coxæ nothing can be said. The head is not more than half as long as the prothorax, well rounded from base to beak, the latter long, rigidly straight, equal, and slender, with the head at least as long as the elytra. The eyes are obscurely preserved, but apparently small, circular, and situated next the base of the beak. The antennæ are slightly longer than the prothorax, seated slightly within the middle of the basal half, the first two joints a little stouter than the following, equal, subovate, hardly twice as long as broad, the succeeding up to the club slender, cylindrical, equal or subequal, more than twice as long as broad, and scarcely longer than the basal, the last three twice as broad, scarcely longer than broad, subquadrate, forming a loose subcylindrical club. The prothorax is higher than long, even; the elytra well arched, the sculpture longitudinally disposed; the legs slender and not very long. The metasternum is long, the pygidium apparently exposed.

Two species are known, both coming from Florissant.

Table of the species of Docirhynchus.

Rostrum alone shorter than the elytra ..... *terebrans.*
Rostrum alone as long as the elytra ..... *culex.*

DOCIRHYNCHUS TEREBRANS.

Pl. IV, Fig. 6.

The head is transversely, regularly, and finely corrugate at base, delicately, feebly, and finely granulate in front, the beak with two or three longitudinal somewhat beaded carinæ; the latter is shorter than the elytra, but with the head equals them in length. The prothorax is uniformly, densely, and somewhat finely granulate, as are also the sides of the metasternum, though here they are longitudinally disposed by merging in longi-

tudinal lines. The elytra are feebly carinate, the carinæ granulate, the granulations dull and rather smaller than on the prothorax; a few scattered short hairs can be seen. The abdominal segments are feebly, coarsely, and transversely corrugate, the corrugations irregular and broken.

The specimen figured does not show the antennæ.

Length of body, excluding rostrum, $3{\cdot}5^{mm}$; height, 2^{mm}; length of rostrum, $1{\cdot}6^{mm}$.

Florissant, Colorado. Three specimens, Nos. 498, 6982, 7558.

Docirhynchus culex.

Pl. viii, Fig. 2.

The sculpturing of the surface is somewhat obscurely preserved, but the head can be seen to be transversely corrugate, and the beak, which is excessively long and straight, as long by itself as the elytra, is longitudinally carinate. The prothorax appears to be finely granulate, and the elytra striate, but little can be seen.

Length of body, excluding rostrum, $4{\cdot}2^{mm}$; height, $2{\cdot}2^{mm}$; length of rostrum, 3^{mm}.

Florissant, Colorado. One specimen, No. 8823.

TERETRUM (*τέρετρον*), gen. nov.

Head conical, nearly as long as broad, the eyes rather large, inferior, the facets large and few in number; rostrum gently curved, moderately slender; antennæ imperfectly preserved and in only one species, where the club is twice as broad as the funicle, its joints subquadrate and equal. Thorax higher than long, more or less arched. Elytra with longitudinal sculpture; pygidium apparently exposed. Legs unusually slender, except the apically swollen fore femora.

Two species occur, one each from Wyoming and Colorado.

Table of the species of Teretrum.

Rostrum considerably longer than the prothorax.....*primulum.*
Rostrum scarcely, if at all, longer than the prothorax.....*quiescitum.*

Teretrum primulum.

Pl. iv, Fig. 3.

Head very delicately, finely, regularly, and transversely corrugated or carded with a few granulations anteriorly; rostrum smooth, imperfectly preserved, but evidently very gently curved and nearly as long as the head and prothorax combined. Thorax well arched, with feeble, sparse, but rather coarse granulations. Elytra with feeble distant carinæ not well preserved.

Length, excluding rostrum, 3·75 mm; height, 1·8 mm; length of rostrum, 1·5 mm.

Florissant, Colorado. One specimen, No. 6377.

Teretrum quiescitum.

Pl. viii, Fig. 6.

Head obscure but apparently rather coarsely granulose, the rostrum of the same character, very gently arcuate, of about the length of the prothorax. Prothorax finely and irregularly rugulose, scarcely arched above. Elytra finely striate and serially granulose, the granulations pretty large.

Length, excluding rostrum, 2·7 mm; height, 1·2 mm; length of rostrum, 0·6 mm.

The head is twisted upside down in the specimen drawn.

Green river, Wyoming, from the upper part of the bluffs behind the town. One specimen, No. 740, U. S. Geological Survey.

This insect bears a close general resemblance to the European *Cossonus marionii* Oust. from the Aix Tertiaries.

TOXORHYNCHUS (τόξον, ῥύγχος), gen. nov.

The form is very compact, the dorsum strongly arched. The head is conical, nearly as long as broad, the eye large, circular or nearly circular, situated at the very base of the snout, the latter delicate, scarcely arcuate, at least as long as the head. Antennæ, obscurely preserved in only a single specimen of one of the species, inserted very near but not at the base of the beak, as long as it, slender, the club composed of subquadrate joints not

greatly enlarged. Thorax nearly twice as high as long. Elytra heavily carinate. Legs moderately slender with normally thickened femora.

Two small species occur in the western Tertiaries, both at Florissant. The smaller should be regarded as the type.

Table of the species of Toxorhynchus.

Eye not much, if any, wider than the beak; the latter of ordinary stoutness. . *minusculus.*
Eye three times as wide as the beak; the latter exceedingly delicate. . . . . *oculatus.*

TOXORHYNCHUS MINUSCULUS.

Pl. IV, Fig. 1.

Head smooth but for the transverse striation or carding, which is very regular and delicate; eye circular or transversely oval, surrounded with granulations, which are also seen upon the rostrum. This is very gently arcuate, having a general direction nearly in continuation of the general direction of the upper outline of the head, and is of about the length of the prothorax. Prothorax rather coarsely and rather densely granulose, as is also the whole under surface of the body, though more sparsely, and with perhaps larger granulations. Elytra with about ten very prominent granulate carinæ, the interspaces also irregularly granulose, all the granulations of the same size as those on the prothorax. Femora, and even tibiæ, minutely and faintly transversely corrugate, on the tibiæ showing a tendency to break up into granulations.

Length, excluding rostrum, 2^{mm}; height, $1{\cdot}1^{mm}$; length of rostrum, $0{\cdot}6^{mm}$.

Florissant, Colorado. Seven specimens, Nos. 7344, 8952, 9224, 10024, 10902, 14490, 15256.

TOXORHYNCHUS OCULATUS.

Pl. IV, Fig. 11.

A single specimen, unfortunately with the very delicate rostrum broken. Head very small for this group, apparently smooth, the exposed side almost entirely occupied by the large subcircular eye, the hinder margin of which reaches the prothorax and the facets of which are unusu-

ally large, scarcely less than 0.02^{mm} in diameter; rostrum excessively slender. Prothorax very delicately and uniformly granulate, and also, as far as can be seen, but less delicately, the abdominal segments. Elytra with heavy and coarsely granulate carinæ, the interspaces delicately granulate like the thorax.

Length, excluding rostrum, 3·15^{mm}; height, 2^{mm}.

Florissant, Colorado. One specimen, No. 13600.

STEGANUS (στεγανός[1]), gen. nov.

A very different type from any others in the subfamily, but linked to them by several characteristic features, and especially recalling the larger Isotheini in its elongate form. The head is excessively short in proportion to its height, and appears as if enveloped in the large hood-like prothorax. The eyes are small, transversely oval. The beak is separated from the head by a distinct though fine constriction, is slender, scarcely arcuate, porrect, fully as long as the prothorax. The antennæ are not preserved. The prothorax is tumid, considerably higher than long, roughly sculptured. The elytra are also rather coarsely sculptured, but are scarcely at all arched. The legs, excepting the stout fore femora, are slight and of moderate length. Apparently the pygidium is covered.

A single species occurs, in the Roan mountains of western Colorado.

Steganus barrandei.

Pl. viii, Fig. 5.

The head and rostrum are perfectly smooth, the former at least four times as high as long; the transverse eyes are scarcely longer than the width of the slender rostrum, which is somewhat longer than the prothorax, narrows at the base, and beyond is equal and very slender. Prothorax well arched above, truncate at each extremity, coarsely punctato-rugose. Elytra punctato-rugose, but more densely than the prothorax, and with distinct longitudinal arrangement, the puncta following faintly impressed striæ much narrower than they.

[1] In allusion to the enveloped head.

Length, excluding rostrum, 4·3^{mm}; height, 1·5^{mm}; length of rostrum, 1·7^{mm}.

Roan mountains, western Colorado, in the most prolific beds close to the summit. One specimen, Nos. 1015 and 1016, U. S Geological Survey.

Named in honor of the distinguished Bohemian paleontologist, the late Joachim Barrande.

Family OTIORHYNCHIDÆ.

The Otiorhynchidæ are well represented in the American Tertiaries, the numerical preponderance of the species having then been much more than double what it is now. But the most striking fact is its importance for the Gosiute fauna, where 15 genera and 32 species occur, against 10 genera and 14 species at Florissant. Excepting in the Scolytidæ, which have but 4 species in the western Tertiaries, and are thus relatively insignificant, no other family shows a preponderance of forms in the Gosiute fauna; and as the preponderance is here very marked we may fairly regard the Otiorhynchidæ as thoroughly characteristic of this fauna. It is a further curious fact that the Florissant Otiorhynchidæ are mostly made up of members of different tribes from the others, the Evotini and Promecopini belonging exclusively, or almost exclusively, to the Lacustrine fauna, while the Tanymecini, Cyphini, and Phyllobiini are exclusively, the more numerous Ophryastini and Otiorhynchini almost exclusively, Gosiute; the Brachyderini alone are divided equally between both. No other family of Rhynchophora shows in so striking a manner a division of tribes between the two principal horizons of the western Tertiary insect beds, and it is therefore probable that the fossils of this family may in the future furnish the best indications (as far as Rhynchophora are concerned) of the horizon of future insect localities in the West.

In Europe the number of genera and species is far less than in America, and the tribes Ophryastini, Evotini and Promecopini, having in America fully two-fifths the genera and nearly half the species, do not appear to occur at all, nor do any tribes occur in Europe which are not found in America, excepting the extinct tribe Pristorhynchini, which is represented by a single species. Even in the tribes that are the same the

genera are mostly different; thus the Brachyderini are represented by Liparus, Anisorhynchus, and Brachyderes, five species in all; the Otiorhynchidæ by Otiorhynchus and Laparocerus, a half dozen species, all Pleistocene; the Tanymecini by Thylacites, a single species; the Cyphini by Naupactus and Strophosomus, a couple of species; and the Phyllobiini by Phyllobius and Polydrosus, in amber. We find, therefore, only 11 genera and 17 species in Europe, against 23 genera and 47 species in America. The importance of the Otiorhynchidæ in the American Tertiaries, and particularly in the Gosiute fauna, is therefore apparent.

The following table will give in detail the peculiarities of this distribution, by which it appears that the relative development of the different tribes in the recent American fauna is in this instance more nearly approached by the American than by the European Tertiary fauna.

Table of tribal distribution of recent and fossil Otiorhynchidæ.

Tribes.	Recent North American. (Henshaw's Catalogue.)		Tertiary North American.		Tertiary European.	
	Number of species.	Per centage.	Number of species.	Per centage.	Number of species.	Per centage.
Brachyderini	13	11.3	6	12.8	5	29.4
Ophryastini	40	34.8	13	27.7	0	0.0
Otiorhynchini	27	23.5	9	19.1	6	35.3
Dirotognathini	1	0.9	0	0.0	0	0.0
Tanymecini	7	6.1	1	2.1	1	5.9
Cyphini	13	11.3	3	6.4	2	11.8
Evotini	3	2.6	5	10.6	0	0.0
Phyllobiini	5	4.3	6	12.8	2	11.8
Promecopini	6	5.2	4	8.5	0	0.0
Pristorhynchini	0	0.0	0	0.0	1	5.9
Total	115	100.0	47	100.0	17	100.1

Tribe BRACHYDERINI.

A half dozen fossil species of this tribe have been found in America, three species of Epicærus, typical of the Gosiute fauna, and one species each of Hormorus, Trigonoscuta, and Tenillus, the last an extinct type, all from the Florissant basin, and so far as known peculiar to the Lacustrine fauna. In the European Tertiaries it was one of the most abundant tribes

of Otiorhynchidæ, for Heyden describes a Liparus from Sieblos, and Giebel one from Aix, mentioned and figured first by Curtis. Besides, two species of Anisorhynchus have been described and figured from Kutschlin and Corent by Deichmüller and Oustalet, and two of Brachyderes from Aix by the latter. Weyenbergh also claims that Anisorhynchus occurs at Solenhofen in the Brown Jura.

EPICÆRUS Laporte.

This is an exclusively American type of weevil, far more abundant in tropical and subtropical than in temperate America, but three or four species occur in our southern states, including one as far north as Pennsylvania. Three species, possibly to be referred to two, are found in the western Tertiaries, though none of them are found at Florissant. It seems to be the prevailing type at Green river, White river, and the Roan mountains, and may be regarded as one of the characteristic features of the Gosiute fauna.

Table of the species of Epicœrus.

Larger species, exceeding 5·5^{mm} in length exclusive of rostrum.....*exanimis.*
Smaller species, not exceeding 5^{mm} in length.
Striæ of elytra more narrowly separated; eyes transversely ovate .....*saxatilis.*
Striæ of elytra more widely separated; eyes circular .....*effossus.*

EPICÆRUS EXANIMIS.

Eudiagogus exanimis Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., II, 58 (1876).
Epicœrus exanimis Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., IV, 765 (1878); Tert. Ins. N. A., 479–480, Pl. VII, Fig. 31, Pl. VIII, Figs. 30, 31, 38, 42 (1890).

This is the commonest species in the Green river beds. Twenty-three additional specimens have been found, consisting mostly of elytra only, though half a dozen of them preserve the rest of the body as well, or parts of it. From these it may be stated in addition to the original description that the fourth and fifth abdominal segments together are about equal to either the second or fifth; that the first and second segments are separated by a suture strongly and rather widely arcuate in the middle, and that the intercoxal piece of the metasternum is arcuate in front; the abdomen is broadest at the first segment and narrows rather rapidly behind. The

measurements of the interspaces between the elytral striæ in the original description are twice too large.

Green river, Wyoming, from the bluffs behind the town. Fourteen specimens, Nos. 715, 716, 720, 722, 734, 738, 747, 749 and 986, 987, 988, 990, 994, 995, 997, U. S. Geological Survey. Roan mountains, western Colorado, in the richest shales at the top of the bluffs at the head of East Salt creek. Three specimens, Nos. 262, 1004, 1042, U. S. Geological Survey; and at the same locality, a few feet lower down, four specimens, Nos. 3, 4, 35, 961, U. S. Geological Survey. White river, Colorado, in the lowest shales on the southern side opposite Canyon Butte. One specimen, No. 496, U. S. Geological Survey. White river, Utah, from the very highest shales on the northern side next the Colorado line. One specimen, Nos. 919 and 964, U. S. Geological Survey.

Epicærus saxatilis.

Eudiagogus saxatilis Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., II, 84–85 (1876).
Epicærus saxatilis Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., IV, 765 (1878); Tert. Ins. N. A., 478–479, Pl. VIII, Figs. 33, 34, 36 (1890).

Four additional specimens of this species have been found, one at the same locality (Green river, Wyoming) as the original, No. 30, L. A. Lee; another in the same place but at a different station, namely, the bluffs behind the town, No. 717, U. S. Geological Survey; the others from the summit of the Roan mountains, western Colorado, near but not in the richest insect beds in the bluffs overlooking the head of East Salt creek; two specimens, Nos. 953, 978, U. S. Geological Survey.

The measurements of the interspaces of the elytra in the original description are twice too great, and there are nine and not six striæ.

Epicærus effossus.

Eudiagogus effossus Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., II, 85–86 (1876).
Epicærus effossus Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., IV, 765 (1878); Tert. Ins. N. A., 480–481, Pl. VIII, Figs. 7, 35 (1890).

Additional elytra referred to this species have been found in new localities: Roan mountains, western Colorado, from the richest insect beds

at top of bluffs opposite head of East Salt creek. Three specimens, Nos. 1007 and 1008, 1017 and 1018, 1027 and 1028, U. S. Geological Survey. White river, Utah, from the highest summits of the buttes next the Colorado line on the northern bank. One specimen, No. 962, U. S. Geological Survey.

The measurements of the interspaces between the elytral striæ given in the original description are twice too large.

HORMORUS Horn.

A genus founded on a single species from eastern North America, still the only one known. To it I have referred a single fossil from Florissant.

Hormorus saxorum.

Pl. II, Fig. 4.

Provisionally, until further material is obtained, I place in this genus a species which seems to belong here or in its near neighborhood from the structure and relations of the posterior coxæ, the straight suture between the first and second abdominal segment, the length of the antennal scape, the form of the rostrum, and the general facies; but the length and slenderness of the funicle of the antennæ, and indeed of the scape as well, indicate that it should be placed outside of it but in the near vicinity; the third and fourth abdominal segments also are together somewhat longer than the second. The single specimen is, unfortunately, not very well preserved, but shows the following characteristics: Head smooth, with delicate, transverse, curving rugæ; rostrum (incorrectly rendered on the plate) straight, declivent, nearly as long as the thorax, stout, being fully half as high as long, equal or subequal, finely granulated, the apex rounded; eyes rather small, rounded, not over a third as broad as the rostrum. Antennæ very slender throughout, the scape enlarged apically but not coarsely, attaining the middle of the eye; funicle exceedingly slender and equal, nearly as long as the head and rostrum together, the club lacking. Prothorax subcylindrical, equal, without tuberosities, minutely rugulose. Elytra poorly preserved, but with series of indistinct circular lenticles, probably casts of rather weakly impressed puncta.

Length, 10^{mm}; rostrum beyond eyes, 2^{mm}; elytra, 7^{mm}; height of body, 3·75^{mm}.

Florissant, Colorado. One specimen, No. 8787.

TRIGONOSCUTA Motschulsky.

A genus known by a single species only, from California. The fossil species which I place here can hardly have found its proper home, though it would seem to be not far removed from it. The stoutness of the rostrum and want of obliquity of the antennal scrobes, with its more compact form and the greater transverseness of the thorax, would seem to separate it, while the form of the femora, the relation of the coxæ, the breadth and convexity of the intercoxal process of the hind legs, the form and size of the second abdominal segment, and the course of the suture separating this from the first segment are points of particular resemblance.

TRIGONOSCUTA INVENTA.

Pl. II, Fig. 3.

Body stout, compact, a little more than half as long again as broad. Head small, finely punctate; eyes large, transversely broad-oval; antennal scrobes scarcely oblique; rostrum shorter than the head, rather stout as seen laterally, sparsely and not very finely punctate. Prothorax apparently fully twice as broad as long, densely and rather finely punctate; in front, finely and transversely striate. Elytra coarsely punctato-striate, the interspaces with a single row of finer circular puncta, separated from each other in the same row by half their diameter Anterior coxæ attingent; middle pair separated by a very narrow space, less than one-fourth the diameter of the coxal cavity; hind pair very widely distant, nearly twice the diameter of the coxal cavity. Femora large, long, clavate, punctate. Tibiæ moderately slender, not flexed. First and second abdominal segments long, separated by a sinuous suture; whole under surface densely, uniformly, and rather coarsely punctate.

The specimen shows at the same time dorsal and ventral aspects, but

the thorax is partially and the head completely turned to show a side view.

Length, exclusive of rostrum, 5·25^{mm}; rostrum, 0·5^{mm}; breadth, 3·2^{mm}.

Florissant, Colorado. One specimen, No. 2271.

TENILLUS (τείνω, ἴλλος), gen. nov.

The length of the beak of this insect suggests at first that it belongs to the Curculionidæ, but the completely concealed metasternal epimera, with the stoutness of the rostrum, indicate pretty clearly that it belongs to the Otiorhynchidæ. As the thorax shows no signs of postocular lobes or fimbriæ, and the antennal scrobes are lateral and curve down so as to terminate beneath the eye, it clearly belongs in the Brachyderini, but it can not possibly be referred to any of our living genera. The head is moderately long, but the rostrum, a little arcuate, is nearly twice as long as the head and apparently with a pair of superior longitudinal sulci; the eyes are broadly oval and longitudinal. The thorax is tapering without ocular lobes or fimbriæ. The first and second abdominal segments are subequal and slightly longer than the equal third and fourth, all with distinct and simple sutures, as far as can be seen. Tibiæ a little arcuate, the third tarsal joint apparently not wider than the second. It would seem to be not far removed from Trigonoscuta and Calyptillus.

A single species is known, from Florissant.

TENILLUS FIRMUS.

Pl. VIII, Fig. 8.

Head subconical, punctate, as coarsely but not quite so densely nor nearly so deeply as the prothorax; eyes fully half as long again as high, infringing on the beak, which is stout, considerably arcuate, especially toward the apex, longer than the thorax and nearly twice as long as the head, apparently smooth. Prothorax much higher than long, tapering, very densely, rather coarsely, and deeply punctate. Under surface of thorax similarly but even more densely punctate; of abdomen, indistinctly punctate.

Elytra punctato-striate, the interspaces apparently flat and smooth. Femora moderately stout, apparently delicately punctate.

Length, excluding rostrum, 4mm; rostrum, 0·85mm; height, 2mm.

Florissant, Colorado. One specimen, No. 3023, collection of R. D. Lacoe.

Tribe OPHRYASTINI.

With the exception of a couple of species, referred to Ophryastites as indicative of an alliance to Ophryastes, and which come from Florissant, all the fossil species of this tribe, relatively the most important of the family, are characteristic of the Gosiute fauna. They consist of four species of Ophryastes, two others of Ophryastites, one of Exomias, and four of Phyxelis. None of these genera have been elsewhere recognized in a fossil state.

OPHRYASTES Schönherr.

Excepting a single Siberian species, this is an exclusively American type, much more abundant in north temperate America than further south. The seven species found in the United States are all found in the western half of the continent. Four species occur in the western Tertiaries, none of them at Florissant, so that it would appear to be peculiar to the Gosiute fauna.

Table of the species of Ophryastes.

Elytra not exceeding 7·5mm in length.
- Eye rounded beneath ..... *compactus.*
- Eye pointed beneath ..... *petrarum.*

Elytra exceeding 8mm.
- Elytral punctures large ..... *grandis.*
- Elytral punctures small ..... *sp.*

OPHRYASTES COMPACTUS.

Ophryastes compactus Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., IV, 765–766 (1878); Tert. Ins. N. A., 477–478, Pl. VIII, Fig. 39 (1890).

No additional specimens have been found.

Green River, Wyoming. S. H. Scudder.

Ophryastes petrarum.

Pl. viii, Fig. 10.

I have placed this insect in the same genus as *O. compactus* of the Green river beds, from their close general resemblance, although the totally different form of the eye would seem to forbid it. It is a little larger than that species, and does not so nearly resemble recent species of Ophryastes. The head is short and smooth, the snout much enlarged, almost bullate, with a short basal neck; the antennal scrobes oblique, passing beneath the eye, but straighter than usual in Ophryastes, the eye transverse, oval, with a slight obliquity, rather larger above than below. The prothorax is considerably higher than long, well arched above, the surface uniformly vermiculato-rugose, with no lateral ruga; the rugosities somewhat subdued. Elytra well arched, with no very abrupt apical descent, with close series of large, attingent, circular punctures (or on the reverses elevated lenticles), the series of opposite sides of the elytron showing a tendency to unite toward the apex.

Length, excluding snout, 9·5^{mm}; of snout, beyond eye, 0·1^{mm}; of elytron, 7·3^{mm}; height in middle, 4^{mm}.

Roan mountains, western Colorado, from the most prolific beds at the crest of the bluffs at head of East Salt creek. One specimen, Nos. 338 and 342, U. S. Geological Survey.

Here also belongs an elytron, from the very lowest shales on the White river, western Colorado, opposite Canyon butte. No. 507, U. S. Geological Survey.

Ophryastes grandis.

Pl. viii, Fig. 7.

Only a single elytron has been found, but this agrees so well in form and sculpture with the other fossil species placed here that I include it in the same category, although much large than any of them. The interspaces between the punctured striæ are either naturally very flat or have been abraded; the striæ suddenly depressed, but not very deeply, except by the equally abrupt and somewhat deeper, large, circular puncta, which

are separated from each other in the same series by slightly more than their own diameter, and this is a little greater than that of the stria in which they are placed.

Length of elytron, 10^{mm}; greatest width, 4·5^{mm}.

Roan mountains, at summit of bluffs at head of East Salt creek, western Colorado. One specimen, No. 102, U. S. Geological Survey.

Ophryastes? sp.

A large, stout, short-snouted, but very imperfect specimen seems to be nearly related to this genus. It is too fragmentary and imperfect to be worth figuring, and need only be mentioned as perhaps the largest beetle discovered on the White river. It is fully as large as our largest species of Ophryastes. The rostrum is hardly longer than broad; the thorax tumid and longitudinally coarsely and heavily ridged; the elytra striate, with small, not very deeply impressed punctures; the interspaces elevated, but more or less flattened. The hinder part is broken off, but its full length is estimated to have been about 15·5^{mm}; the fragment is 13·5^{mm} long and 6·5^{mm} high.

The very highest beds on the summit of the buttes on the right bank of the White river, Utah, next the Colorado boundary. No. 920, U. S. Geological Survey.

OPHRYASTITES, gen. nov.

Under this generic name I propose to group such species as are insufficiently represented, by elytra which can not be referred to other known fossil species, but which agree closely, so far as can be told by these elytra, with the same parts in other Ophryastini. They all show a more or less vaulted form, though often obscured by pressure, and nine series of punctured striæ, those of opposite sides of the elytron meeting near the apex, to a greater or less degree, and sometimes accompanied by an impressed line bordering either margin. Four species are found in the western Tertiaries, at Florissant, the Roan mountains, and White river, Colorado.

Table of the species of Ophryastites.

Elytra more than twice as long as broad.
  Elytra hardly more than twice as long as broad.
    Punctures of striæ large and shallow ..... *absconsus.*
    Punctures of striæ small and deep ..... *cinereus.*
  Elytra nearly or quite two and a half times as long as broad ..... *digressus.*
Elytra less than twice as long as broad ..... *dispertitus.*

Ophryastites absconsus.

Pl. ix, Fig. 1.

This species is a little larger than either of the others and of a coarser structure, and apparently was densely scaled; the interspaces between the striæ are heavily and coarsely ridged, and the punctures moderately large and moderately deep, the striæ themselves not deeply or at least not sharply impressed.

Length, 7^{mm}; breadth, 3·25^{mm}.

Florissant, Colorado. Three specimens, Nos. 506, 1099, 11309.

Ophryastites cinereus.

Pl. viii, Fig. 12.

The single imperfect specimen of this species (the base of the elytra is broken) appears to have been densely scaled like the last, but the interspaces are scarcely ridged, being only gently arched, while the striæ are deep, narrow, and sharp, and the punctures still deeper and finely impressed; the proportions are apparently the same as in the preceding species.

Length of fragment, 5^{mm}; probable length of elytron, 6^{mm}; greatest breadth, 2·75^{mm}.

Florissant, Colorado. One specimen, No. 972, U. S. Geological Survey.

Ophryastites digressus.

Pl. ix, Fig. 2.

This species differs from the other two in the much more elongated form of the elytron, and in the more distinct impression, apically, of the

marginal striæ of either side. The interspaces appear to be nearly flat, the striæ fine and slightly impressed, and the punctures distinct, but slight and exceptionally distant.

Length, 6·5^{mm}; breadth, 2·5^{mm}.

Lowest shales, White river, western Colorado. One specimen, No. 487, U. S. Geological Survey.

Ophryastites dispertitus.

Pl. ix, Fig. 3.

A poorly preserved elytron, of very broad form and overlying in part its mate, represents a stouter but otherwise rather smaller species than the others. The elytron is scarcely less than twice as long as broad, tapering from the middle, but only gradually, until near the tip, where it evidently had an abrupt descent, the apex being broadly rounded. There are nine shallow and rather broad striæ, which are filled with rather sharply and somewhat deeply impressed, not very large, circular puncta, separated from one another by about their own diameter.

Length of elytron, 4·5^{mm}; breadth, 2·5^{mm}.

Roan mountains, western Colorado, from the richest beds at the summit of the bluffs at head of East Salt creek. One specimen, No. 135, U. S. Geological Survey.

EXOMIAS Bedel.

This is a European genus, fairly supplied with species, of which a single one is also found in the United States, in New York. To it I refer a single fossil from the Roan mountains of Colorado.

Exomias obdurefactus.

Pl. ix, Fig. 4.

Body subcylindrical; head short; beak half as long as prothorax, or as long as the head, stout, broadly rounded at tip, front margin rather strongly convex; eyes circular, their diameter half the width of the beak, the facets about 0·02^{mm} in diameter. Prothorax higher than long, truncate

at each extremity, hardly arched, the surface bluntly rugose. Elytra from two and one-third to two and one-half times as long as broad, very gently arched, descending not at all rapidly behind, the striæ shallow, marked by not very deep but moderately large circular punctures, their own diameter apart, inducing very slight transverse creases beside them, which are generally inconspicuous.

Length, excluding rostrum, 4^{mm}; head and rostrum, 1·1^{mm}; height of body, 1·4^{mm}.

Roan mountains, western Colorado, from the richest shales at summit next head of East Salt creek. Five specimens, Nos. 309, 1002 and 1003, 1005 and 1006, 1035, and 1056, U. S. Geological Survey; from near the same, one specimen, No. 11, U. S. Geological Survey.

PHYXELIS Schönherr.

Phyxelis is now a monotypic genus, having but a single species, found on the Atlantic slope of the United States. One or more of the four species here referred are found in all the principal Tertiary localities of the West excepting Florissant. The species placed here in all probability belong to two or more different genera, and it is doubtful whether any one of them properly belongs in Phyxelis. They are placed here provisionally until better specimens may show further details of their structure. The last two, at least, seem to belong together.

Table of the species of Phyxelis.

Larger forms, exceeding 3·5^{mm} in length:
- Eye small, transverse ..... *dilapsus.*
- Eye large, subcircular ..... *excissus.*

Smaller forms, less than 3·5^{mm} in length ..... *evigoratus.*

The fourth species, being insufficiently known, is omitted from the table.

PHYXELIS DILAPSUS.

Pl. VIII, Fig. 11.

The single specimen is preserved so as to show a nearly dorsal view. It is a stout, pretty well rounded form. The head is extremely short, hardly

allowing more than the rather small obovate transverse eyes to be seen. The beak is more than two-thirds as long as the prothorax, broad and equal, broadly rounded at the tip, with scarcely any sign of an apical expansion. Thorax twice as broad as long, somewhat tapering, the surface roughened and perhaps punctate. Elytra a little broader than the thorax, each fully twice as long as broad, broadly rounded apically, subequal, the surface very faintly scored with fine striæ and profusely, finely, and faintly punctate.

Length, including rostrum, 4^{mm}; elytra, 2·5^{mm}; breadth, 2^{mm}.

Green river, Wyoming, from the bluffs behind the town. One specimen, No. 984, U. S. Geological Survey.

Phyxelis excissus.

Pl. viii, Fig. 16.

The single specimen is here shown upon a side view. Its form is entirely similar to that of the last species, but the head is not so extremely short. The eye is large and circular; unfortunately the beak, partially seen at first, was broken and lost in attempting to work it out from the matrix; what was seen did not show it to differ from that of the preceding. The thorax is fully half as high again as long, tapering, hardly arched above, the surface rather coarsely and obscurely punctate. Elytra similarly punctate without reference apparently to the similarly coarse and somewhat obscure striæ; they are together evidently broader than the thorax, and each is considerably less than twice as long as broad, rapidly descending, but well rounded posteriorly, moderately arched above. Femora scarcely enlarged, very faintly and finely striate.

Length, excluding rostrum, 3·75^{mm}; elytra, 2·6^{mm}; height, 1·75^{mm}.

Roan mountains, western Colorado, from the richest shales at the summit, opposite the head of East Salt creek. One specimen, No. 1033, U. S. Geological Survey.

Phyxelis evigoratus.

Pl. viii, Figs. 13, 14, 15.

Head very short, nearly concealed from above by the prothorax; eyes rather small, circular; rostrum moderately stout, nearly equal, about three-

fourths as long as the prothorax. The latter viewed from above much broader than long, truncate, and of about equal width at each extremity, the sides full, the surface rather coarsely and very shallowly punctate. Elytra about two and a half times longer than broad, finely, sharply, and delicately, but not deeply, punctato-striate, the interspaces feebly rounded and apparently sparsely pilose. Legs short, the femora rather broad, the tibiæ rather stout and straight. Abdomen rapidly tapering posteriorly, feebly and minutely punctate, the suture between the first and second segments (either of which is as long as the third and fourth together) slightly angulate or curved, the convexity forward.

Length, excluding rostrum, 3·25^{mm}; rostrum, 0·5^{mm}; elytra, 2·25^{mm}; breadth of thorax, 1·2^{mm}.

White river, Utah, next the Colorado line, from the very highest parts of the buttes. Two specimens, Nos. 898, 901, U. S. Geological Survey. Roan mountains, western Colorado, near the richest beds at summit of bluffs at head of East Salt creek. One specimen, No. 960, U. S. Geological Survey.

Phyxelis eradicatus.

Pl. viii, Figs. 17, 18.

This species, which, if the specimens here collected really belong together, varies considerably in size, differs from the preceding, *P. evigoratus*, mainly in the greater slenderness of the elytra and their coarser and sharper markings. In the largest the elytron is about two and a third times longer than broad, with nearly straight sutural margin, very strongly arcuate outer margin, and subacuminate apex. There are ten punctured striæ, the striæ rather shallow and not sharp, and the interspaces smooth and broadly arched, but the puncta are rather coarse, tolerably deep, circular or more or less longitudinal, and heavier on the basal than the apical half of the elytron.

The specimens are fragmentary and will hardly bear further description. In one the abdomen is clearly shown and it resembles that of the preceding species in every particular except that it is more bluntly rounded behind.

Length of elytra, 2·1–4·1^{mm}; width of same, 0·75–1·8^{mm}.

Roan mountains, western Colorado, from the richest beds at summit of bluffs at head of East Salt creek. Two specimens, Nos. 1009 and 1010, 1060 and 1061, U. S. Geological Survey. White river, Utah, next the Colorado line, from the highest point on the butte. One specimen, No. 906, U. S. Geological Survey.

Tribe OTIORHYNCHINI.

Four species of Otiorhynchus, four of Otiorhynchites, and one of Neoptocus have been found in our American Tertiaries, all but one (a species of Otiorhynchites from Florissant) belonging to the Gosiute fauna. None of these genera have ever before been recognized in the earlier Tertiaries. The only members of this tribe recorded from the European Tertiaries are five species from the Pleistocene, all regarded as identical with existing forms, and a single species of Laparocerus from diluvial beds in Madeira, mentioned by Heer.

OTIORHYNCHUS Germar.

This genus, now the most prolific in forms among all the Rhynchophora, numbers its species by the hundreds, almost all of which are gerontogeic, North America having but a scant half dozen, some of which are identical with those of the Old World.

In Europe, the genus has been recognized in a fossil state only in the Pleistocene, Heer and Flach having described three or four species or varieties which are regarded as identical with living species. In America we have referred here four species, mostly known (like the European) from their elytra; two of the species occur at Green river and two at the Roan mountains.

Table of the species of Otiorhynchus.

Elytra exceeding 5^{mm} in length.

Prothorax only a little higher than long; puncta of the elytra longitudinal ..... *perditus.*

Prothorax nearly twice as high as long; puncta of the elytra circular ..... *subteractus.*

Elytra not exceeding 4^{mm} in length.

Striæ between the punctures distinct and sharp ..... *tumbæ.*

Striæ between the punctures indistinct ..... *flaccus.*

Otiorhynchus perditus.

Otiorhynchus perditus Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., II, 84 (1876); IV, 766 (1878); Tert. Ins. N. A., 476–477, Pl. VIII, Fig. 25 (1890).

No additional specimens have been found.

Green river, Wyoming. F. C. A. Richardson, S. H. Scudder.

Otiorhynchus subteractus.

Pl. IX, Fig. 8.

Closely allied to *O. perditus*, from which it differs in its slightly larger size, slightly more curved and stouter rostrum, and somewhat differing sculpture of the elytra. The rostrum is nearly twice as long as high, considerably arcuate, equal, well-rounded at the tip, as much longer than the head as it is shorter than the prothorax, nearly smooth; the eyes are transverse, slightly broader above than below, about half as long as the breadth of the rostrum. The prothorax is nearly twice as high as long, tapering, and a little tumid, the surface minutely subrugulose. The elytra are well arched, twice as long as broad, with series of rather feebly punctate, rather heavy striæ, the puncta shallowly impressed and circular instead of being longitudinal as in *O. perditus;* the interspaces are feebly arched and delicately subrugulose.

Length, 9^{mm}; rostrum beyond eyes, $1{\cdot}7^{mm}$; height of same, $0{\cdot}8^{mm}$; length of elytra, 6^{mm}; height of body, 4^{mm}.

Roan mountains, at summit of bluffs at head of East Salt creek, western Colorado. One specimen, Nos. 54 and 133, U. S. Geological Survey.

Otiorhynchus tumbæ.

Otiorhynchus dubius Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., IV, 766 (1878).
Otiorhynchus tumbæ Scudd., Tert. Ins. N. A., 477, Pl. VIII, Fig. 13 (1890).

The single original specimen is the only one yet known.

Green river, Wyoming, from beneath the Fish cut. S. H. Scudder.

Otiorhynchus flaccus.

Pl. IX, Fig. 5.

A pair of elytra in natural juxtaposition of a blackish brown color They are fully three times as long as broad, and equal throughout nearly

their entire length, the surface microscopically punctate with closely crowded, very shallow punctures running into each other laterally, so as to effect a faint and exceedingly delicate transverse wrinkling; besides which there are longitudinal rows of rather large, deep, circular punctures (bead-like elevations in this cast) removed from each other by considerably more than their own diameter.

Length of elytron, 4^{mm}; breadth, $1{\cdot}2^{mm}$.

Roan mountains, western Colorado, from close to the richest beds at the summit of the cliff at head of East Salt creek. One specimen, No. 1, U. S. Geological Survey

OTIORHYNCHITES.

Fritsch has employed this term for the elytron of a Coleopterous insect from Secondary rocks plainly belonging to the Rhynchophora. It is here used for certain Tertiary elytra, most of them bearing a close resemblance to those of Otiorhynchus, merely to indicate their general affinities. They are much larger than our native species of Otiorhynchus. Four species are described, two from the Roan mountains, Colorado, one of these also from Green river, and one each from Fossil, Wyoming, and Florissant, Colorado.

Table of the species of Otiorhynchites.

Markings of elytra relatively delicate.
- Outer margin of elytra nearly parallel to inner ..... *absentivus.*
- Outer margin strongly convex.
  - Interspaces between the striæ flat ..... *tysoni.*
  - Interspaces between the striæ strongly convex ..... *fossilis.*

Markings of elytra exceedingly heavy ..... *commutatus.*

OTIORHYNCHITES ABSENTIVUS.

Pl. IX, Fig. 13.

Elytra somewhat elongated, subparallel with well rounded apex, with ten rows of moderately deep punctate striæ, subconfluent and evanescent at the tip, the tenth stria entire, the puncta circular, with a slight tendency to become longitudinal, moderately deep, each separated from its

fellows by considerably more than its own diameter; the interspaces flat and densely clothed with rather coarse pile.

Length, 7^{mm}; breadth, 3^{mm}.

Florissant, Colorado. One specimen, No. 969 and 970, U. S. Geological Survey.

Otiorhynchites tysoni.

Pl. ix, Fig. 12.

Elytron of moderate length, the inner margin straight, the outer strongly convex, the apex pointed, scarcely outside the line of the inner margin; ten not very deeply impressed striæ, all but the first, second, ninth, and tenth subconfluent at some distance before the tip, these, and especially the first and second, evanescent beyond the others, leaving a considerable portion of the tip smooth; puncta small, rather deeply impressed, slightly elongated, distant from each other by scarcely more than their own length; interspaces flat, smooth.

Length, 6^{mm}; breadth in advance of middle, 2·75^{mm}.

Roan mountains, western Colorado, from the richest beds at top of bluff at head of East Salt creek. One specimen, No. 199, U. S. Geological Survey. Green River city, Wyoming, bluffs behind town. One specimen, No. 791, U. S. Geological Survey. (This last is placed here with much doubt.)

I have given this species the name of the late Philip T. Tyson, the geologist of Maryland.

Otiorhynchites fossilis.

Pl. viii, Fig. 9.

Elytron of moderate length, the inner margin nearly straight, the outer very strongly convex, the elytron narrowing strongly at base, the apex bluntly pointed; ten deeply impressed, sharp striæ, the second and third strongly arcuate at apex, almost meeting the tenth and inclosing a small open space, where the intermediate striæ converge but do not become even subconfluent, fading apically; puncta strong, those of the first stria linear,

the others subcircular, a little elongate, deeply impressed; interspaces strongly convex, almost ridged, especially on the inner third.

Length, 5·5^{mm}; breadth in middle, 2·5^{mm}.

Fossil, Wyoming. One specimen, No. 564, U. S. Geological Survey.

Otiorhynchites commutatus.

Pl. ix, Fig. 9.

A single fragment of an elytron is provisionally placed here, simply as typical of the family. It differs very much from anything else seen in the extreme heaviness of the markings. The base is broken off. It represents a pretty large beetle of a stout form. The elytron is slightly arcuate, narrows only on the apical third, and is broadly rounded posteriorly with a rectangular apex. There are nine series of very large, rather strongly but not sharply depressed rectangular or slightly longitudinal punctures, giving the appearance of broad, rather deep sulci, bridged by rather narrow, distant, transverse carinæ.

Length of fragment, 4·75^{mm}; probable length of elytron, 5·5^{mm}; breadth, 2·5^{mm}.

Roan mountains, western Colorado, from the richest beds at summit of bluffs overlooking head of East Salt creek. One specimen, No. 189, U. S. Geological Survey.

NEOPTOCUS Horn.

A single Floridian species represents this genus, to which with some doubt I have referred a fossil from the Roan mountains and White river of western Colorado.

Neoptocus? sp.

Pl. ix, Fig. 6.

A couple of specimens showing very short and broad elytra, rapidly descending behind, are referred here provisionally. It is quite possible they do not belong together. One specimen shows also the thorax, which is very short and broad, nearly or quite as broad at base as the elytra, tapering

rapidly and arched, its surface a little rough. The elytra are scarcely longer than the height of the body, acutely striate, with rather distant distinct punctures.

Length of body, 4·6^{mm}; elytra, 3·2^{mm}; height of body, 3^{mm}.

White river, western Colorado, from the very lowest shales. One specimen, No. 544, U. S. Geological Survey. Roan mountains, western Colorado, from near the richest shales at summit of bluff at head of East Salt creek. One specimen, No. 951, U. S. Geological Survey.

Tribe TANYMECINI.

A single species of Tanymecus occurs at Green River, and a species of Thylacites has been described by Deichmüller from Kutschlin, Bohemia.

TANYMECUS Germar.

The Old World possesses the largest number of species of this genus in which Gemminger and Harold in 1871 catalogued fifty-seven species, but besides the two which are found in the eastern half of the United States, only two others are known from the New World, Mexico and Brazil possessing each one species. The only fossil species recognized is one found at Green River, Wyoming.

TANYMECUS SECULORUM.

Tanymecus seculorum Scudd., Tert. Ins. N. A., 475–476, Pl. VIII, Fig. 22 (1890).

No more specimens have been found.

Green River, Wyoming. Dr. A. S. Packard.

Tribe CYPHINI.

Three existing genera of this tribe, each with a single species (Entimus, Syntomostylus, and Artipus), are found in the White river and Roan mountains, but have not been found apart from the Gosiute fauna. In Europe a species of Naupactus is described from Oeningen by Heer, and Smith mentions a species doubtfully referred to Strophosomus as found in the Eocene of Peckham, England.

ENTIMUS Germar.

This is a South American genus, comprising four or five magnificent species, of which the Brazilian diamond beetle is an example. The fossil from White river which I referred here many years ago is too fragmentary to be so placed with any confidence, but, in default of further specimens to revise the reference, I have thought best to leave it here.

ENTIMUS PRIMORDIALIS.

Entimus primordialis Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., II, 84 (1876); in Zittel, Handb. d. Palæont., I, ii, 789, Fig. 1011 (1885); Tert. Ins. N. A., 474–475, Pl. v, Figs. 109, 109a (1890).

This species was based on a single specimen found by Mr. W. Denton on the White river, Colorado, near the Utah boundary. No additional remains have been found.

SYNTOMOSTYLUS (σύντομος, στῦλος) nom. nov.

This name is proposed to replace Brachystylus of Schönherr (1845), since the latter name had been previously employed for a genus of Carabidæ by Chaudoir (1838).

The genus is composed of but a single living species, the *Chlorophanus acutus* of Say, found in the middle Atlantic states and Kentucky. One fossil species is found on the White river and the Roan mountains, western Colorado.

SYNTOMOSTYLUS RUDIS.

Pl. IX, Fig. 2.

Represented only by elytra, which show a slender, strongly convex, laterally arcuate form, agreeing fairly well with our *Lyntomostylus acutus* (Say) with a similar subacuminate tip, but not subsinuous striæ. They are about three times as long as broad, the striæ moderately deep and broad, the interspaces convex, the punctures not very deep, large, and circular, involving more than the striæ, but not crowded.

Length of elytron, 5^{mm}; breadth, 1.7^{mm}.

Roan mountains, western Colorado, from near the richest shales on summit of bluff at head of East Salt creek. One specimen, No. 104, U. S.

Geological Survey. White river, western Colorado, from the lowest shales on the southern side. Two specimens. Nos. 457, 463, U. S. Geological Survey.

ARTIPUS Schönherr.

This is a West Indian genus with three existing species of small size, of which one is found at Key West. A single fossil from the White river is referred here with some hesitation.

ARTIPUS? RECEPTUS.

Pl. IX, Fig. 7.

The species here referred does not seem to belong in this genus, but I can find no other with which it so well agrees. The form is compact, stout, well rounded, and even. The head is short, broad at base, and tapers very rapidly to the very stout snout, which more nearly resembles that of Strophosomus, though the antennal scrobes pass toward the middle of the eye and not beneath it; the head is granular, like the thorax, but the beak smooth; the beak tapers with an arcuate upper surface, and shows no sign of apical enlargement; the eyes are not large, and are circular. The thorax is profusely but rather delicately granulate, and its upper surface forms a uniform arch with the not very convex elytra; it is short, and the sides of the front are roundly and deeply emarginate. Elytra about twice as long as broad, with fine, sharp, deep, delicately punctate striæ; interspaces flat, clothed with short pile.

Length, excluding beak, 3·5^{mm}; of rostrum, 0·75^{mm}; of elytra, 2·5^{mm}; height, 1·75^{mm}.

White river, eastern Utah, from the top of the very highest buttes. One specimen, No. 708, U. S. Geological Survey.

Tribe EVOTINI.

This is the only tribe of Otiorhynchidæ which has been found fossil only at Florissant, and so may be regarded as typical of the Lacustrine fauna. Three genera have been recognized, one with two species being an extinct type called Evopes; the others, with three species between them, being Lachnopus and Omileus, American types.

LACHNOPUS Schönherr.

A characteristic West Indian genus with about forty species. A single one is found in Florida. That two species should occur in the Tertiary beds of Florissant is an indication of the warmer climate of Oligocene times in that region.

The species here referred to Lachnopus are among the largest of our fossil Rhynchophora and much larger than the single species living in the United States, but smaller than many exotic forms. They (or at least the best known species) appear to differ from Lachnopus in some important features, such as the direction of the antennal scrobes and the length of the scape, perhaps also in the form of the thorax; and though the two species here described have somewhat differently formed legs, the larger and least known species agreeing best with living Lachnopi, they yet agree so well in general features that it has seemed best not to separate them.

Table of the species of Lachnopus.

Elytral punctures sharply circular, separated by fully their own diameter; adjoining interspaces of equal elevation. Femora stoutest in apical half..... *recuperatus.*

Elytral punctures more or less, though slightly, transverse, separated by much less than their own length; adjoining interspaces of unequal elevation. Femora stoutest in middle..... *humatus.*

LACHNOPUS RECUPERATUS.

Pl. II, Figs. 8, 12.

Form moderately stout, oval. Head and rostrum considerably longer than the thorax, very finely and densely punctured, the rostrum considerably longer than the head, which is scarcely longer than the diameter of the large round eye. Antennal scrobes running against and not beneath the eye, the scape passing but little the anterior margin of the same; funicle and club together about twice as long as the scape, the club oval. Thorax almost twice as high as long, truncate at base, slightly fuller in the lower part of the sides, the base bisinuate, the surface very compactly and somewhat finely punctate. Elytra oblong-oval, less than two and a half times longer than broad, with rows of moderately large, sharply impressed, circu-

lar punctures, usually separated by more than their own diameter, and situated in barely impressed shallow striæ, the tenth stria complete; interspaces flat or gently convex and similar. Legs with subclavate femora internally emarginate apically, apically expanded and mucronate tibiæ, and short and broad apically expanded tarsal joints. Under surface of the body and coxæ densely punctate. Second segment of the abdomen, incorrectly given on the plate, as long as the two following segments together and separated from the first by an arcuate suture.

Length of whole body, 11·5^{mm}; elytra, 7·5^{mm}.

Florissant, Colorado. Three specimens, Nos. 2450, 9215 and 11252, 12438.

LACHNOPUS HUMATUS.

Pl. II, Fig. 11.

This species is represented only by a couple of elytra, one of them accompanied by a leg. It differs from the preceding in the coarser punctures of the striæ, which are so heavily impressed as to involve slightly the sides of the interspaces and give the punctures somewhat of a transverse appearance; they are also separated by a less distance from each other, and the alternate interspaces are somewhat more elevated than the intermediate ones. The femora show scarcely any sign of any internal apical emargination, are largest in the middle, and not in the apical half; the tibiæ are scarcely expanded apically and of much slenderer form.

Length of elytra, 8·5^{mm}.

Florissant, Colorado. Two specimens, Nos. 420, 3975.

EVOPES (*εὐώπης*), gen. nov.

Rostrum longer and slenderer than the head, which is not prolonged behind the eyes; eye moderately large, circular; antennal scrobes oblique and arcuate, passing beneath the eye; antennæ very long and slender for this tribe, the scape gradually enlarging to the apex so as to be clavate, reaching the posterior margin of the eye; funicle distinctly more than half as long again as the scape, very slender, with obconic joints, of which the first two are longer than the others and subequal, the others subequal among themselves; club subfusiform or elongate oval, apically pointed, fully half

as long as the scape, the three joints subequal and indicated only by the suture. Thorax truncate at both extremities, without ocular lobes or fimbriæ. Elytra apparently wider than the thorax (none of the specimens are preserved with a dorsal view), with rounded humeri. Second segment of the abdomen equal in length to the two following together, separated from the first by a straight suture. Apparently none of the tibiæ are mucronate at tip; tarsi rather slender.

This genus seems to belong to the Evotini. The mesosternal side pieces are diagonally divided and subequal, and the metathoracic episternum is moderately broad; there are clearly no ocular lobes nor fimbriæ on the prothoracic margin behind the eyes; the tenth stria of the elytra is free, and the head is not prolonged behind the eyes. It differs, however, from any of the genera known to me, autopically or by description, in the length and slenderness of the antennæ. It seems to belong nearest to Lachnopus, which is represented in our living fauna by a single species in Florida, but by many others in the West India islands.

Two fossil species are known, both from Florissant.

Table of the species of Evopes.

Rostrum stouter than the fore femora; granulation (or punctuation) of the prothorax subdued ..... *veneratus.*

Rostrum no broader than the fore femora; granulation of the prothorax distinct and sharp ..... *occubatus.*

Evopes veneratus.

Pl. 1, Figs. 15, 21.

Form oblong, rather compact. Head, apparently including rostrum, and prothorax very finely beaded (or punctured), the former more finely than the latter, both very uniformly and not very sharply. Head and rostrum slightly longer than the thorax, the latter much stouter than the fore femora; prothorax higher than long, gently arched above, scarcely broader at base than at apex, truncate at each extremity. Elytra rather elongate, the lateral margin very gently sinuate at the base, with rows of rather sharp, rather deeply punctured striæ (showing on reverses as sharp beaded ridges), the punctures slightly longitudinal and in each row removed from

their neighbors by rather more than their own length. The whole is of a uniform blackish or blackish brown color.

Length, excluding rostrum, 7·7mm; of head and rostrum, 2·3mm; of antennæ, 4·2mm; of elytra, 5·5mm; height of body, 3mm.

Florissant, Colorado. Seven specimens, Nos. 1653, 5939 and 7635, 6543, 8157?, 11270 and 13033, 11798 and 12048, 13015.

Evopes occubatus.

Pl. II, Figs. 7, 15.

Form as in the other species. Head, including rostrum, and prothorax finely, similarly, and uniformly beaded (or punctured), the sculpture distinct and sharp. Head and rostrum considerably longer than the thorax, the latter scarcely or not at all stouter than the fore femora. Prothorax higher than long, scarcely arched above, tapering distinctly forward, truncate at each extremity. Elytra shaped as in *E. veneratus*, the striæ slender and slightly impressed, the punctures delicate, much smaller than in the other species, but deeply impressed and in virtue only of their lesser size separated by wider intervals; elytra clothed with linear series of hairs, apparently arising from the punctures, nearly as long as the interspaces. Color as in the other species.

Length, excluding rostrum, 7mm; of head and rostrum, 2mm; of elytra, 5·5mm.

Florissant, Colorado. Four specimens, Nos. 486, 8970, 11772, and in the Princeton College collection, No. 1.591?.

OMILEUS Horn.

This monotypic genus is known at present only in Texas, and it is interesting therefore to find a fossil form at Florissant.

Omileus evanidus.

Pl. II, Fig. 14.

Head and rostrum longer than the prothorax, the surface smooth or nearly so, but the rostrum longitudinally sulcate and stout, much stouter than the fore femora; scape of antennæ barely reaching the middle of the

eye, the funiculus and club together slightly shorter than the thorax; eye circular (represented too large on the plate). Prothorax much higher than long, truncate at each extremity, with no fimbriæ, the surface punctato-rugose. Elytra not very elongated, well arched posteriorly, with linear series of rather large circular punctures widely separated from each other and represented in the cast by rather pronounced lenticles, separated from each other by considerably more than their own diameter over most of the elytra, but subconfluent, forming ridges (or striæ) toward the apex. The hind femora nearly reach the tip of the abdomen.

Length, including rostrum, 7^{mm}; of head and rostrum, 1·75^{mm}; of elytra, 4·1^{mm}; height of body posteriorly, 2·8^{mm}.

This species, though not very closely resembling our living *O. epicaeroides* Horn, seems to agree with it in all generic features, excepting in the somewhat shorter antennal scape and the completely circular eye; the second abdominal segment appears, also, to be relatively longer, and when more fully known, it may have to be generically distinguished.

Florissant, Colorado. One specimen, No. 6544. It is possible that another but a poorly preserved specimen, No. 5075, may belong here.

Tribe PHYLLOBIINI.

The six fossil species from America referred to this tribe are equally divided between Phyllobius and Scythropus, and being altogether absent at Florissant, may be regarded as typical of the Gosiute fauna. Curiously both genera may be regarded as gerontogeic. The tribe is represented in European Tertiaries by Phyllobius and Polydrosus, said by Burmeister to occur in amber.

PHYLLOBIUS Schönherr.

This is an Old World type, with numerous species largely confined to the northern hemisphere A single European species has been found, perhaps occurring by accident, in Canada, and another is credited to Mexico. Very close to this genus, if not belonging to it, are three fossil species in the Roan mountains, White river, and Green river Tertiaries, but none are found at Florissant. Burmeister says he has seen a species of Phyllobius in amber, but otherwise it has not before been recognized among the fossils.

The species from the Rocky mountain Tertiaries included here are known only by their elytra, and are consequently not placed here with any certainty. They are, however, very similar to, though coarser in their sculpture than, other remains referred to the allied genus Scythropus, the latter of which are regarded as more definitely placed from the testimony of other parts of their structure.

Table of the species of Phyllobius.

Interspaces between elytral striæ flat or broadly rounded.
  Strial punctures of elytra very large and coarse, as wide as or wider than the interspaces ..... *antecessor.*
  Strial punctures of elytra only moderately large, narrower than the interspaces ..... *carcerarius.*
Interspaces between elytral striæ with a median carina ..... *avus.*

PHYLLOBIUS ANTECESSOR.

Pl. IX, Fig. 16.

A single elytron with its reverse is all that is preserved. It is a little less than two and a quarter times as long as broad, gently vaulted, nearly straight, but with a scarcely perceptible arcuation, the humeral angle scarcely rounded, the apex rounded subacuminate. There are ten series of large, circular puncta, as large as or larger than the intervening interspaces, abruptly and rather heavily impressed, those in each row separated from their neighbors by about the same distance as those of neighboring rows, but irregular, and with the intervening space barely channeled. Interspaces flat or broadly arched, smooth.

Length of elytron, 4^{mm}; breadth, 1·8^{mm}.

Roan mountains, western Colorado, from the richest beds at crest of bluff overlooking head of East Salt creek. One specimen, Nos. 264 and 301, U. S. Geological Survey.

PHYLLOBIUS CARCERARIUS.

Pl. IX, Fig. 11.

Only elytra are known. They differ from the preceding species, principally in having the markings less coarse. The breadth is contained a little

more than two and a third times in the length; the form does not differ from that of the preceding species. Nine or more series of circular puncta can be seen, the puncta of moderate size and somewhat impressed, separated from their neighbors in the same row by rather less than their diameter, but from those in the neighboring row by very much more than that. Interspaces smooth and flat, or gently arched.

Length of elytra, 3·1^{mm}; breadth, 1·3^{mm}. None are quite perfect, and the measurements may not represent the dimensions with exactitude.

White river, Colorado, from the lowest shales. One specimen, Nos. 452 and 454, U. S. Geological Survey. White river, Utah, from the very highest shales on the northern buttes next the Colorado line. One specimen, No. 897, U. S. Geological Survey.

Phyllobius avus.

Pl. ix, Fig. 17.

Single elytra are all that are known of this species, though one specimen shows part of the abdomen, but too vaguely to be of any aid. The elytron is about two and two-fifths longer than broad, very gently vaulted, the apex somewhat acuminate. Eight series of puncta can be traced, slightly less distant from one another the farther they are from the straight sutural margin, the puncta very small, sharply but not deeply impressed, circular or with a slight longitudinal tendency. Interspaces flat and smooth, the middle line distinctly elevated as a slight and slender carina.

Length, 3^{mm}; breadth, 1·25^{mm}.

It is possible that the specimens from Green river do not belong here; they are certainly of a broader form than the typical specimen and more obscure.

White river, Utah, from the highest beds on the northern buttes next the Colorado line. One specimen, No. 701, U. S. Geological Survey. Green River, Wyoming, from the buttes behind the town. Two specimens, Nos. 736, 980, U. S. Geological Survey.

SCYTHROPUS Schönherr.

A genus with relatively few species found in the northern hemisphere, and in about equal numbers in the Old and New World, though our species

are almost exclusively confined to California. Three species have been found in the Tertiaries of Green River, White river, and Roan mountains, one referred here with much doubt, but none from Florissant, so that it may be regarded as one of the characteristic features of the Gosiute fauna.

The species placed here are known principally by their elytra only, which agree closely with those of our living forms. The abdomen is preserved in an instance or two, and shows the third and fourth segments not more than together equal to the second, which is separated from the first by an arcuate suture; the hind coxæ are widely separated, and the intercoxal process is broadly arcuate in front; the abdomen is rather narrow, narrowing posteriorly, well rounded apically, and the middle coxæ are narrowly separated.

Table of the species of Scythropus.

Puncta of elytra feebly impressed..... *subterraneus.*
Puncta of elytra deeply impressed, at least in the basal half.
Larger species. Striæ of elytra equally distant throughout..... *somniculosus.*
Smaller species. Striæ of elytra much more widely separated in the middle of the elytra than at the base..... *abacus.*

SCYTHROPUS SUBTERRANEUS.

Pl. IX, Fig. 14.

Single elytra only are known, excepting that a few stones show a pair found together, in a couple of instances spread and accompanied by the abdomen, and in another showing an upper view of head and thorax. The head is short and nearly concealed beneath the thorax; eyes small, oval, transverse (in this respect not agreeing with living species); beak half as long as the prothorax, and somewhat longer than broad, truncate with rounded angles. Prothorax bullate, somewhat broader than long, densely and not very finely punctate, anteriorly constricted. Elytra from two and quarter to two and a third times as long as broad, tapering beyond the middle by the strong curvature of the outer margin, while the sutural margin is straight, the humeral angle well rounded, the apex subacuminate; there are ten rather delicately punctate, sharply impressed striæ, the inter-

spaces smooth and well arched, with a median series of short, distant bristles.

Length of elytra, 1·9–2·6^{mm}; average, 2·3^{mm}; breadth, 0·8–1·1^{mm}.

Green River, Wyoming, from the buttes behind the town. Five specimens, Nos. 724, 744, 746, 981, 993, U. S. Geological Survey. The same from the fish cut on railway. One specimen, No. 41, L. A. Lee. White river, Utah, from the very highest beds on the north side next Colorado boundary. Seven specimens, Nos. 705, 706, 889, 907, 908, 916, 924, U. S. Geological Survey. Roan mountains, western Colorado, from the richest beds at top of bluff overlooking East Salt creek. Three specimens, Nos. 943 and 944, 1045, 1051, U. S. Geological Survey; from near the same, one specimen, No. 22, U. S. Geological Survey.

Scythropus somniculosus.

Pl. ix, Fig. 18.

A single elytron is known. It is a little more than two and a third times longer than broad, slightly the broadest in the middle, tapering only at the apex, which is slightly angulate, the outer margin only very slightly arcuate. There are eight delicately impressed punctate striæ, the puncta distinct and deeply impressed in the basal half, shallow apically, rather small and circular throughout, besides two approximate impunctate marginal striæ.

Length of elytron, 4^{mm}; breadth, 1·75^{mm}.

Roan mountains, western Colorado, from the richest beds at summit of the bluffs overhanging the head of East Salt creek. One specimen, No. 176, U. S. Geological Survey.

Scythropus? abacus.

Pl. ix, Fig. 15.

This species is here referred very doubtfully. It is somewhat distorted in preservation and somewhat imperfect, but seems to agree better with this genus than with any other I have seen. The anterior part of the head with the beak is uncertain, there appearing to have been here some crushing and

mingling of parts. The head, however, is rather large and the eyes rather large, circular, prominent, and well separated from the thorax; head, beak, and thorax all equally granulated. Thorax cylindrical, as long as high. Elytra from two to three times as long as broad, very regularly and uniformly arched with distinct and sharp striæ which are plainly nearer each other at the base than in the middle of the elytra, with small, distinct, and deep circular or slightly elongated punctures separated by about their own diameter, looking on the reverse like beads on the wires of an abacus.

Length of head and thorax, 1·5^{mm}; of elytra, 2^{mm}; height of body in middle of elytra, 1^{mm}.

White river, western Colorado, from the upper half of Canyon butte. One specimen, No. 586, U. S. Geological Survey.

Tribe PROMECOPINI.

Excepting a Eudiagogus which occurs in the Gosiute fauna, all the other members of this tribe in the American Tertiaries are confined to Florissant; they are but three in number, but they belong to two distinct genera, both of which are extinct.

I have placed in this tribe several species which seem nearly allied and which from the visible structure of the mesothoracic epimera of some of them appear to fall in the second division of the family. The eyes being transverse and the ocular lobes very large indicate that they fall in the present tribe, a strictly American group, all the living members of which, according to Lacordaire, are of small size, and as far as their general appearance goes, very homogeneous. Some of the forms placed here are, however, far more robust than the living types and of considerably larger size than the largest of them.

Table of the genera of Promecopini.

Body stout, not more than twice as long as broad.
- Rostrum relatively slender, eyes as broad as rostrum; second abdominal segment longer than the two following ..... *Eudomus.*
- Rostrum relatively broad; eyes narrower than rostrum; second abdominal segment not longer than the two following ..... *Eucryptus.*

Body slender, much more than twice as long as broad ..... *Eudiagogus.*

EUDOMUS (εὔδομος), gen. nov.

Body stout, less than twice as long as broad. Rostrum as long as the head, pretty stout, equal, the tip broadly rounded. Eyes strongly transverse, oval, subacuminate, very large, as long as the lateral breadth of the rostrum. Scrobes strongly arcuate, passing beneath the eyes. Antennæ short, club not at all stout, long-oval, the apical as large as the two preceding joints. Thorax broader and higher than long, with prominent subangulate ocular lobes. Elytra much broader than the thorax at base, with rounded humeri and parallel sides. Second abdominal segment longer than the two following, its anterior suture strongly arcuate; intercoxal process broad, tapering, truncate at tip. Metasternal side piece moderately wide, expanded anteriorly by a narrow triangular side process directed inwardly; mesosternal side pieces subequal, the episternum separated from the epimeron by a sinuous suture so directed that the lateral outer margin of the epimeron is considerably longer than its posterior margin, the opposite of what is found in Eudiagogus.

This genus evidently falls in the Promecopini in the vicinity of Eudiagogus, but differs from it as from all living genera in the much robuster form and larger size, as well as in most of the details of structure given above.

Two species occur, both at Florissant.

Table of the species of Eudomus.

Elytra considerably less than twice as long as the rest of the body.....*robustus.*
Elytra almost twice as long as the rest of the body.....*pinguis.*

EUDOMUS ROBUSTUS.

Pl. III, Figs. 2, 4.

Head, including rostrum, and thorax finely and densely beaded, the markings a little coarser and more pronounced on the thorax than elsewhere. Similar markings occur on the under side of the thorax. The elytra are considerably less than twice as long as the rest of the body, and have punctured, strongly impressed striæ, the punctures being circular or scarcely

longitudinal, twice as deep as the striæ and separated by about their own length in the striæ; besides this, though none of the specimens show it well, the elytra are thinly clothed with short, rather coarse hairs, which, perhaps, have a longitudinal arrangement in the interspaces, one row, especially, in the middle of the same.

Length, excluding rostrum, 9mm; rostrum, 1·25mm.

Florissant, Colorado. Eight specimens, Nos. 1742 and 4675, 2105, 6660, 8263, 8527, 13662, and of the Princeton Collection, Nos. 1.536, 1.550 and 1.620. Nos. 465, 8525, 13036 may also belong here, but are too imperfect to decide.

Eudomus pinguis.

Pl. II, Fig. 9.

The sculpturing of the surface is very much the same as in the preceding species, but with perhaps slightly less difference between that of the head and thorax; there is a slight median carina on the head and thorax. Elytra almost twice as long as the rest of the body, the rostrum and head being a little shorter than in *E. robustus;* the punctures of the elytral striæ are more distinctly elongated than in that species, and so separated by a narrower space; there is a row of median hairs in each interspace, the hairs half as long as the width of the interspace, and there are, besides, some other indifferently scattered hairs.

Length, excluding rostrum, 10·5mm; rostrum, 1·1mm.

Florissant, Colorado. Three specimens, Nos. 4739, 4904, and from the Princeton collection, Nos. 1.531 and 1.548.

EUCRYPTUS (*εὖ, κρυπτός*), gen. nov.

This genus is more nearly allied to the preceding than to any of the living members of the tribe, but has not so markedly robust a form, being in this respect more like Eudiagogus. It has, however, a much stouter rostrum than Eudomus, and a differently formed and smaller eye. The rostrum is as long as the head, and, while no stouter at tip than in Eudomus, enlarges so much basally that here it is exceptionally stout. The eyes are large, transverse, situated high up, but very broadly and regularly obovate,

not so long as even the apical breadth of the rostrum. Scrobes straight or gently arcuate, terminating at the eye, which they strike just above the lower edge. Second abdominal segment not longer than the two following together, at least on the sides.

A single species is known.

Eucryptus sectus.

Pl. III, Fig. 9.

The head and prothorax are densely and rather finely subrugulose, on the head, excepting the rostrum, complicated by fine, close, transverse striations, and on the prothorax faintly showing signs of a longitudinal arrangement, and slightly coarser than on the head; the prothorax also shows, laterally, an arcuate rounded plica. The elytra are each about two and a half times longer than broad with straight linear series of rather large, deeply impressed rounded puncta separated in the same row by rather less than their own diameter; feeble signs in some places show that the interspaces were covered with semi-erect, not very fine hairs.

Length, excluding rostrum, 8·5^{mm}; rostrum, 1·4^{mm}; height of body, 3·75^{mm}.

Florissant, Colorado. Two specimens, Nos. 13632, 13683.

EUDIAGOGUS Schönherr.

This is a tropical American type with a meager number of species of which two occur in our Gulf states. A single species occurs fossil in America, first recognized at Green River, but since found also at White river and the Roan mountains, so that it is probably characteristic of the Gosiute fauna.

Eudiagogus terrosus.

Eudiagogus terrosus Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., IV, 766–767 (1878); Tert. Ins. N. A., 475, Pl. VIII, Fig. 29 (1890).

Three additional specimens which appear to belong here have been obtained from new localities, each specimen consisting of a pair of fairly preserved elytra or a single elytron only.

Roan mountains, western Colorado, from the richest shales at the summit of the bluff at the head of East Salt creek. One specimen, No. 1055, U. S. Geological Survey. From the same locality in slightly lower beds at same station. One specimen, No. 117, U. S. Geological Survey. White river, western Colorado, from the very lowest shales on the south side of the river opposite Canyon butte. One specimen, No. 468, U. S. Geological Survey.

Family CURCULIONIDÆ.

One hundred species, or slightly more than one-half of the Tertiary Rhynchophora of North America, belong to the Curculionidæ, but this preponderance is a little less than in the recent American fauna where the family holds a still more important place; and is the more conspicuous from the fact that its numbers are more than four times those of any other family, while in the Tertiary deposits of the West the Otiorhynchidæ have nearly half as many species as the Curculionidæ. In general, the relative numerical proportion of the subfamilies is similar to what obtains in North America at the present day, or at least the vast proportion of the species belong as now to the Curculioninæ; but the Alophinæ possessed then a far greater percentage (eight times greater) than now, while the Balaninæ were also relatively much more numerous, the percentage of species to the whole number of the family being then nearly five times greater; the loss fell on the Curculioninæ and to a small extent on the Apioninæ, while the Ithycerinæ, now represented by a single species, are not known to have existed.

In Europe, if we regard the species of Hipporhinus as Alophinæ, the relative preponderance of the subfamilies of fossil Curculionidæ approaches nearer and indeed very closely to the condition of things in America to-day, for more than four-fifths of the species are to be referred to the Curculioninæ, though the Alophinæ are still nearly three times in excess of their present American proportion, and the Sitoninæ have an even slightly greater relative preponderance. As in America, all the subfamilies are present excepting the Ithycerinæ. The total number of species, strangely enough, is exactly the same as in America.

The details of this comparison may be seen in the following table:

Table of recent and fossil Curculionidæ, arranged by subfamilies.

Subfamilies.	In numbers.			In percentages.		
	Recent North American.	Tertiary North American.	Tertiary European.	Recent North American.	Tertiary North American.	Tertiary European.
Sitoninæ	8	3	4	1.3	3.0	4.0
Alophinæ	11	14	5	1.7	14.0	5.0
Ithycerinæ	1	0	0	0.1	0.0	0.0
Apioninæ	69	7	6	10.8	7.0	6.0
Curculioninæ	543	70	83	84.8	70.0	83.0
Balaninæ	8	6	2	1.3	6.0	2.0
Total	640	100	100	100.0	100.0	100.0

In the United States, Florissant furnishes the vast proportion of the Tertiary species in all the subfamilies except the Sitoninæ, where two out of the three come from the Gosiute fauna; but it is curious to note one exception in that all the species of the first tribe of Curculioninæ, the Phytonomini, and nearly all those of the second, the Hylobiini, also come from the Gosiute fauna. The other species of the Gosiute fauna are scattered here and there, but, all told, they form only one-fourth of the whole number of species and represent only one-sixth of the genera.

Subfamily SITONINÆ.

As Sitona alone represents this subfamily among the fossils the reader is referred to that genus for general remarks. It may only be mentioned that the group appears to have been represented in Tertiary times in about the same relative numbers as at present.

SITONA Germar.

This genus, rich in species, is confined to the northern hemisphere, and is especially at home in Europe and the neighboring regions. There are a considerable number of species in North America, some of which are also inhabitants of the Old World, and nearly all are confined to the Pacific slope. It is well recognized in the European Tertiaries, distinct forms

having been described from Aix (two species), Oeningen, and Rott. Three species are described below, one from Florissant, Colorado, another from Green River, Wyoming, and the third from both the Roan mountains, Colorado, and Green River, Wyoming, but this last species is referred here with much hesitation, and it may well belong to the Otiorhynchidæ rather than the Curculionidæ. Our other species bear no close resemblance to any of those from the European Tertiaries.

Table of the species of Sitona.

Rostrum shorter than the head.
- Body less than twice as long as high ..... *exitiorum.*
- Body much more than twice as long as high ..... *fodinarum.*

Rostrum half as long again as the head ..... *paginarum.*

Sitona exitiorum.

Pl. iv, Fig. 13.

Body well arched, the dorsal curve pretty uniform, somewhat elongate, well rounded behind. Head full, nearly twice as high as long, finely and transversely rugoso-punctate; eyes small, circular, situated well forward, their lower edge at the middle line of the side; rostrum very stout, shorter than the head, apically broad (slightly distorted in the specimen figured, so as to look pointed). Prothorax nearly half as high again as long, tapering and gently arched above, the surface densely and not coarsely punctate. Elytra with feebly impressed punctate striæ. Legs rather slender and long, especially the tibiæ, which are apically truncate.

Length, excluding rostrum, 4·6 mm; rostrum, 0·7 mm; elytra, 3·1 mm; height of body, 2·6 mm.

Florissant, Colorado. Four specimens, Nos. 466, 3540, 5333, 8204.

Sitona fodinarum.

Pl. x, Fig. 5.

Body well arched but with the middle of the dorsal curve flattened. Head moderately full, twice as high as long, nearly smooth; eyes rather large, circular, situated well forward, central in height; rostrum very stout,

slightly shorter than the head, the upper margin strongly curved, the apex oblique. Prothorax more than half as high again as long, scarcely tapering, but little arched above, the surface bluntly rugoso-punctate, heaviest above. Elytra with not very feebly impressed punctate striæ, the interspaces faintly punctate. Legs apparently rather short, but none of the specimens show them well. Abdomen very finely punctate, the metasternal episterna very broad.

Length, excluding rostrum, 3·85^{mm}; rostrum, 0·7^{mm}; elytra, 2·5^{mm}; height of body, 1·4^{mm}.

Green River, Wyoming. Three specimens, No. 100, Dr. A. S. Packard, from the Fish cut; Nos. 712, 719, U. S. Geological Survey, from the bluffs behind the town.

SITONA PAGINARUM.

Pl. x, Fig. 1.

The head is short, fully twice as high as long, and smooth; eye circular, rather small, removed from the front margin of the prothorax by about half its own diameter; rostrum moderately stout, twice as long as the head, equal, rather bluntly rounded at the apex, and smooth. Thorax rather shorter than high, truncate at each extremity, with no ocular lobes, very gently arched above, the surface very faintly and transversely rugulose. Elytra with feebly impressed punctate striæ, very gently arched except posteriorly, where they are rapidly declivent. Legs not very stout and rather short.

Length, excluding rostrum, 6^{mm}; rostrum, 1^{mm}; elytra, 4^{mm}; height of body, 2^{mm}.

Roan mountains, western Colorado, in and very near the richest beds on the bluffs at the head of East Salt creek. Three specimens, Nos. 182, 958, 1050, U. S. Geological Survey. Green River, Wyoming, from the bluffs behind the town. One specimen, No. 726, U. S. Geological Survey.

Subfamily ALOPHINÆ.

The Alophinæ have a remarkable development among the fossils of the American Tertiaries, and nearly all the forms belong to extinct types. Four genera with fourteen species are recognized and the latter, with but

three exceptions (of two genera), are confined to Florissant; indeed, the prevalence of the subfamily may be considered as one of the characteristic features of the Lacustrine fauna, for not only are the species relatively numerous but they are exceptionally abundant in individuals; of the Curculionidæ which have fallen under review, about two-fifths of the specimens belong here. The relative predominance of the family may be made more conspicuously apparent by a statement of percentages: The proportion of Alophinæ to other Curculionidæ in the existing North American fauna is in genera about 4½ per cent; in species, less than 2 per cent; while in the American Tertiary fauna the relative proportion of genera is 10 per cent and of species not less than 14 per cent. Whether any similar prevalence of the subfamily in European rocks can be discovered is uncertain, but I am inclined to look upon the numerous species of Rhynchophora which have been referred to Hipporhinus as belonging here, in which case this could probably be asserted, at least to a certain extent.

Table of the genera of Alophinæ.

Prothorax largest beyond the base, being more or less tumid.

Largest forms of subfamily. Prothorax relatively small, only half as wide as the elytra at their base; beak dorsally channeled ..... *Centron.*

Smallest forms of subfamily. Prothorax relatively large, not much narrower than the elytra at their base; beak not channeled ..... *Limalophus.*

Prothorax largest at the base, more or less tapering beyond.

Prothorax ample, tapering but little, the head abruptly smaller and short ..... *Geralophus.*

Prothorax and head together subconical, tapering regularly from base of prothorax, the head fully half as long as thorax ..... *Coniatus.*

CENTRON (κέντρων), gen. nov.

I am somewhat at a loss just where to place the insect here described, represented by a couple of specimens which appear to belong together but are preserved in different attitudes, so as to render the determination somewhat insecure. All the characters drawn from the under surface of the body are taken from the specimen not figured. The form and size of the rostrum, the prolongation of the antennal grooves to its tip, the transverse eyes narrowed below, the subglobular form of the heavily pitted

prothorax with its ocular lobes, the contiguity of the front coxæ, and the relative proportions of all but the basal segment of the abdomen, conspire to indicate that it belongs to the Alophinæ. The first segment of the abdomen, however, is exceptionally long, nearly twice as long as the second, and fully as long as the long metasternum, so that it is impossible to place it in any of our living genera of Alophinæ. It is also remarkable for the relatively small size of the prothorax as compared to the abdomen, being scarcely half as wide as the elytra at their base, as in Triglyphus. The side pieces of the metasternum are narrow and those of the mesosternum equal, and divided diagonally by a straight suture.

A single species occurs at Florissant.

Centron moricollis.

Pl. 1, Figs. 7, 8.

This is one of the largest and most striking of the Florissant Rhynchophora. The head is small, well embraced by the prothorax, finely and deeply punctured, the punctures usually separated from one another by their own diameter, being represented too closely crowded on the plate; the rostrum is stout, uniform, and nearly straight, scarcely longer than the short thorax, broadly rounded at the apex, and faintly and finely punctate; antennal groove straight, extending nearly the entire length of the rostrum and striking the middle of the large transverse oval eye, not given in the figure. Prothorax subglobular but much broader than long, studded profusely with exceedingly large, sharp, and very deep punctures, more closely than represented on the plate, nearly 0·2^{mm} in diameter, and giving the thorax the appearance of a mulberry. Elytra together fully twice as wide as the prothorax, each about twice as long as broad, with series of narrow tuberculate and punctate ridges and between them series of distinct and sharp, pretty large circular punctures separated usually by twice their own diameter in each row. Legs moderately long, the femora stout and transversely and finely striato-punctulate.

Length, excluding rostrum, 10^{mm}; rostrum, 2^{mm}; width of thorax, 3·1^{mm}; of elytra, 6·5^{mm}.

Florissant, Colorado. Two specimens, Nos. 5209, 8354 and 9256.

LIMALOPHUS (λιμός, Alophus, nom. gen.), gen. nov.

The specimens representing this genus are not so well preserved as are those of the other genera of Alophinæ, but enough to show that they can hardly be referred to any other genus, living or fossil. The head is small and the eyes transversely oval, with a very stout beak, which is, however, longer than the head, and smooth, with no median groove, though a fine lateral channel can be seen on either side above the scrobes. The antennal club is exceptionally slender. The thorax is broadest beyond the base, being somewhat tumid (more noticeably in one than in the other species), so that the thorax and elytra have independent curves. The third and fourth abdominal segments are together no longer, probably a little shorter, than the second. Both the species are of small size, smaller than usual among the Alophinæ.

The two species come from Green River, and one of them is also found at White river.

Table of the species of Limalophus.

Relatively long; rostrum stout, distinctly less than twice as long as thick; thorax very distinctly tumid, scarcely broader at base than at tip ..... *compositus.*

Relatively short; rostrum less stout, nearly or quite twice as long as thick; thorax but little tumid, distinctly broader at base than at tip ..... *contractus.*

LIMALOPHUS COMPOSITUS.

Pl. x, Fig 2.

Body distinctly more than twice as long as high. Head small; eyes oval, transverse, a little pointed beneath; rostrum nearly half as broad again as the longer axis of the eye, about half as long again as thick, straight and nearly equal. Prothorax nearly half as broad or high again as long, bullate, hardly narrower in front than behind, densely punctate. Elytra one-fourth broader at base than the thorax, punctato-striate, the interspaces without lines of bristles, apparently flat and microscopically punctuate.

Length, excluding rostrum, 3·75^{mm}; rostrum, 0·6^{mm}; elytra, 2·7^{mm}; height of body, 1·75^{mm}; breadth of prothorax, 1·4^{mm}; of elytra, 1·75^{mm}.

Green River, Wyoming, from the bluffs behind the town. Two specimens, Nos. 750 and 754, 977, U. S. Geological Survey. White river, Utah, from the very highest beds on the northern buttes next the Colorado line. One specimen, No. 577, U. S. Geological Survey.

Limalophus contractus.

Pl. x, Fig. 3.

Body barely more than twice as long as high. Head rather small; eyes oval and transverse, hardly pointed beneath; rostrum scarcely broader than the longer axis of the eye, nearly or quite twice as long as broad, straight or faintly arcuate, equal; antennæ with a very slight club. Prothorax nearly half as high again as long, the sides full but tapering, the base being decidedly broader than the apex, the surface densely punctate. Elytra more arched than in the preceding species, at their broadest not more than a fifth broader than the thorax, punctato-striate, the interspaces flat and slightly roughened.

Length, excluding rostrum, 3·25^{mm}; rostrum, 0·55^{mm}; elytra, 2·3^{mm}; height of body, 1·6^{mm}; breadth of prothorax, 1·55^{mm}; of elytra, 1·8^{mm}.

Green River, Wyoming, from the bluffs behind the town. Six specimens, Nos. 711, 714, 732, 735, 742 and 991, 976, U. S. Geological Survey.

GERALOPHUS (γεραιός, Alophus, nom. gen.), gen. nov.

Body compact, broad and stout, suboval, only about half as long again as broad. Head short and abruptly smaller than the thorax. Eyes moderately large, broad oval, and transverse; rostrum of variable length, varying from about half as long as the prothorax to as long as it, moderately stout, slightly arcuate, with a distinct and deep superior median groove; antennæ inserted just beyond the middle of the rostrum, the scape not very long but reaching to the eye or to its posterior margin, the funicle and club together about as long as the beak, the first two joints of the funicle long and subequal, the remaining five short and subequal, subquadrate, the club oval and twice as broad as the funicle. Prothorax about one-fourth narrower than the elytra, the basal half subequal, beyond rapidly narrowing, the whole nearly twice as broad as long, and granulate and punctured, without postocular lobes. Elytra broad, well arched, punctafo-striate, the inter-

spaces with a median row of short stiff bristles. Legs rather short and stout, the tibiæ straight, except the hind pair, which are longer and gently arcuate, the femora a little arcuate, the tarsi more (in the hind legs less) than half as long as the tibiæ, constructed exactly as in Trichalophus, the only living genus of Alophinæ I have been able to examine. The fore coxæ are attingent, the middle coxæ narrowly, the hind coxæ widely separated, the last by nearly the diameter of the coxal cavities. The third and fourth abdominal segments are shorter than the others but not very short, being together a third longer than the second; the first and second segments are separated by a straight suture.

It is noticeable that in the forms with short rostrum, the specimens are preserved about as often on a dorsal as on a lateral view, while in those with long rostrum, it is rare to find one preserved other than lying upon its side; it is not unlikely that in the former the body may be relatively more depressed, in the later more compressed than in the alternate type.

Nine species are known, all from Florissant, and from Florissant only, where it is the most abundant type of Rhynchophora, and may be regarded as typical of these beds.

Table of the species of Geralophus.

Rostrum not more than half as long as prothorax.
- Larger species, more than 5·7^{mm} long.
  - Rostrum relatively stout, less than twice as long as basal breadth . *antiquarius.*
  - Rostrum relatively slender, more than twice as long as basal breadth *occultus.*
- Smaller species, less than 5·2^{mm} long . . . . . *saxuosus.*

Rostrum nearly or quite as long as the prothorax.
- Moderately stout species, with moderately arched elytra.
  - Larger species, more than 5·75^{mm} long.
    - Largest species, exceeding 7·5^{mm} in length . . . . . *fossicius.*
    - Smaller species, not equaling 7^{mm} in length.
      - Rostrum relatively stout and short, distinctly shorter than length of prothorax . . . . . *repositus.*
      - Rostrum relatively slender and long, scarcely or not shorter than prothorax . . . . . *lassatus.*
  - Lesser species, less than 5·75^{mm} long.
    - Rostrum stout, much wider than diameter of eye . . . . . *pumiceus.*
    - Rostrum slender, narrower than diameter of eye . . . . . *retritus.*
- Exceptionally stout species, with very strongly arched elytra . . . . . *discessus.*

Geralophus antiquarius.

Pl. III, Figs. 16, 17.

Of medium size. Head nearly smooth, minutely granulated; rostrum about half as long as the prothorax, stout, especially at base as viewed from above; antennal club about as long as the preceding four joints of the funicle. Prothorax densely and rather finely granulated. Elytra sharply punctato-striate, the punctures longitudinal and not wider than the striæ, the interspaces with a median row of stiff bristles as long as half the width of the interspaces and separated from each other by more than their own length.

Length, excluding rostrum, 6^{mm}; rostrum, 1^{mm}; height of body, 3·4^{mm}; width of thorax, 2·75^{mm}; of elytra, 3·5^{mm}. Some exceed 7^{mm} in length.

Florissant, Colorado. Twenty-four specimens, Nos. 470, 477, 1770, 4918, 5792, 7113, 7648, 7778, 7853, 8047 and 8569, 8566, 8939, 9133, 11251, 11288, 12053, 13039, 15606, 13625, 13639, S. H. Scudder; Nos. 3010, 3018, 3019, 3025, R. D. Lacoe.

Geralophus occultus.

Pl. VIII, Figs. 6, 21, 22, 23, 24.

Eurhinus occultus Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., II, 87 (1876).

Of medium size. Head very finely granulate, including the beak, which is about half as long as the thorax and slender even at base, as viewed from above, being equal throughout and nowhere broader than the longer axis of the eye. Prothorax densely and rather finely granulated. Elytra precisely as in the preceding species, excepting that the interstitial bristles appear to be slightly longer and slightly more approximated.

Length, excluding rostrum, 5·75^{mm}; rostrum, 1^{mm}; height of body, 3^{mm}; width of thorax, 2·5^{mm}; of elytra, 3·25^{mm}. Some exceed 7^{mm} in length.

Florissant, Colorado. Twenty-four specimens, No. 971, U. S. Geological Survey; Nos. 65, 447, 2259, 6477, 7504, 8600, 8876, 8999, 9841, 10246, 10699, 10711, 11299, 12252, 12261, 13598, 13680, 14424, S. H. Scudder; Nos. 1.587, 1.593 and 1.598, 1.617, Princeton College collection; and Nos. 2 and 3, 9, T. L. Mead.

Geralophus saxuosus.

Pl. I, Fig. 5; Pl. III, Figs. 10, 11; Pl. IV, Fig. 14.

Of smaller size. Head very finely granulate, the granulations arranged to a certain extent transversely; rostrum slightly exceeding half the length of the thorax, very slender, and gently arcuate; antennal club about half as long as the funicle. Prothorax densely and rather finely granulated. Elytra as in *G. occultus*, except that the puncta appear to be circular.

Length, excluding rostrum, 5·1 mm; rostrum, 0·75 mm; height of body, 2·75 mm.

Florissant, Colorado. Five specimens, Nos. 3895, 5315, 7710, 10072, 11291 and 14243. No. 7710, an elytron only, is placed here with much doubt.

Geralophus fossicius.

Pl. II, Figs. 16, 17, 24; Pl. III, Figs. 19, 20.

Of largest size. Head, including the beak, minutely granulated, only a little less finely than the thorax; rostrum barely shorter than the prothorax, moderately stout, gently arcuate and equal; eyes long oval, transverse; scape of antennæ just reaching the anterior margin of the eye. Prothorax densely and rather finely and uniformly granulate, laterally carinate. Elytra sharply punctato-striate, the puncta, especially, deeply and abruptly impressed, a little longitudinal and rather distant, the interspaces flat, with a median row of short, acicular bristles, removed by about their own length from one another and about three-quarters as long as the width of the broadest part of the interspaces.

Length, excluding rostrum, 9·5 mm; rostrum, 1·8 mm; height of body, 5·2 mm.

Florissant, Colorado. Twelve specimens, Nos. 2853 and 7686, 3009, 4409, 4427, 6012, 7656, 11781, and 12432, 11787 and 12428, 12030, 13014, 13030, S. H. Scudder; 3017, R. D. Lacoe; and, perhaps, 1.602, Princeton College collection.

Geralophus repositus.

Pl. III, Figs. 26, 28, 30; Pl. x, Fig. 6.

Of medium size. Head and prothorax precisely as in the preceding species, the rostrum very faintly granulate, distinctly shorter than the prothorax, moderately stout, barely arcuate and equal; eyes long oval, transverse; scape of antennæ just reaching the anterior margin of the eye, half as long as the funicle and club together, the club fully as long as the preceding three joints together. Elytra sharply punctato-striate, the puncta very slender and longitudinal, not very remote, the interspaces flat with the usual median row of bristles; these are removed from each other by about their own length, which is slightly less than the width of the interspaces.

Length, excluding rostrum, 6·5^{mm}; rostrum, 1·4^{mm}; height of body 3·5^{mm}.

Florissant, Colorado. Twenty-nine specimens, Nos. 499, 5241, 5497, 7682, 7744, 8104, 8194, 8295, 8636, 9020, 9273, 10086, 10188, 10343, 11245, 11247, 11286, 11293, 11294, 11311, 11315, 12050, 12479, 13603, 13647, 13667, 14162, 14994, S. H. Scudder; No. 3020, R. D. Lacoe.

Geralophus lassatus.

Pl. III, Figs. 7, 8, 14, 18, 25; Pl. x, Fig. 7.

Of medium size. Head and rostrum delicately and closely granulose, the rostrum as long or almost as long as the prothorax, slender, arcuate, and equal; eyes rather broad oval, transverse; scape of antennæ much more than half as long as funicle and club together, reaching the posterior margin of the eye, the club hardly so long as the last three joints of the funicle, the funicle gradually enlarging so that the club is not so abrupt as in the preceding species. Prothorax densely and rather coarsely granulose. Elytra as in *G. repositus*, but with rather coarser puncta.

Length, excluding rostrum, 5·8^{mm}; rostrum, 1·7^{mm}; height of body, 3·25^{mm}.

Florissant, Colorado. Forty-one specimens, Nos. 484, 487, 1042, 2141, 2172, 3225 and 3654, 3227, 3597, 4712, 4752, 4832, 6661, 7723, 7764, 8128, 8584, 8632, 8767, 9009, 9014, 9153, 9182, 9396, 11170, 11267,

11276, 11292, 11300, 11312, 12430, 13602, 13646, 13653, 13659, 13665, 13670, 13677, 14016, S. H. Scudder; Nos. 3015, 3021, R. D. Lacoe; No. 1.518, Princeton College collection.

Geralophus pumiceus.

Pl. III, Fig. 13.

Of small size. Head delicately granulose; eyes rather long oval, transverse; rostrum as long as the prothorax, rather slender, but broader than the longer axis of the eye, very little arcuate, and equal. Prothorax densely and somewhat coarsely granulate, hardly more than half as wide as the base of the elytra. Elytra deeply and sharply striate, the striæ rather feebly punctate, the puncta but little longitudinal; interspaces flat, with linear series of bristles but poorly preserved on all specimens seen.

Length, excluding rostrum, 5·5^{mm}; rostrum, 1·25^{mm}; height of body, 2·75^{mm}.

Florissant, Colorado. Four specimens, Nos. 5404, 7520, 8415, 13021.

Geralophus retritus.

Pl. II, Fig. 5; Pl. III, Fig. 3.

Of small size. Head delicately granulose; eyes rather large, broad oval, transverse; rostrum as long as the prothorax, a little arcuate, slender, being narrower than the longer axis of the eye, equal; scape of antennæ reaching front margin of eye. Prothorax densely, uniformly, and rather coarsely granulose, nearly three-quarters as wide as the elytra at their base. Elytra deeply and sharply punctato-striate, the puncta exceptionally long, not wider than the striæ.

Length, excluding rostrum, 5·3^{mm}; rostrum, 1·4^{mm}; height of body, 2·7^{mm}.

Florissant, Colorado. Six specimens, Nos. 426, 482, 1682, 9194, 11799, 15258.

Geralophus discessus.

Pl. IV, Figs. 15, 16, 17.

Of medium size and exceptional stoutness, so as to have a subglobular form. Head delicately granulose; rostrum rather slender, nearly straight

and equal, longer than the prothorax; scape of antennæ barely reaching the front margin of the eye, hardly more than half as long as the funicle and club together, the joints of the funicle gradually widening so that the club is but little broader than its apical joints, which are broader than long. Prothorax very tumid, densely and coarsely granulose. Elytra very strongly arched and very deeply and very sharply punctato-striate, the puncta circular; there are slight indications of median bristles in the interspaces.

Length, excluding rostrum, 5·6^{mm}; rostrum, 1·5^{mm}; height of body, 4^{mm}.

Florissant, Colorado. One specimen, No. 13612.

CONIATUS Germar.

It is on account of their rounded eyes and the tapering form of the head and prothorax combined that I have placed here two species which seem to be Alophinæ, but which can not be placed with any other of the genera, living or fossil, of this group. In one of the species, though not in the other, the third and fourth segments of the abdomen are relatively longer than in the other fossils of this family, and this is perhaps an indication that when better known these two species will have to be generically separated.

The dozen species belonging to this group are all Mediterranean and most of them European. A single species has been found fossil in the European Tertiaries at Aix and two species in our western beds, one at Florissant, the other in the Gosiute fauna. The European species has nothing specially in common with ours and is half or less than half the size of either of them.

Table of the species of Coniatus.

Rostrum arcuate, tapering, as long as the prothorax.....*evisceratus.*
Rostrum straight, equal, shorter than the prothorax.....*refractus.*

CONIATUS EVISCERATUS.

Pl. III, Figs. 1, 5.

Head conically tapering, about one-third higher than long, the surface posteriorly covered with excessively fine, transverse striæ, anteriorly

with punctures, as on the thorax, but so feeble as to be inconspicuous; eye circular, removed by nearly twice its diameter from the prothorax, of less diameter than the width of the beak; the latter is fully as long as the prothorax, slightly tapering, slightly arcuate, and shows the antennal scrobes to be scarcely oblique, nearly as long as the beak. Prothorax nearly twice as high as long, distinctly and regularly tapering, the surface densely punctate. Elytra sharply and distinctly punctato-striate, the interspaces flat, with no signs of series of bristles. Under surface of thorax heavily and coarsely punctate, but not so densely as the thorax. Under surface of abdomen similarly but still more sparsely and far more feebly punctate; the third and fourth segments are together considerably longer than the second. Legs moderately long and slender.

Length, excluding rostrum, 4^{mm}; rostrum, 0·75^{mm}; elytra, 2·75^{mm}; height of body, 1·85^{mm}.

Florissant, Colorado. Six specimens, Nos. 436, 1236, 1246, 8681, 8810, 8956.

Coniatus refractus.

Pl. x, Fig. 4.

Head very feebly and rather coarsely punctate, but not so coarsely as the prothorax, conically tapering but pretty full, more than half as high again as long, the eyes obscure in the specimens seen, the rostrum stout and much shorter than the prothorax, straight and equal. Prothorax about half as high again as long, tapering considerably and regularly with very little fullness, the surface densely punctate. Elytra heavily punctato-striate, with no serial bristles in the tolerably flat interspaces. Third and fourth abdominal segments together scarcely longer than the second. Legs rather short, the femora considerably thickened.

Length, excluding rostrum, 4^{mm}; rostrum, 0·55^{mm}; elytra, 3^{mm}; height of body, 1·75^{mm}.

White river, Utah, on the river bank about 5 miles from the Colorado boundary. One specimen, Nos. 593 and 601, U. S. Geological Survey.

Roan mountains, western Colorado, from the richest beds at summit of bluffs overlooking head of East Salt creek. One specimen, No. 157, U. S. Geological Survey. Also a third specimen, No. 313, from either the Roan mountains or White river, U. S. Geological Survey.

Subfamily APIONINÆ.

Since both in Europe and in America the only Tertiary forms of this family have been referred to the genus Apion (which contains all but one of the numerous forms now existing in America), the reader is referred to that genus for the general remarks that might be looked for here.

APION Herbst.

A genus enormously rich in species, of small size, distributed all over the world, but absent from Australia, and principally found in the northern hemisphere. About seventy species are found in North America, and, as may be imagined, are widely distributed, the larger number, however, being found in the southern half of the country. Half a dozen fossil species have been found in Europe, principally in Brunstatt, and as many at Florissant alone, while an additional species has been found in the Roan mountain beds. It appears, therefore, to be somewhat characteristic in this country of the Lacustrine fauna.

All the species from Florissant and the Roan mountains referred to this genus appear to fall in the fourth section of Smith, in his last synopsis of the species, and the Florissant species perhaps also in his group Ventricosum; but the first species, at least, is very different from any of our modern forms in the great length of the head, and in all but one of our fossil species the eyes are farther from the margin of the prothorax than is common, and the thorax is always more transverse. The same, too, may be said of the other fossil species hitherto described from Brunstatt, Oeningen, and Rott, by Förster, Heer, and Heyden, six in number, if we separate, as I think we must, the species described from Rott and the one from Brunstatt, doubtfully regarded as the same by Förster.

Table of the species of Apion.

Head longer than thorax; beak very stout, scarcely longer than head ..... *smithii.*
Head shorter than thorax; beak relatively slender, much longer than head.
Beak nearly straight; eye distant from front edge of prothorax.
Thorax coarsely and distantly punctate ..... *pumilum.*
Thorax finely and closely punctate.
Beak longer than the dorsum of the prothorax.
Head relatively short; rostrum more than half as long as elytra; elytra heavily striate ..... *confectum.*
Head relatively long; rostrum less than half as long as elytra; elytra faintly striate ..... *curiosum.*
Beak shorter than the dorsum of the prothorax ..... *exanimale.*
Beak distinctly arcuate.
Beak relatively stout; eye distant from front edge of prothorax .. *evestigatum.*
Beak relatively slender; eye but slightly removed from front edge of prothorax ..... *refrenatum.*

Apion smithii.

Pl. v, Fig. 2.

This, the largest of the Florissant species, differs strikingly from the others and from all modern species known to me in the great length of the head, as well as in the great length and looseness of the antennal club, so that I question whether it should fall here. The general form appears to be as in the group Ventricosum. The head is considerably longer than the thorax and longer than broad, tapers with full sides and rounded front nearly from the base, and is nearly smooth but transversely wrinkled; the rostrum is only a little longer than the head, very stout (for Apion) and equal, scarcely arcuate, well rounded at the tip, with no expansion except at extreme base; the loose club occupies nearly two-fifths of the antennæ, which are longer than the beak by the length of the apical joint. Thorax very short and transverse, broadest at the base but scarcely tapering, a little arched above, the surface very distantly, rather coarsely but not heavily punctate. Elytra not clearly and fully preserved in any specimen, but the striation appears to be feeble, and their punctuation rather coarse. Legs with very stout and large fore femora, but in no way abruptly clavate.

Length, excluding rostrum, 4^{mm}; rostrum, 1^{mm}; height in middle of abdomen, 2^{mm}.

Florissant, Colorado. Four specimens, Nos. 8592, 8702, 9034, 13619.

The species is named for the entomologist, Prof. John B. Smith, of New Jersey, the latest monographer of the genus in America.

Apion pumilum.

Pl. v, Fig. 17.

Viewed from the side, the dorsal aspect is strongly arcuate. The head is nearly as long as the thorax, rounded conical, the surface transversely striate, beneath the eye punctate; eyes circular, not large, lying next the base of the beak, which is porrect and slender, but in the single specimen known is broken a little beyond the base; so far as can be seen it has exactly the aspect of that of *A. curiosum*. Thorax about half as high again as broad, scarcely tapering, very gently arcuate above the surface, with large and distant punctures, very different from those of any of the other species. Elytra apparently somewhat larger at base than the prothorax, very arcuate, fullest in the middle, rapidly descending behind, apparently less than twice as long as broad, with coarse, deep punctate striæ. Legs obscure.

Length, excluding rostrum, 2^{mm}; elytra, 1·6^{mm}; height, 1^{mm}.

This is the smallest of the fossil species.

Florissant, Colorado. Two specimens, No. 7759, S. H. Scudder; No. 2178, U. S. Geological Survey.

Apion confectum.

Pl. v, Fig. 3; Pl. x, Fig. 9.

A pretty stout species, largest in the middle of the elytra, and behind that rapidly narrowing much as in the group Crassinasum of Smith, but not quite so rapidly. Head considerably higher than long, tapering with slightly arcuate sides, transversely faintly striate, the circular eye at the base of the beak and removed by about its own diameter from the front margin of the prothorax; beak slender, nearly half as long as the body, faintly arcuate, especially next the base where it is also a little tapering.

Thorax very much higher than long, tapering somewhat with rounded sides, the surface delicately and closely punctate. Elytra considerably arcuate, especially on posterior half, with large and coarse, heavily punctate striæ. Legs not very long and rather slender, the femora moderately stout. Under surface of the body heavily and not very finely punctate.

Length, excluding rostrum, 3^{mm}; rostrum, 1·3^{mm}; elytra, 2·4^{mm}; height of body, 1·6^{mm}.

This species appears to be somewhat allied to the Brunstatt species which Förster compares with *A. primordiale* Heyden from Rott, but which in the length of the rostrum and somewhat different form of the elytra seems to differ from that species.

Florissant, Colorado. Four specimens, Nos. 3527, 8110, 8900, 9183.

Apion curiosum.

Pl. v, Fig. 5.

A moderately stout form, largest just behind the middle of the elytra, and behind that narrowing rapidly as in the group Ventricosum of Smith, but not so abruptly. Head but little higher than long, tapering with arcuate sides, transversely, faintly, and finely striate, the circular eye situated at the base of the beak and removed by more than its own diameter from the front margin of the prothorax; beak longer than the dorsum of the prothorax, nearly continuing the upper and lower curves of the elongate head, slender, equal, and just perceptibly arcuate; club of antennæ subcylindrical, about three times as long as broad, bluntly rounded at apex, tapering at base, about twice as stout as the funicle. Thorax nearly half as high again as long, scarcely tapering, the dorsum gently arcuate, the surface delicately and closely punctate. Elytra strongly arcuate, especially on the posterior rapidly descending portion, with very faint punctate striæ. Legs slender and moderately long, the fore femora not clavate and but little thickened.

Length, excluding rostrum, 3·25^{mm}; rostrum, 0·9^{mm}; elytra, 2·25^{mm}; height of body, 1·8^{mm}.

This species seems to be somewhat allied to Heer's *A. antiquum* from Oeningen.

Florissant, Colorado. Two specimens, Nos. 7777, 13675.

Apion exanimale.

Pl. v, Fig. 1.

A stout-bodied form, only moderately arcuate behind the head, apparently largest on the basal half of the elytra, somewhat as in the group Segnipes of Smith. Head twice as high as long, tapering very rapidly with arcuate sides, delicately and transversely striate; eye circular, situated slightly behind the base of the beak, and removed from the front margin of the prothorax by its own diameter; front of head descending rapidly above and so forming a decided angle with the beak, which is moderately stout, a little shorter than the dorsum of the prothorax, nearly straight, equal on the basal, tapering slightly on the apical half. Thorax considerably higher than long, hardly tapering, longest above by reason of the arcuation of the body, delicately and closely punctate. Elytra about twice as long as broad, gently arcuate, broadly rounded at tip, with only very slight indications of any striæ. Legs moderately stout and rather long, the femora heavily clavate at tip.

Length, excluding rostrum, 2·5^{mm}; rostrum, 0·7^{mm}; elytra, 1·8^{mm}; height of body, 1·4^{mm}.

Florissant, Colorado. One specimen, No. 11306.

Apion evestigatum.

Pl. x, Fig. 8.

The mode of preservation of the single specimen does not permit a precise description of the form of the body, which, however, appears to be much as in the group Segnipes of Smith. The head is but little higher than long, subconical, with scarcely arcuate sides, smooth or with exceedingly fine faint transverse striation; eyes large, circular, situated as far forward as possible, and separated from the front margin of the prothorax by more than half their own diameter; rostrum moderately stout, as long as head and prothorax together, porrect, gently arcuate, especially on apical half, equal or scarcely enlarging apically. Prothorax a third higher than long, tapering but little, and with hardly any fullness, nearly smooth or very finely and very faintly punctate. Elytra rather less than twice as broad as

long, subacuminate at tip, the striæ sharp, slender, and rather deep, with very minute, very distant, and faintly impressed, and therefore inconspicuous puncta, the interspaces smooth and broadly rounded. Legs rather long, the femora moderately clavate at tip, the tibiæ slender and equal.

Length, excluding rostrum, 3·75^{mm}; rostrum, 1·25^{mm}; elytra, 2·5^{mm}; height of body, 2?^{mm}.

Roan mountains, western Colorado, from the richest beds at summit of bluffs overlooking the head of East Salt creek. One specimen, Nos. 1029 and 1030, U. S. Geological Survey.

Apion refrenatum.

Pl. v, Fig. 7.

A relatively slender form, largest in the middle of the elytra, much as in Smith's fifth section. Head about twice as high as long, tapering very rapidly, with arcuate sides, behind delicately and transversely striate; eye circular, rather large, situated in the middle of the head (a little too far forward in the figure) and but little separated from the front edge of the prothorax, the facets about 0·015^{mm} in diameter; beak nearly as long as the head and prothorax together, slender and equal, gently arcuate throughout. Thorax much higher than long, tapering a little, with slightly rounded sides, the surface rather coarsely punctate. Elytra rather elongate, fully twice as long as broad, not very arcuate except at the extreme posterior portion, with heavy, very faintly and rather coarsely punctate striæ. Legs moderately long and rather slender, the femora not greatly enlarged.

Length, excluding rostrum, 2·5^{mm}; rostrum, 0·65^{mm}; elytra 2^{mm}; height of body, 1·25^{mm}.

There is some resemblance between this species and *A. sulcatum* Förster, from the Oligocene of Brunstatt.

Florissant, Colorado. One specimen, No. 505.

Subfamily CURCULIONINÆ.

The bulk of fossil Curculionidæ naturally fall into this subfamily, by far the most important in the existing fauna. All the larger tribes of the subfamily found to-day in America occur in the Tertiary rocks of our West, and

besides them two of those which are but feebly developed. The European fossils fall into the same tribes as the American, with the exception that two of the American tribes, the Anthonomini and Prionomerini, are absent; but though, singularly enough, the total number of species is exactly the same in the two countries, the distribution among the tribes is very different in the proportional importance of each. The following table, showing the number of species in each tribe and the porportional representation of each in the living American fauna (taken from Henshaw's Catalogue of 1885, without attention to the supplements) in the American Tertiary deposits, and in the European Teritary deposits, will set this forth with greater clearness than any descriptive statement.

Table of tribal distribution of recent and fossil Curculioninæ.

Tribe.	Recent North American. Henshaw's Catalogue.		Tertiary North American.		Tertiary European.	
	Number of species.	Per-centage.	Number of species.	Per-centage.	Number of species.	Per-centage.
Phytonomini	43	8.0	2	2.9	3	4.3
Emphyastini	1	0.2	0	0.0	0	0.0
Hylobiini	13	2.5	7	10.0	10	14.3
Cleonini	45	8.5	5	7.1	22	31.4
Erirhinini	70	13.1	9	12.9	13	18.6
Trachodini	3	0.5	0	0.0	0	0.0
Otidocephalini	9	1.7	0	0.0	0	0.0
Magdalini	17	3.2	1	1.4	2	2.9
Anthonomini	56	10.5	16	22.9	0	0.0
Prionomerini	3	0.5	1	1.4	0	0.0
Tychiini	16	3.0	3	4.3	3	4.3
Cionini	4	0.8	2	2.9	4	5.7
Trypetini	1	0.2	0	0.0	0	0.0
Derelomini	3	0.5	0	0.0	0	0.0
Læmosaccini	1	0.2	0	0.0	0	0.0
Cryptorhynchini	113	21.2	7	10.0	5	7.1
Ceuthorhynchini	41	7.7	6	8.6	6	8.6
Barini	92	17.3	11	15.7	2	2.9
Hormopini	1	0.2	0	0.0	0	0.0
Total	532	99.8	70	100.1	*70	100.1

* In this column the European species referred to Curculionites (fifteen in number) are not taken into account, since the tribes into which they may fall can not be determined.

Here it will readily be seen that the greatest and the only conspicuous differences between the American and European Tertiaries lie, on the one side, in the Cleonini, which contain nearly one-third of the Curculioninæ of the European deposits, and hardly more than 7 per cent of those of the American; and on the other side, in the Anthonomini, which do not exist at all in the European Tertiaries, but form nearly one-fourth of the American Tertiary Curculioninæ, and in the Barini, which comprise nearly 16 per cent of the American Curculioninæ and hardly 3 per cent of the European. No such striking differences appear in comparing the numerical preponderance of the tribes in the recent and fossil Curculioninæ of North America, the greatest disparity appearing in the reverse proportions of the Anthonomini and the Cryptorhynchini, the former being relatively more than twice as important in the Tertiaries as now, the latter more than twice as important now as in the Tertiaries, and in the Hylobiini, where the fossils, though not numerous, formed 10 per cent of the total fauna in Tertiary times, while they hold only one-fourth of that percentage in the existing fauna; a relation again nearly reversed in a group of greater importance in recent times, the Phytonomini, where the percentage to the whole fauna is now nearly three times greater than it was in Tertiary times. In all other cases the difference between recent and Tertiary times, where the tribe was represented at all, is insignificant. In all these cases of distinction between the recent and Tertiary representation, excepting only in the Phytonomini, the disparity would have appeared still greater if the Tertiary Curculioninæ of Europe had been compared with the recent fauna of North America; from which we may conclude that as far as the Curculioninæ are concerned, the Tertiary fauna of America shows closer relationship to the existing American fauna than does the European Tertiary fauna.

Tribe PHYTONOMINI.

Two genera of this group, Phytonomus and Hypera, two species of the former, one of the latter, have been recognized in the European Tertiaries in the Oligocene of Aix, Provence; in the American Tertiaries, two species have been found, one each of Lepyrus and Listronotus, in the Green River deposits.

LEPYRUS Germar.

A boreal genus, found in both worlds, with a very limited number of species. North America possesses three, mostly found north of our borders and in the western half of the continent. It has never been recognized until now among the fossils, and our species from Green River is referred here with much doubt.

LEPYRUS? EVICTUS.

Pl. x, Fig 10.

A single specimen and its reverse show an elytron and a portion of the abdominal segments, the latter in all respects resembling Lepyrus. The elytron has the form and general appearance of that of *L. colon* Gyll.; the striæ, however, are separated by equal intervals, and the interspaces are feebly convex and not flat, but again are similarly subrugulose, and the depth and breadth of the striæ are similar, as also their union posteriorly with one another.

Length of elytron, 6·5^{mm}; breadth 2·25^{mm}.

Green River, Wyoming, from the bluffs behind the town. One specimen, Nos. 733 and 862, U. S. Geological Survey.

LISTRONOTUS Jekel.

A New World genus with tolerably numerous species in North America, mostly found east of the Rocky mountains. A single species is found in the Green River Tertiaries.

LISTRONOTUS MURATUS.

Listronotus muratus Scudd., Tert. Ins. N. A., 474, Pl. VIII, Fig. 23 (1890).

No additional specimens have been found.

Green River, Wyoming. Dr. A. S. Packard.

Tribe HYLOBIINI.

This tribe is fairly well represented in the European Tertiaries, ten species being recorded of three genera—Hylobius, six species from Aix, Rott, Corent, and Dürnten (the latter Pleistocene); Plinthus, two species

from Aix and Corent; and Pissodes, two species from Sieblos and Brunstatt. In the American Tertiaries we have found seven species, mostly confined to the Gosiute fauna: Pachylobius with three species from White river, Green River, and Roan mountains; Hylobius with three species, two from Green River and one from Florissant; and an extinct genus, Laccopygus, with a single species from the Lacustrine fauna at Florissant.

PACHYLOBIUS LeConte.

A North American genus of only one or two species, confined to the Southern states. Three species have been found in our Western Tertiaries, and being apparently peculiar to the Gosiute fauna, may be regarded as one of its typical forms.

The three species from the Rocky mountain Tertiaries here entered under Pachylobius are so placed from the close resemblance of their elytra and from the structure of the body of the first of them, which accords well with that of this genus. Here the head, forced beneath the thorax, can only be seen to have rather large, oval, low-placed eyes, a relatively long, moderately stout beak with scrobes running with little obliquity to the eyes, a somewhat tumid prothorax hardly if at all longer than broad; the middle coxæ are slightly separated, the hind coxæ much further removed from each other, the first abdominal segment sending a triangular process between them; the metasternum has a slight blunt median carina barely flanked by slight carinæ; the suture separating the first and second abdominal segments is considerably arcuate in its middle half; the third and fourth abdominal segments are together considerably longer than the mass of the second, and the fifth is relatively short. Not all of these characters distinguish Pachylobius, so that it is questionable whether the reference can be strictly made.

Table of the species of Pachylobius.

Elytral striæ hardly impressed; ninth stria distinctly punctured ..... *deleticius.*

Elytral striæ deeply impressed; ninth stria impunctured, or nearly so.

Elytra less or not more than two and a half times longer than broad; punctures delicate ..... *compressus.*

Elytra nearly three times longer than broad; punctures coarse, especially at base ..... *deprædatus.*

Pachylobius deleticius.

Pl. x, Fig. 14.

The beak in the only specimen known is broken, but what remains shows that it is at least nearly as long as the pronotum, equal, moderately stout, as broad as the longer axis of the eye, and gently arcuate. Prothorax rather finely punctuate. Elytra about two and a third times longer than broad, subequal, the humeral angle broadly rounded off, the apex rounded subacuminate, with nine series of deeply and sharply impressed but rather small circular punctures, excepting the eighth series barely channeled between the puncta to form a stria, the eighth and ninth series approximate, the puncta of any given row separated by about their own diameter, nearly or quite as deeply impressed next the apex as at the base.

Length of elytron, 3·8 mm; breadth, 1·6 mm.

White river, Utah, from the very highest beds on the northern buttes, next the Colorado line. One specimen, No. 709, U. S. Geological Survey.

Pachylobius compressus.

Pl. x, Fig. 11.

The somewhat abundant remains consist of elytra only, and usually of single elytra. They have the same proportion as in the preceding species, but are one-half larger, distinctly though slightly arcuate, tapering from the middle by the considerable curve of the outer margin, the apex subacuminate, the humeral angle rather prominent but rounded. There are eight series of delicately and rather slightly punctured, slender, and sharply impressed striæ (the punctures and finally the middle striæ fading next the apex), besides a ninth impunctured marginal stria.

Length of elytron, 5·5 – 6·2 mm, average, 5·6 mm; breadth, 2·2 – 2·5 mm, average, 2·4 mm.

Roan mountains, western Colorado, from the richest beds at crest of bluff overlooking the head waters of East Salt creek. Nine specimens, Nos. 138, 166, 197, 268, 280, 948, 1040, 1049, 1052, U. S. Geological Survey. From near the same beds in the same locality. One specimen, No. 63, U. S. Geological Survey. Green River, Wyoming, from the bluffs behind the town. One specimen, No. 998, U. S. Geological Survey.

Pachylobius deprædatus.

Pl. x, Fig. 12.

This species is also represented only by single elytra, which differ from the same parts in the last species only in being larger, slenderer, and of a coarser sculpture. They are almost three times longer than broad, with otherwise of quite the same shape as in *P. compressus*. The striæ are the same as there, fading in the same way, but the puncta are heavier and coarser, and there is a greater difference between the base and apex, since they vanish completely posteriorly.

Length of elytra, 6·6–7·8^{mm}; breadth, 2·3–2·8^{mm}.

Roan mountains, western Colorado, from the richest beds at the crest of the ridge opposite head of East Salt creek. One specimen, No. 1043, U. S. Geological Survey. From near the same beds. Three specimens, Nos. 23, 59, 97, U. S. Geological Survey.

HYLOBIUS Germar.

A genus widely spread though not very numerous in species, found mostly in the boreal parts of the northern hemisphere and living upon coniferous trees. Three species are found in North America and occur only east of the Rocky mountains, but from Canada to the Gulf. Half a dozen species have been described from the European Tertiaries, three from Aix, and one each from Rott, Corent, and Dürnten, the latter in an interglacial deposit where only an elytron was found. In America we find three species, one at Florissant, somewhat resembling the rather imperfect Corent species, but with a fuller thorax, and two from Green River, which do not appear to approach any of the European fossils very closely.

Table of the species of Hylobius.

Eye fully twice as high as long ..... *provectus.*
Eye much less than twice as high as long.
Elytral striæ delicate, very faintly and finely punctate; beak slender .. *packardii.*
Elytral striæ less delicate, distinctly and deeply though finely punctate; beak stout ..... *lacoei.*

Hylobius provectus.

Hylobius provectus Scudd., Bull. U. S. Geol. Geogr. Surv. Terr., II, 86 (1876); IV, 767 (1878); Tert. Ins. N. A., 473–474, Pl. VIII, Figs. 37, 41 (1890).

No additional specimens have been found.

Green River, Wyoming. F. C. A. Richardson, F. C. Bowditch.

Hylobius packardii.

Pl. X, Fig. 13.

A second species of the genus has been found at the same locality as the last. The head is poorly preserved, but the eye is much smaller than in *H. provectus*, though still large and transversely oval; the rostrum is faintly arcuate, slender and nearly equal or slightly enlarged in the apical half, and nearly as long as the head and thorax together, not very broadly rounded at the tip. Thorax very short for an Hylobius, much broader than long, with a median longitudinal impression, and the surface finely, distantly, and rather faintly punctate. Elytra considerably more than twice as long as broad, equal on the basal two-thirds, the striæ fine and slight with small delicate distant circular punctures. Legs rather long, femora rather slender.

Length, excluding rostrum, 6·4^{mm}; rostrum, 1·25^{mm}; elytra, 4·9^{mm}; height of body, 2 75^{mm}.

Green River, Wyoming. One specimen, No. 225, Dr. A. S. Packard.

I name this species for my life-long friend and colleague, Prof. A. S. Packard, of Brown University.

Hylobius lacoei.

Pl. X, Fig. 15.

Head nearly three times as high as long, finely punctate. Eye pretty large, transverse; rostrum stout, nearly as long as the pronotum, its upper edge arcuate, the lower straight, the tip well rounded; antennæ inserted near the middle of the rostrum, the scrobes nearly straight and slightly declivent, running toward the eye, enlarging to the tip, the funicle and scape of about equal length; thorax fully half as high again as long, truncate at each extremity, tapering somewhat with arched dorsum, the surface densely

and rather finely punctate. Elytra with delicately impressed slender striæ, distinctly and deeply punctate, with circular or slightly longitudinal fine puncta, removed from each other by about twice their length. Legs of moderate length, the femora moderately stout and clavate, the tibiæ coarse but elongated, the apex enlarged and hooked.

Length, excluding rostrum, 7·25^{mm}; rostrum, 2^{mm}; elytra, 4·5^{mm}; height of body, 3·5^{mm}.

This beetle has all the aspect of an Hylobius, and agrees with it in most points of structure, but there appear to be no postocular lobes, and the tarsal joints of the fore legs are not at all expanded. It would, therefore, appear probable that it can not strictly belong here.

Florissant, Colorado. One specimen, No. 3013, Mr. R. D. Lacoe.

The species is named for Mr. R. D. Lacoe, of Pittston, Pennsylvania, who has laid the paleontologists of this country under heavy obligations by his substantial and generous aid.

LACCOPYGUS (λακκόπυγος), gen. nov.

We have here a very striking genus of Hylobiini, remarkable particularly for the structure of the funicle of the antennæ, by which it seems nearest allied to, though still somewhat distant from, the Mexican Laccoproctus. The head rapidly narrows in front, and the rostrum, large at base, also narrows a little, but is still rather stout and considerably shorter than the thorax. The antennal scrobes extend almost to the tip, and the slender, apically clavate scape reaches the posterior border of the eye; the funicle is composed of seven similar elongate joints, subequal, excepting the second, which is twice or more than twice as long as any of the others, and, with those on either side of it, fully equals the scape in length; the club is stout oval, and the seventh joint of the funicle in no way involved in it. Eyes rather small and round. Thorax exceptionally short, being fully half as broad again as long, with gently convex sides and truncate extremities. Elytra moderately elongated, considerably broader at base than the prothorax, not abruptly declivent behind. Fore femora exceedingly stout; all the tibiæ slender; first joint of tarsi elongated, more than twice as long as broad, slender at base; second a little more than half as long, oval; third

similar; fourth elongated and slender, enlarging apically as usual. Fore coxæ contiguous. Second abdominal segment as long as the third and fourth together, separated from the first by a straight suture.

The single known species of this genus comes from Florissant, and closely resembles in general appearance the large fossil Cleonus, *C. exterraneus*, from the same beds.

Laccopygus nilesii.

Pl. 1, Figs. 16, 17.

Head smooth; rostrum finely and closely punctate. Prothorax finely and closely rugoso-scabrous, pretty uniform over the whole surface. Striæ of abdomen with pretty sharp and deep, more or less longitudinal and confluent puncta, the interspaces nearly smooth and flat.

Length, 11^{mm}; breadth at base of elytra, 4·25^{mm}; length of elytra, 6·5^{mm}; scape of antennæ, 2^{mm}; funicle, 3^{mm}.

Florissant, Colorado. One specimen, Nos. 6386 and 6387.

Named for my good friend, the geologist, Prof. W. H. Niles, of the Massachusetts Institute of Technology.

Tribe CLEONINI.

This is one of the most important tribes of Curculioninæ in the European Tertiaries, no less than half a dozen genera with twenty-two species being recognized, and, at Oeningen at least, the species are abundant in individuals. These genera are Rhinobatus, recognized at Aix by Hope and Serres; Lixus, with two species, at Oeningen; Rhinocyllus, with one species, at Rott; Cleonus, with fourteen species (the largest number referred to any one genus of Curculionidæ, or, indeed, of Rhynchophora, excepting the magazine genus Curculionites), from Oeningen (6), Corent (2), Aix (6), and Brunstatt (one species found also at Aix). It is a far less important ingredient of the Tertiary fauna of North America, and is confined to Florissant, where five species occur, all but one also referred to Cleonus, the exception being distinguished as an extinct generic type under the name of Eocleonus.

EOCLEONUS (*'ηώς*, Cleonus, nom. gen.), gen. nov.

I am constrained to propose a new generic name for an insect evidently belonging to the Cleonini, although it is imperfectly known, for it can not be brought into any of the known genera from the structure of the antennæ. The general appearance of the insect is that of a short-snouted Lixus, were not the head so much longer, it being more than half as long as the prothorax, and the arcuate, equal, blunt-pointed snout scarcely longer than the head; the eye is circular and not very large, situated in the middle of the head; the scape of the antennæ does not extend back to the base of the snout by the length of the first joint of the funicle, while the funicle alone is nearly as long as the snout, its first joint slender and longest, the remainder stout and subequal, the seventh subglobular and in no way forming a part of the large fusiform club. The thorax is of about equal height and length, scarcely tapering. The base of the elytra is sinuate. The fore legs are rather slender and not very long.

A single species is known from Florissant.

EOCLEONUS SUBJECTUS.

Pl. VI, Fig. 7; Pl. XI, Fig. 2.

Head and rostrum delicately and profusely punctate, on the head more or less confused in a general longitudinal direction, and more or less vermiculate. Thorax less delicately punctate, transversely and briefly vermiculate, with faint signs both here and on top of the head of a fine short pile. Elytra with very faint striæ, and clothed with short delicate pile, which appears to be arranged in overlapping transverse rows. Fore tibia as long as the rostrum. Only the base of the elytra is preserved.

Length of head and thorax, excluding rostrum, 3^{mm}; rostrum, $1{\cdot}5^{mm}$; height of body, 2^{mm}.

Florissant, Colorado. One specimen, No. 5355.

CLEONUS Schönherr.

A genus rich in species, of which nearly two hundred are catalogued, very generally confined to the Old World, where they are found in all lati-

tudes and longitudes, while in the New World they are confined to North America, which possesses about twenty-five species, all of them restricted to the western half of the continent. No genus of Rhynchophora (excepting that refuge for vague and ill-defined forms, Curculionites) has been so widely recognized in a fossil state. Half a dozen species have been figured from Aix alone, and one of these has been recognized also at Brunstatt, half a dozen or more others at Oeningen, besides two at Corent. In this country four species have been found at Florissant, none elsewhere, this being the only genus of Rhynchophora I know which is so much more richly developed in Europe than in America. It may be doubted, however, whether all the European fossil species should be placed together. Of these species, our *C. foersteri* seems to bear closest resemblance to Oustalet's *C. arvenensis*, from Aix; our *C. exterraneus* resembles not a little the same author's *C. inflexus* from the same place; and our *C. primoris* is not very far removed from Heer's *C. asperulus*, again from the same; while our *C. degeneratus* is altogether different from anything found in the European Tertiaries.

Table of the species of Cleonus.

Eye circular.

Large species with short subequal rostrum ..... *exterraneus.*

Smaller species with long tapering rostrum ..... *primoris.*

Eye transverse.

Rostrum stout, nearly straight, tapering ..... *foersteri.*

Rostrum slender, arcuate, equal ..... *degeneratus.*

Cleonus exterraneus.

Pl. 1, Figs. 13, 20.

I place this species in this genus only as typical of the Cleonini, for the completely circular eye would seem to show that it can not properly be included in it. On a side view the head and rostrum have a completely independent curvature, not properly shown in the figures; the head is smooth, excepting on the sides below the upper margin of the eye, where it is transversely and very finely rugose, and on the posterior portion, where it is faintly and finely punctate, like the rostrum. The thorax is closely and more coarsely punctate, and above faintly rugulose. The elytra, in none of the

specimens well preserved, have the striæ with rather small sharp circular puncta, separated by fully their own diameter.

Length, 10–11^{mm}; height, 5·5^{mm}; length of elytra, 7·5^{mm}; of rostrum, 1·5^{mm}; width of latter, 1·5^{mm}.

Florissant, Colorado. Seven specimens, Nos. 2717, 7359, 8069, 8682, 10543, 11268, 11302 and 13601.

Cleonus primoris.

Pl. xi, Fig. 7.

Head punctate, nearly as long as high; eyes circular and pretty large, well removed from prothorax; rostrum as long as the head, tapering considerably, relatively slender at tip; antennæ inserted beyond the middle, the slender clavate scape not reaching the eye, the funicle slender, a little longer than the scape, the joints subequal, and the club stout oval. Thorax obscure, punctate. Elytra with close rows of very delicate striæ, apparently very finely punctate, each interspace with a row of short, fine bristles.

Length, excluding rostrum, 6^{mm}; rostrum, 1·3^{mm}; width of body, 3·6^{mm}.

Florissant, Colorado. One specimen, No. 1.549, Princeton College collection.

Cleonus foersteri.

Pl. xi, Fig. 4.

The head is uniformly and profusely punctate, the eye very large, transverse, subfusiform, completely crossing the head on a side view; rostrum fully as long as the head, stout at base, regularly and gently tapering throughout, feebly arcuate and rounded at tip; the antennæ are inserted somewhat beyond the middle of the snout, in the middle of its upper half, and the scrobes run obliquely toward the lower portion of the eye, the scape extending to the posterior margin of the same. Thorax profusely punctate, like the head. Elytral striæ composed of slender series of very delicate but rather sharply impressed longitudinal puncta, the interspaces with a median series of short bristles nearly as long as the width of the interspaces.

Length, excluding rostrum, 6mm; rostrum, 1mm; elytra, 4·25mm; height of body, 3·2mm

Florissant, Colorado. One specimen, No. 3011, Mr. R. D. Lacoe.

I take pleasure in naming this insect after my correspondent, Dr. B. Foerster, of Mulhouse, Alsatia, whose recent researches upon the fauna, and especially the insect-fauna, of the Oligocene of his district are well known and important.

CLEONUS DEGENERATUS.

Pl. II, Fig. 22.

Head faintly and very finely punctate, the eye very large, occupying, as seen on a side view, the entire front of the head; rostrum considerably longer than the head, rather slender, equal throughout, considerably arcuate. Thorax sharply, deeply, profusely punctate. Elytral striæ moderately slender, deep, punctate throughout.

Length, excluding rostrum, 5·5mm; rostrum, 1·2mm; elytra, 4mm; height of body, 2·5mm.

Florissant, Colorado. One specimen, Nos. 2609 and 3129.

Tribe ERIRHININI.

No tribe of Curculioninæ shows such a variety of structural forms in the Tertiary deposits, whether of Europe or America, as this. In Europe no less than nine genera, with thirteen species, have been recognized, namely: Bagous, with three species at Brunstatt and Corent; Hydronomus, one species at Aix; Tanysphyrus, the same; Erirhinus, the same; Notaris, recognized by Curtis at Aix; Dorytomus, recognized by Serres at Aix; Erycus, two species in the Pleistocene of Hösbach; Smicronyx, one species at Brunstatt; and Erirhinoides, an uncharacterized extinct genus, with one species in amber. In America we find seven genera and nine species, all of which, with a single exception, come from Florissant. Of the genera found also in the European Tertiaries, we have Dorytomus, with two species; Erycus and Erirhinus, each with one; besides these Grypidius, with one species, and Procas, with two, one of which occurs only in the Gosiute fauna; while there are also two extinct genera, with one species each, Numitor and Smicrorhynchus.

DORYTOMUS Germar.

Nearly fifty species of this genus are known, most of which belong to the Old World, though North America possesses fourteen, found mostly in rather high latitudes. Two fossil species are known, both from Florissant.

Table of the species of Dorytomus.

Prothorax twice as high as long; rostrum very gently arcuate.....*williamsi.*
Prothorax only a little more than half as high again as long; rostrum considerably arcuate .....*coercitus.*

Dorytomus williamsi.

Pl. vi, Fig. 2.

The specimens referred here seem pretty plainly to fall in Dorytomus, and in the vicinity, though not very close, of *D. brevicollis* LeConte. The head is very delicately scabrous, the eye pretty large, reniform, transverse; the beak is twice as long as the prothorax, much longer than head and prothorax together, very gently and regularly arcuate, and distinctly and rather heavily striate; the funicle and club together are nearly as long as the beak, the second joint of funicle longer than the third. The prothorax is decidedly transverse, being twice as high as long, tapers very rapidly and regularly with no anterior constriction, the surface densely and rather coarsely punctured with more or less transverse punctures. Elytra with deeply impressed and punctate striæ, the punctures small; interspaces feebly punctate and clothed with short hairs. Femora strongly clavate, armed beneath with an acute tooth; tibiæ very slender.

Length, excluding rostrum, 4·1 mm; rostrum, 1·85 mm; elytra, 2·5 mm; height of body, 2·5 mm.

Florissant, Colorado. Two specimens, Nos. 7132, 11290.

Named for the talented paleontologist, Prof. H. S. Williams, of Cornell University.

Dorytomus coercitus.

Pl. vi, Fig. 4.

I place this species in Dorytomus, to which it is certainly closely allied, although the legs are shorter and the thighs appear to be stouter than

in any of our living species, and I can also discover no inferior tooth on the fore femora, the only pair preserved. The head is small and nearly smooth, the rostrum considerably and regularly arcuate, two-thirds as long as the elytra, neither punctured nor striate, but apparently smooth; scape of antennæ just failing to reach the base of the rostrum, the funicle alone as long as the scape, its first joint as long as the second and third together, the others subequal, the second and third equal, the club ovate and rather stout. Prothorax fully half as high again as long, tapering with very full sides, very faintly and profusely punctulate. Elytra very faintly punctato-striate. Fore femora very stout, being just beyond the middle nearly half as wide as long; tibiæ moderately slender, scarcely arcuate, scarcely longer than the prothorax.

Length, excluding rostrum, 5·6^{mm}; rostrum, 2·5^{mm}; elytra, 4^{mm}; height of body, 2·4^{mm}.

Florissant, Colorado. One specimen, No. 1987.

GRYPIDIUS Schönherr.

This genus as now known contains only three north European species, of which two are common to the northern parts of North America. A single fossil species is known, and comes from Florissant.

Grypidius curvirostris

Pl. vi, Fig. 1.

A single specimen represents a species a little larger than the wide spread *G. equiseti* (Fabr.) and with a much more strongly curved snout. The head is exceedingly short, buried in the thorax, the eye small, circular, with a smaller diameter than the rostrum; the latter more than twice as long as the head and thorax together, all but the basal fourth very strongly arcuate, moderately slender; scape reaching the base of the snout, its point of insertion uncertain but apparently just before the apical third, the funicle and club together apparently about half the length of the rostrum. Thorax well rounded, rapidly tapering so as to be almost demioval, higher at the base than long, densely and rather finely punctate. Elytra rather elongate with punctate striæ. Second abdominal segment scarcely longer than the

third and fourth together, the sutures straight to the margin. Under surface punctate like the thorax, but somewhat more finely.

Length, excluding rostrum, 6^{mm}; height, 2·4^{mm}; length of elytra, 4·5^{mm}; of rostrum, 3·6^{mm}.

It bears a close general resemblance to *Balaninus flexirostris* from the same beds.

Florissant, Colorado. One specimen, No. 7661.

ERYCUS Tournier.

This genus is principally European, half a dozen species being known there, of which one is also found in North America, together with an additional species found in the northernmost United States and northward. Flach figures two of the European species as found in the Pleistocene deposits of Hösbach, Bavaria, and a single fossil species has been found at Florissant. The Hösbach specimens are known principally by their elytra, that of *E. acridulus* being not unlike ours, but the proportions of the thorax are widely different, and our fossil is a much larger species.

Erycus brevicollis.

Pl. II, Fig. 19.

Head feebly and not finely punctured; eye large, transversely broad ovate and pointed beneath, situated low down at the base of the rostrum, which is twice as long as the prothorax, strongly and regularly arcuate. Prothorax half as high again as long (in this respect disagreeing with Erycus), regularly arched above, with broad and rather full but not very distinct postocular lobes, the surface closely and distinctly punctate. Elytra gradually tapering in the apical half, the humeri rounded, striæ with long quadrate approximate punctures, the interspaces feebly punctate. Legs much as in our *E. puncticollis* LeC., but with less abruptly clavate thighs, not toothed, the appearance of a tooth on the fore femora being an accident of preservation.

Length, excluding rostrum, 6·2^{mm}; rostrum, 3·25^{mm}; elytra, 4·75^{mm}; height of body, 3^{mm}.

Florissant, Colorado. One specimen, No. 10058.