

Article XXV.— ON THE TENTHREDINOIDEA OF THE FLORISSANT SHALES.

By S. A. ROHWER.

Through the kindness of Prof. T. D. A. Cockerell I have had the pleasure of working up the fossil Tenthredinoidea of the expedition of 1907 to the Florissant shales. In working the species of this expedition a few notes on some already described species were made and as they may be useful they are given in the following paper. To make easier the determination of new material a table to separate all the species known to occur at Florissant is given.

At present there are eighteen genera represented in the Tertiary at Florissant, seven of which are known only in the fossil condition. Comparing the fossil and recent species we find that there are 25 fossil species to 31 recent species (these represent 14 genera). Two of the genera are known to be both recent and fossil. Six of the fossil genera are not known to occur in Colorado to-day but are found in the eastern or southern parts of the United States. Of the five remaining genera that are found both fossil and recent in Colorado all but *Tenthredo* and *Pteronvus*, which are circumpolar, may be called eastern genera, having more eastern than western species. It will be seen from the above that the fossil fauna of Florissant bears but little resemblance to the recent fauna, but is more like the present day fauna of the eastern States, Virginia and northward.

I wish to express my thanks to Mr. C. T. Brues for the kindness of sending his manuscript before his valuable paper (Bull. Mus. Comp. Zoöl., Vol. LI, No. 10) appeared, and to Prof. T. D. A. Cockerell for valuable assistance.

The types of the new species herein described, except *Pseudocimbea clavatus*, are in the American Museum of Natural History.

TABLE TO SEPARATE TENTHREDINOIDEA OF FLORISSANT BEDS.

Radial cell *with two* cross-nervures; length perhaps 13 mm.

Megaxyela petrefacta Brues.

Radial cell <i>with one</i> cross-nervure	1.
Radial cell <i>without</i> a cross-nervure	18.
1. Front wings with a subcostal nervure	2.
Front wings without subcostal nervure	3.
2. Cu ₂ present; abdomen dark; smaller	<i>Atocus defessus</i> Scudd.
Cu ₂ absent, abdomen light; larger	<i>Neurotoma cockerelli</i> Roh.

3. Lanceolate cell of fore wings petiolate 4.
 Lanceolate cell of fore wings not petiolate 6.
4. Second and third cubitals receiving a recurrent nervure; basal and first recurrent not parallel; length 4 mm. *Fenusa primula* Roh.
 Second cubital receiving both recurrent nervures; basal and first recurrent parallel; length 7 mm. or more 5.
5. Transverse median received in about middle of first discoidal cell; second recurrent almost interstitial with second transverse cubitus.
Dineura laminarum Brues.¹
 Transverse median received before the middle of first discoidal; second recurrent not nearly interstitial with second transverse cubitus.
Dineura sazorum Ckll.¹
6. Basal nervure and first recurrent nervure not parallel 7.
 Basal nervure and first recurrent nervure parallel 8.
7. Lanceolate cell contracted; basal nervure joining subcostal remote from origin of cubitus *Hemichroa eophila* Ckll.
 Lanceolate cell with an oblique cross-nervure; basal nervure joining the cubitus near its base *Paremphtytus ostentus* Brues.
8. Lanceolate cell with an oblique cross-nervure; basal nervure joining subcosta at or near the origin of cubitus 9.
 Lanceolate cell with a straight cross-nervure or contracted; basal nervure joining subcosta remote from origin of cubitus 10.
9. Basal nervure interstitial or nearly so with transverse median 14.
 Basal nervure remote from the transverse median 11.
10. Abdomen unicolorous; stigma bulging from costa, transverse radial very close to apex *Paleotaxonus typicus* Brues.
 Abdomen pale, marked with black; stigma not bulging from costa, transverse radial near middle and drawing stigma out
Paleotaxonus trivittatus Roh.
11. Length 17 mm. 12.
 Length 9 mm. 13.
12. Transverse median somewhat more than its own length beyond basal nervure *Pseudosiobla misera* Brues.
 Transverse median less than its own length beyond basal nervure
Pseudosiobla megoura Ckll.
13. Second cubital on radial more than two times as long as first cubital on cubitus; wings infuscated *Eriocampa scudderi* Brues.
 Second cubital on radial no longer than first cubital on cubitus; wings hyaline *Eriocampa wheeleri* Ckll.
14. Lanceolate contracted 15.
 Lanceolate cell with a straight cross nervure 16.
15. Three enclosed cubital cells; antennæ not clavate, 9-jointed
Macrophya pervetusta Brues.

¹ Since the above was written another species of *Dineura* was found. The three may be separated as follows:

- Transverse median received by first discoidal between middle and base; (length 7 mm., head and thorax dark, abdomen banded with light) *D. sazorum* Ckll.
 Transverse median received by first discoidal near middle, not a noticeable distance basad to middle 1.
 1. Robust; intercostal vein not its own length basad to basal; second recurrent very close to second transverse cubitus *D. laminarum* Brues.
 Slender; intercostal vein more than its own length basad to basal; second recurrent quite free from second transverse cubitus *D. cockerelli* Roh.

Two enclosed cubital cells; antennæ clavate, 6-jointed.

Trichiosomites obliviosus Brues.

16. Lanceolate cell of hind wings not petiolate at apex . . . *Tenthredo avia* Brues.
Lanceolate cell of hind wings petiole at apex 17.
17. Length 13 mm.; venation light; petiole of lanceolate cell of hind wings short, less than one third of basal nervure . . . *Tenthredo submersa* Ckll.
Length 10½ mm.; venation dark; petiole of lanceolate cell of hind wings more than half the length of basal nervure . . . *Tenthredo infossa* Brues.
18. One enclosed cubital cell; ovipositor long, projecting much beyond end of the abdomen *Lithoryssus parvus* Brues.
Two or more enclosed cubital cells; ovipositor not projecting 19.
19. Second cubital receiving both recurrent nervures; lanceolate cell petiolate; length seven mm. *Pteronus prodigus* Brues.
Second cubital receiving only one recurrent nervure 20.
20. Lanceolate cell petiolate; length 9 mm. *Lisconeura vexabilis* Brues.
Lanceolate cell with a cross nervure, not petiolate; length 17 mm. or over; antennæ clavate 21.
21. Length 17½ mm.; apical joint of antennæ truncate *Pseudocimbex clavatus* Roh.
Length 25 mm.; apical jointed of antennæ rounded at apex
Phenacoperga coloradensis Ckll.

LYDIDÆ.

Neurotoma Konow.

Neurotoma cockerelli sp. nov.

Apparently a male. Length 11 mm. Head nearly as wide as thorax; broadest across the orbits; hind margin rounded; narrowest at base of mandibles, antennæ inserted close to clypeus; basal joint longer and broader than second (from the second the joints are wanting). Head and thorax deeply and coarsely punctured; basal plates finely punctured; abdomen smooth. Color black; abdomen beyond the basal plates ferruginous with darker bands at the junction of the segments. Wings hyaline; nervures brown, stigma paler.

Comparing the venation with that of *Neurotoma fasciata* (fig. 36, plate xxiv Proc. U. S. Nat. Mus., Vol. xxix) the following differences were noted:

- (1). The basal nervure joins the cubitus nearer the middle of the first cubital cell, and is slightly more oblique.
- (2). The transverse median joins the anal nervure nearer the cross nervure of the lanceolate cell.
- (3). The third cubital cell is longer.
- (4). The second recurrent nervure is longer and is straight.

Habitat.—Station 17, Florissant, Colo., 1907 (T. D. A. Cockerell).

The only other member of this family known from the Florissant shales is *Atocus elefessus* Scudder. *Neurotoma cockerelli* may be easily known from this species by the absence of the cross nervure between the median cell and the second anal cell (Cu_2 being absent); the light-colored abdomen; and its larger size.

Atocus Scudder.

This genus is known only by the type species. It falls between *Neurotoma* Knw. and *Pamphilius* Latr. It may be separated from *Neurotoma* by the presence of Cu_2 , and from *Pamphilius* by the absence of Sc_1 . I am indebted to Prof. T. D. A. Cockerell for his notes on Mr. Scudder's type of *Atocus defessus*. Mr. C. T. Brues (p. 270, Bul. Mus. of Comp. Zool. 1908) gives some valuable notes on this genus.

TENTHREDINIDÆ.

EMPHYTINÆ.

Paleotaxonus Brues.

This genus will fall near *Pseudosiobla* Ashm., both having the transverse median and basal nervure interstitial or nearly so. It may be separated from *Pseudosiobla* by the following comparison:

<i>Paleotaxonus</i> Brues.	<i>Pseudosiobla</i> Ashm.
1. Intercostal vein present.	1. Intercostal vein absent.
2. Subdiscoidal nervure (m_3) parallel with the cubitus.	2. Subdiscoidal nervure (m_3) not parallel with the cubitus.
3. Marginal cell made angulate by the drawing down of the marginal nervure by the second transverse cubitus.	3. Marginal cell not thus angulate, rounded on the lower margin.
4. Second cubital cell much more than half the length of the third cubital cell.	4. Second cubital cell but a little more than half the length of third cubital cell.

Paleotaxonus typicus Brues and *Pseudosiobla excavata* Nort. differ in the shape of the stigma, but *Paleotaxonus trivittatus* Roh. has the stigma similar to *Pseudosiobla excavata*, and it is undoubtedly a *Paleotaxonus*.

In the costal area *Paleotaxonus* is similar to *Stromboceros* Konow, but is quite distinct from that genus, being known at once by the presence of a cross nervure in the lanceolate cell.

Paleotaxonus trivittatus sp. nov.

Probably a female. Length 10 mm., length of anterior wing $7\frac{1}{2}$ mm.; width of abdomen in widest part 3 mm. Head as usual in the larger species of *Taxonus*; malar space not large, although perhaps it is not wanting; antennæ not reaching beyond the metanotum. Intercostal vein very distinct, a little less than its length basal of basal vein; basal vein joining the subcostal about twice the length of the

intercostal vein basal to the origin of the cubitus; second cubital cell wider where the first recurrent nervure joins it than at any other place; third cubital cell about three times wider at apex than at base; transverse medial received a little beyond the middle of third cubital cell; subdiscoidal nervure (m_2) long, parallel with cubitus; third discoidal cell long and narrow as in *Paleotoxonus typicus*; stigma tapering from base to apex, more drawn out where the transverse marginal joins it than it is in *P. typicus*, not forming a bulge on the costa as *P. typicus*, similar to *Pseudosiobla excavata* Nort.; cross nervure of lanceolate cell a little more oblique than in *P. typicus* (according to Mr. Brues's figure of *P. typicus*). Hind wings with two discal cells, the upper exceeding lower on outer margin, but it is not as wide; lanceolate cell of hind wings with a distinct petiole at apex, which is about as long as in *Eriocampa*. Color rufous; middle lobe of mesonotum, basal plates, four posterior legs (the anterior ones cannot be seen) quadrate spots on sides and in middle of each abdominal segment above black; antennæ apparently rufous. Wings hyaline; nervures and stigma black.

Habitat.—Station 13, Forissant, Colo., 1907 (T. D. A. Cockerell).

The specimen is very well preserved. The markings of the abdomen are very distinctive. I know of no American species of Emphytinæ that is similarly marked. In the presence of the intercostal nervure this differs from *P. typicus*. This may make some difference in its generic position, but if so *Paleotoxonus* would verge into *Pseudosiobla*.

Pseudosiobla Ashmead.

Pseudosiobla megoura Ckll.

I do not think that this is a true *Pseudosiobla*, but it is nearest to this genus and for the present will be left here. The transverse marginal is not so bent as in *Pseudosiobla excavata* (Fig. 48, plate xxviii, Vol. xxix, Proc. U. S. Nat. Mus.); the basal nervure is farther from the cubitus; the transverse medial in basal fourth of first discoidal. The large, long abdomen and the habit of entire fossil are very unsuggestive of *Pseudosiobla*.

Tenthredo misera Brues is probably the same as this species. If this is true *misera* would be a synonym of *megoura*. Mr. Brues description of *misera* does very well for *megoura*, and *misera* is not a *Tenthredo*, the cross-nervure of the lanceolate cell being oblique. However these two species may be separated by the characters given in the foregoing table.

Eriocampa Hartig.

Eriocampa wheeleri Ckll.

A specimen from station 14, 1907 (Geo. N. Rohwer) seems to be the female of *wheeleri*. The venation measurements average about 110 μ larger

than those given by Prof. Cockerell, but there is no difference otherwise. Length 9 mm.

PHYLLOTOMINÆ.

Paremphtus *Brues.*

This is a very remarkable genus! It is easily separated from its allies (*Caliroa* Costa, *Eriocampoides* Knw., *Phyllotoma* Fallen) by the loss of the first transverse cubital; basal nervure joining cubitus; shape of first and third discoidal cells; etc.

NEMATINÆ.

Pteronus prodigus *Brues* ♀. Station 14 (W. P. Cockerell)—1907. Length 8 mm.; legs apparently black.

CIMBICINÆ.

Trichiosomites *Brues.*

An excellently preserved specimen with reverse from station 14, 1907 (W. P. Cockerell) differs in these points from Mr. Brues' description of *T. obliviosus*:—Abdomen rufous; venation pale brown; basal nervure curves gently inward; third transverse cubitus (the first is absent) a little longer, thus causing the marginal and cubital nervures to diverge more strongly; scutellum not smooth, but punctured as the rest of thorax with deep well separated punctures. His specimen may have been a male, this is undoubtedly a female.

PHENACOPERGINÆ.

Pseudocimbex gen. nov.

Body similar to *Cimbex*. Head a little wider behind eyes; antennæ apparently 7-jointed, clavate, the last two joints forming the club, the last joint truncate at apex; the club is very broad and short having a spherical appearance; radial cell without an appendiculation; a distinct subcostal cell; intercostal vein wanting; basal nervure and transverse median interstitial; stigma very narrow; two enclosed cubital cells (the fossil where the first transverse cubitus should be is rather faint, but I feel sure this is as described); first and second cubitals each receiving a recurrent nervure; basal nervure and first recurrent parallel or subparallel; lanceolate cell of fore wings short, ending a short distance before the transverse median, a slightly oblique cross-nervure in about middle of cell (the anal area is somewhat obscure, but I believe it is as here described).

Type of genus *Pseudocimbex clavatus* Roh.

Following Rev. Konow's arrangement (genera Insectorum, 1905) this genus and *Phenacoperga* Ckll. would form a new tribe between the Cimbicini and Syzygonini. Following Dr. A. D. MacGillivray (Proc. U. S. Nat. Mus., Vol. XXIX, pp. 569-654, 1906) this new subfamily falls nearer Nematinae than it does Perginae. In general habit it resembles Cimbicinae and Perginae (including all allies), but I think it is nearer the Cimbicinae. I have followed Dr. MacGillivray and called it a subfamily.

The two genera of this new subfamily are both fossil. They may be separated as follows:

Phenacoperga Ckll.

1. Club of antennæ obtusely rounded at apex, elongate.
2. Radial cell angulate near base, caused by the pulling down of the second transverse cubital.
3. Lanceolate cell long and rather narrow, not ending before the transverse median.
4. Cross-nervure of lanceolate cell near base of cell.

Pseudocimbex Roh.

1. Club of antennæ truncate at apex, short, somewhat spherical.
2. Radial cell not thus angulate, rounded on lower margin.
3. Lanceolate short and broad, ending before the transverse median.
4. Cross-nervure of lanceolate cell in about the middle.

Phenacoperga coloradensis and *Pseudocimbex clavatus* may be known

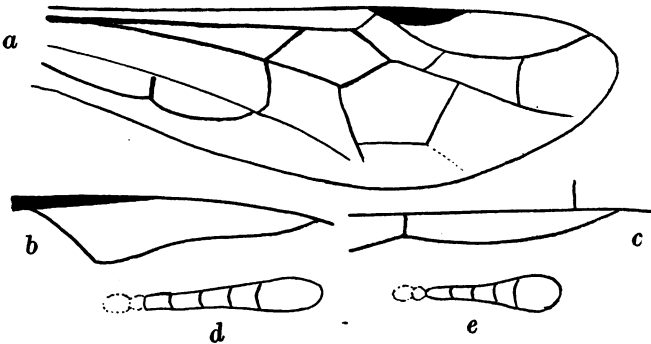


Fig. 1, a, Fore wing of *Pseudocimbex clavatus* sp. nov.; b, radial cell of *Phenacoperga coloradensis* Ckll.; c, lanceolate cell of same; d, antenna of same; e, antenna of *Pseudocimbex*.

from each other most easily by their size. *P. coloradensis* is 25 mm. long, while *P. clavatus* is only $17\frac{1}{2}$ mm.¹

¹ In the figure the stigma of *P. clavatus* is too large, the lanceolate cell of *P. coloradensis* too wide and the cross-nervure straight instead of oblique.

Pseudocimbex clavatus sp. nov.

Apparently a ♀. Length 17½ mm.; length of fore wing 14 mm. Head not quite as wide as thorax; antennæ short, stout, very thick, the last two joints forming the club which is very broad appearing spherical; first recurrent nervure received in about middle of the first cubital cell; second recurrent received in about the middle of second cubital cell; subcostal cell similar to *Lophyrus* sp. (fig. 45, Proc. U. S. Nat. Mus., Vol. XXIX, plate xxvii), but is not as broad above the basal nervure; stigma very narrow almost wanting; cross-nervure of lanceolate cell rather broad and slightly oblique, color black; abdomen probably rufous. Wings apparently fuscous; nervures and stigma dark brown.

Habitat.—Florissant, Colo. Collector unknown. Probably from Fossil Stump Hill at station 17.

Type in the museum at the State Capitol Building, Denver, Colorado.

FENUSINÆ.

Fenusa Leach.**Fenusa primula** sp. nov.

Probably a ♀. Length 4 mm.; length of fore wing 3½ mm. Head not as wide as thorax, antennæ as usual; costa thick also subcosta; stigma rounded on lower margin; basal nervure very strongly bent, cubitus on the lower part of first cubital cell very weak; first cubital cell much narrower at apex than at base, in this respect like *Scolioneura betuleti* (fig. 75, Proc. U. S. Nat. Mus., Vol. xxix, plate xxxvii); second cubital three times wider at apex than at base; first recurrent received in first cubital a little beyond middle; second recurrent at about basal third of second cubital; transverse radial in about middle of second cubital; transverse median received a little beyond middle of first discoidal; lanceolate cell petiolate, the upper part of the petiole very weak, petiole probably longer than *Fenusa pygmæa* (Fig. 74, Proc. U. S. Nat. Mus., Vol. xxix); hind wings not decipherable, but the lanceolate cell seems to be reduced to a line as in *Kaliosysphinga dohrnii* (fig. 73, Proc. etc.). Color black; wings subhyaline, nervures brown.

Differs from *Fenusa pygmæa* (fig. 74, Proc. etc.) in the following characters: (1) first transverse (really second because the first is wanting) cubitus is shorter; (2) stigma rounded on lower margin, not angulate; (3) transverse radial slightly curved; (4) upper nervure of lanceolate cell weak; (5) first recurrent a little nearer transverse cubitus; (6) second transverse cubitus is not so oblique; (7) cubitus arising nearer basal.

The following measurements are in μ :

(1). Length of first (second) transverse cubitus	85
(2). Width of second cubital at third transverse cubitus	289
(3). Width of stigma in widest part	238
(4). Distance from lower (nearest) part of stigma to second transverse cubitus	238
(5). Width of median cell (widest part)	187

Habitat.—Florissant, Colo., station 14, 1907 (S. A. Rohwer.).

SCHIZOCERINÆ.

Lisconeura gen. nov.

Broad, stout species; abdomen somewhat oval; intercostal vein absent; stigma rounded on lower margin; basal nervure more than half its own length basal to origin to cubitus; first recurrent short, not parallel with basal; three enclosed cubital cells, the first small, the second and third of about equal length; second and third cubitals each receiving a recurrent nervure; transverse median near middle of first discoidal cell; lanceolate cell petiolate; antennæ question.

Type, *Scolioneura vexabilis* Brues, Bull. Mus. of Comp. Zool., Vol. LI, No. 10, p. 263. March, 1908.

This genus may not belong in this subfamily, but the venation is nearer to this group than any other. If the antennæ are more than three jointed there would be no doubt that it would form a new subfamily. Mr. Brues assigned this to *Scolioneura* with a doubt, but it is not very closely related to that genus. The position of the basal nervure alone would exclude it from that genus. The shape of the second and third cubitals will easily separate it from its supposed allies.

DINEURINÆ.

Dineura Dahlb.

There have been two species described as belonging to this genus and there is another in this collection. The three species so far known may be separated by the characters in the foregoing table. There are other characters which also separate them. *D. laminarum* has the intercostal nervure quite close to the basal, not its own length basad to basal; *D. cockerelli* has it about one and a half times its length basad to basal; *D. saxorum* has it two times its length basad to basal. In the position of the intercostal nervure and second recurrent nervure *cockerelli* is nearer to *saxorum* but easily known by the position of the transverse median. All the fossil species differ from *Dineura* as now defined in the position of the intercostal nervure. *D. cockerelli* and *saxorum* have it as in *Mesoneura* Hartig, but position of the transverse radial, second recurrent, and the shape of the costa are not as in that genus. *D. laminarum* has the intercostal as in *Pseudodineura* Knw., but in the character of the transverse radial and second recurrent it is more like *Mesoneura*. *Dineura* Dahlb., *Mesoneura* Hartig, and *Pseudodineura* Knw. are closely related and undoubtedly had a near common ancestor or *Mesoneura* and *Pseudodineura* have been recent offshoots from *Dineura*.

Dineura laminarum Brues. A well preserved specimen from Station 14,

1907 (W. P. Cockerell) differs from the description of the type in having the second recurrent a considerable distance from the second transverse cubitus, about as in *D. geeri* (fig. 63, plate xxxiii, Proc. etc.); and the thorax is entirely black. The following measurement of this specimen may be of value.

- Length of intercostal nervure 119 μ .
- Intercostal basad to basal nervure 85 μ .
- First recurrent from first transverse cubitus 663 μ .
- Length of first cubital cell on cubitus 527 μ .

Dineura cockerelli sp. nov.

Probably a ♂. Length 8½ mm.; length of anterior wing about 7¼ mm. Rather slender, not nearly so robust as *D. laminarum*. Head partly covered with a piece of wood. Stigma widest at base tapering gently to apex; intercostal vein about one and a half times its length basad to basal; basal nervure curved on the lower part; transverse radial not strongly oblique, received a little beyond second transverse cubitus as in *D. geeri* (fig. 63, plate xxxiii, Proc. etc.); transverse median received a little beyond middle of first discoidal cell; first recurrent nervure received in second cubital cell nearly the length of first cubital from base; second recurrent received in second cubital about the length of second transverse cubitus from apex; third discoidal sharply pointed at apex, caused by the inward move of the second recurrent; lanceolate cell as in *D. geeri*. Hind wings as usual, except the lower discal cell is shorter than the upper, about as in *Pseudodineura hepaticæ* (fig. 65, plate xxxiv, Proc. etc.), *D. saxorum* and *D. laminarum* also have this character. Color: head and thorax dark; legs as much as could be seen dark; abdomen dark banded with light as in *D. saxorum*. Wings hyaline; nervures and stigma dark brown.

The following differences were noted when compared with *Dineura geeri* (Fig. 63, Proc. etc.):

- (1). Intercostal nervure considerably basad of basal.
- (2). Stigma more tapering.
- (3). Third discoidal cell more sharply pointed at apex.
- (4). First recurrent nearer middle of second cubital cell.
- (5). Second " " " " " " " "
- (6). Lower discal cell of hind wings shorter than upper.

The following measurements are in μ .

Length of intercostal nervure	85
Intercostal nervure basad to basal	154
Transverse median from basal	833
First recurrent from first transverse cubitus	425
Length of first cubital cell on cubitus	476

Habitat.—Florissant, Colo., station 13 B¹ (S. A. Rohwer), 1907.

¹ Station 13B is between Stations 13 and 14, lower on the slope than 13 (see Kll. Vol. XXIII, 1907, p. 131, Bull. Am. Mus. Nat. Hist.). Geographically it is lower than either 13 or 14, but the layer worked at 13B is the same as that worked at 14. While the layers worked at 13 correspond to 14A (the upper layer of 14 above the heavy sandstone and shale, about 8 feet above) but are much more weathered and break with ease. During the expedition of 1907 station 14 was extended eastward to meet the excavations made years ago at station 9. However the central part of 9, where all 1906 and 1907 fossils came from, was not reached.