

**Revision of the United States species of OCHODÆUS and
other Genera of Scarabæidæ.**

BY GEORGE H. HORN, M. D.

OCHODÆUS, Lep.

Having had occasion of late to examine the *Ochodæus* of our fauna, I noticed certain characters of very great importance which appear to have entirely escaped observation. These have afforded me the means of presenting an entirely new synoptic table which will render the recognition of our species much more easy and certain without regard to sex.

The mentum is described by various authors in a similar manner, Lacordaire writes: *Mentum subtransverse, a little narrower anteriorly, notched in front, ligula moderately prominent and entire.* I have examined all our species and one (*ferrugineus*) foreign, with the following result.

O. pectoralis, Lec.—Mentum in the form of a broad wedge with the base in front, which is concave longitudinally, the tip being emarginate and the sides of the base fimbriate with long hairs.

O. ferrugineus, Esch. (Siberia), has a similar mentum, but the base of the wedge is concave in every direction, while the free lower edge is more elevated and more arcuate; it is also emarginate in front and fimbriate.

O. musculus, Say.—Mentum as long as wide, narrower in front, tip broadly emarginate, and with a deep longitudinal impression extending from base to apex, deeper in front, fimbriate along the sides. A similar form occurs in *simplex* and *biarmatus*.

O. Ulkei, n. sp.—The form here is an exaggeration of the preceding. The longitudinal impression is very deep, the angles of mentum elevated (when viewed from beneath) and the tip not perceptibly emarginate. The impression is here so deep that the mentum appears very deeply bilobed. The edges are fimbriate.

O. frontalis, Lec., has a mentum as long as wide, feebly emarginate in front and a feeble longitudinal impression near the front only.

O. sparsus, Lec.—Mentum broader than long, not narrowed in front, anterior angles rounded, surface plane, not impressed, apex arcuate.

O. striatus, Lec.—Mentum broader than long, feebly narrowed in front, tip not emarginate, a transverse arcuate line of rather long bristly hairs, causing the mentum at first sight to appear very short, broadly emarginate and serrulate in front.

These variations of the form of the mentum have given me the basis of the synoptic table. Other characters however require special mention.

In all the species with one exception the prosternum is very short and truncate or broadly rounded, while in *pectoralis* the prosternum is produced into a lobe imitating in a diminished form that of *Hololepta*.

When the head is thoroughly deflexed, the globular eyes are received in fossæ at the angles of the thorax beneath. The antennæ in repose pass beneath the eyes, the clubs become approximated and are received into fossæ situated immediately in front of the anterior coxæ on each side of the short prosternum. These fossæ are more or less approximated, in *pectoralis* separated by a narrow carina, which in the other species becomes gradually broader as they stand in the table, (*biarmatus* should however be next to *pectoralis* in this respect), until in *sparsus* the carina is broad and flat.

The spur of the anterior tibia is moderately long and stout and in well preserved specimens bears on each side a row of moderately long bristles. The spurs of the middle tibiæ are dissimilar, the outer is slender, the inner broader, slightly curved and pectinate along its inner margin. This character, of extremely rare occurrence in Coleoptera, appears to have been entirely overlooked by those who have described *Ochodæus*; it is very distinctly marked in the Siberian *ferrugineus*. The posterior spurs present nothing peculiar, they are slender and long.

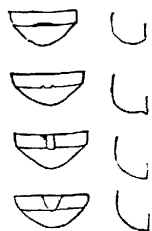


The first hind tarsal joint is always long but in *pectoralis* it is very long and stout, arcuate, longer than all the other joints together and longer than either spur. This species has the hind tibiæ more slender and longer than usual.

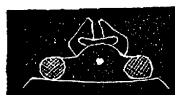
The sutural angle of the elytra is obtuse or rounded, excepting in *pectoralis* and *biarmatus*. In these the tip is sinuate before the suture, and the angle very distinctly (*pectoralis*) or obtusely (*biarmatus*) dentiform.

Certain modifications of the propygidium are worthy of notice. The posterior margin is always very slightly reflexed especially at its

middle. In this condition it remains in *sparsus*. The tips of the elytra pass under this reflexed edge in repose and are thus locked. In *biarmatus* and *pectoralis* the reflexed edge is simply notched at middle and a small acute tubercle on each side appears. Through the notch thus formed the sutural dentiform process passes and the elytra are in this manner firmly secured in repose. The next modification results in a groove running the length of the propygidium, limited on each side by a finely elevated line terminating posteriorly by joining the reflexed edge which is emarginate between them. These lines are exactly parallel in *simplex*, *musculus* and *Ulkei*, divergent in front in *frontalis* and *striatus*.



The pygidium is always short and uncovered in both sexes.



The labrum is very distinctly visible, the anterior angles broadly rounded and tip emarginate. In *sparsus*, however, the labrum is shorter, much broader, the anterior angles prominent outwardly but obtuse, the tip is more deeply emarginate.

Secondarily in importance in the accompanying table come the sexual characters of the male, and from the tendency of the sexes to approximate in the form of their hind tibiae, a character is required which will enable the male to be known even with simple tibiae. The club of the male antennae is always larger, more convex, and the first joint more convex on the proximal side, and more decidedly concave on the distal. The club of the female is of a more decided lamellate type, narrower and with the joints less enclosing, the first especially being scarcely at all cupped.



At the apical end of the posterior femora, on the lower face is a lamella which forms the side of the tibio-femoral articulation. In many of the species in the male this plate is developed into an unciform process, acute at tip. This is entirely wanting in the males (as I consider them), of *pectoralis*, *simplex*, *Ulkei*, *sparsus* and *striatus*, and exists in the others, and in very well developed males of *frontalis*, a small spiniform tooth occurs near the middle of both the anterior and posterior femora.

The posterior tibiae ♂ show four types.

First—Tibiae precisely identical (?) in the sexes. I have seen males only.

Second.—Tibiae broader and more fimbriate ♂.

Third.—Tibiae obtusely dilated at middle ♂.

Fourth.—Tibiæ toothed at middle ♂.

The characters of least importance in grouping the species are found in the form of the clypeus and the armature of the head. With one exception (*biarmatus*) the upper surface of the head is similar in the sexes.

The species may possess stridulating power, the surface of the propygidium is finely alutaceous and with a pearly lustre, and this is probably the organ for the above purpose in conjunction with the edge of the apical elytral margin.

The elytral stria present a peculiarity worthy of notice. In all the neighboring genera in our fauna the sutural stria is parallel with the margin, while the other striæ are slightly oblique; in *Ochodæus*, however, the sutural stria is also oblique and becomes very closely approximated to the sutural margin at its apical third.

The following table is presented as the result of the grouping of the characters above-mentioned.

Prosternum lobed in front.

Mentum in the form of a wedge, elevated in front with the basal face longitudinally concave. First joint of hind tarsus long, stout and arcuate. Clypeus hemihexagonal, anterior edge double, front without elevations..... **pectoralis.**

Prosternum not lobed in front, first joint of hind tarsus long but slender.

Mentum as long or longer than wide, more or less impressed longitudinally.

Mentum longitudinally impressed in its entire length; head with or without ridges, but never with an acute median tubercle.

Posterior tibiæ of male with an acute tooth at middle.

Posterior femora of male with an unciform dilatation of the articular plate.

Clypeus broadly hemihexagonal, with a crescentic ridge near the apical margin, front with short transverse carina..... **musculus.**

Posterior femora of male without tooth at the tip. Clypeus broadly hemihexagonal, anterior margin double; head without tubercles or ridges..... **simplex.**

Posterior tibiæ of male slightly dilated at middle.

Posterior femora of male without apical tooth.

Clypeus broadly rounded, anterior margin double; head without ridges..... **Ulkei.**

Posterior tibiæ of male not differing from that of female except being broader and more fimbriate.

Articular plate of hind femora prolonged nearly one-third the length of the femur, terminating abruptly with an acute angle, similar in the two sexes.

Clypeus broadly rounded, lateral angles elevated into an acute tubercle ♂, or plane ♀..... **biarmatus.**

Mentum very feebly impressed and in front only.

Posterior tibiæ as in *biarmatus*.

Posterior femora male with tooth at tip, and a smaller acute tooth near the apical third which may disappear; anterior femora usually with an acute tooth at middle.

Clypeus hemihexagonal, anterior margin not double, a small acute tubercle near the suture; vertex with feeble transverse ridge.....**frontalis.**

Mentum short, broader than long, not impressed.

Mentum broader than long, not emarginate in front, with a transverse arcuate row of bristly hairs, causing the mentum to appear very short, deeply emarginate and serrulate in front.

Posterior tibiæ as in *biarmatus*.

Posterior femora male toothed at tip.

Clypeus hemihexagonal, margin single; vertex with a short moderately elevated transverse carina.....**striatus.**

Mentum broader than long, not narrowed in front, anterior angles broadly rounded, surface not impressed, apex arcuate.

Males unknown.

Clypeus hemihexagonal, margin single; vertex with an acute moderately elevated tubercle.

Thorax much shorter than any other species, mandibles more prominent, angles of labrum prolonged laterally.....**sparsus.**

In the table it will be noticed that certain species are described as having a double clypeal margin while in others it is single. In the former case a distinct margin is seen above that to which the labrum is attached as in *Elater*. This margin is thickened in *musculus* and forms the anterior ridge of which mention is made.

Having devoted so much space to the description of the special characters of the species, and the synoptic table containing nearly every character of moment, but little now remains except the bibliography and synonymy.

O. pectoralis, Lec., Trans. Am. Ent. Soc., 1868, p. 51.—Color ferruginous brown. Head roughly sculptured by coarse indistinctly limited punctures. Thorax with rather sparsely placed granules (denser in front), each bearing a short hair, median line distinct at base only. Elytra rather deeply striate, striæ not closely punctured, intervals slightly convex, irregularly triseriately punctured, each puncture bearing a short seta. Body beneath sparsely but rather coarsely punctured, sparsely hairy. Pygidium nearly smooth. Length .26 inch; 6.5 mm.*

The two specimens before me, both males, have the tip of the elytra distinctly sinuate, the sutural angle dentiform. The first joint

* The measurements of the present paper are taken from the apical margin of the thorax to the tip of the elytral suture.

of hind tarsi longer than all the others together, stout and arcuate, the second joint longer than the two following (which are equal) together. The prosternum is lobed in front.

Occurs in Arizona and New Mexico.

O. musculus, Say, (*Bolboceras*), Bost. Journ. I., 178; *opacus* ♀, Lec., Trans. Am. Ent. Soc., 1868, p. 51; *americanus*, Westw., Trans. Ent. Soc., Lond., Ser. II., 2, p. 66.—Ferruginous brown, becoming paler. Head coarsely punctured, clypeus with double margin, the upper forming an arcuate carina, a feeble transverse carina on the vertex. Thorax sparsely punctured in male, more densely in the female, median line extremely indistinct even at base. Elytra striate, striæ punctured moderately closely, intervals moderately convex, irregularly tri- or externally biserially punctured, the punctures denser in the female; sutural angle rectangular. Body beneath sparsely punctured and hairy. Length .20—.22 inch; 5—5.5 mm.

I have united *opacus* with *musculus*, although they differ somewhat in the sculpture of the upper surface, for the reason that they both agree in the sculpture of the head, and all the specimens known of the former are female and all of the latter male. The sculpture varies in density in the two males before me.

Westwood describes the clypeus as biangulate, but the figure shows the ordinary hemihexagonal form of this and several other species. I think there is no doubt of the synonymy.

Occurs in Michigan, Dakota and Nebraska.

O. simplex, Lec., Proc. Acad., 1854, p. 222; Trans. Am. Ent. Soc., 1868, p. 51.—Resembles the preceding in form but the sculpture is denser, the striæ of the elytra less deep and the intervals flatter. The clypeal margin is double, but the upper line is not thickened and it follows the hemihexagonal outline of the margin. Median line of thorax very slightly evident at base. Body beneath sparsely punctured, more densely punctured along the middle of the abdomen. Length .20—.26 inch; 5—6.5 mm.

Occurs in Colorado, Nevada and New Mexico.

O. Ulkei, n. sp.—Ferruginous brown, moderately shining. Head moderately punctured, clypeal margin double, the upper line not thicker, front not carinate. Thorax moderately densely granulato-punctate, median line moderately deeply impressed at basal third. Elytra finely striate, striæ very finely punctured, intervals nearly flat, irregularly triserially sparsely punctured. Body beneath sparsely punctured and pilose. Length .20 inch; 5 mm.

This species resembles superficially the preceding, and differs especially in the sexual characters of the male as shown in the table.

One specimen, Nevada. Cabinet of Mr. H. Ulke.

O. biarmatus, Lec., Trans. Am. Ent. Soc., 1868, p. 51.—Ferruginous or brownish testaceous. Head sparsely punctured, clypeal margin arcuate, double, the upper ridge elevated at each end into a small tubercle ♂ or flat ♀. Thorax moderately densely punctato-granulate, median line distinctly impressed at

sal third. Elytra rather deeply striate, striæ closely punctate, intervals convex, moderately densely punctulate. Body beneath sparsely punctate. Length .14—.20 inch; 3.5—5 mm.

Occurs in Texas and New Mexico.

O. frontalis, Lec., New Species, p. 76; Trans. Am. Ent. Soc., 1868, p. 51; *complex*, Lec., loc. cit., p. 51.—Color as in *musculus*. Clypeus hemihexagonal, margin single, an acute tubercle near the frontal suture; front coarsely and deeply punctured and with a moderate transverse ridge. Thorax moderately densely punctato-granulate, a slight impression near each side, median line moderately deeply impressed at basal half. Elytra striate, striæ with rather coarse punctures, intervals feebly convex, moderately regularly bi- and triseriately punctulate. Body beneath very sparsely punctulate. Length .20—.26 inch; 5—6.5 mm.

I have united *complex* with *frontalis* as it has all the essential characters. The front however was described as having three apical tubercles, two of which are represented by a darker spot such as occurs in every species at the end of the frontal suture. The posterior and anterior femora of the male have a small acute tooth at middle which may entirely disappear in less developed specimens.

Occurs from Texas to Florida.

O. striatus, Lec., Proc. Acad., 1854, p. 222; Trans. Am. Ent. Soc., 1868, p. 51.—Size, color and sculpture of *musculus*. Clypeus broadly hemihexagonal, margin single, vertex with a short transverse carina. Median line of thorax rather deeply impressed at basal half. Length .20—.22 inch; 5—5.5 mm.

Occurs in New Mexico and Arizona.

O. sparsus, Lec., Trans. Am. Ent. Soc., 1868, p. 51.—Similar to the preceding but with the thorax relatively shorter. Clypeus hemihexagonal, margin single, head sparsely punctured, and with a moderately prominent acute vertical tubercle. Thorax sparsely punctured, median line moderately deeply impressed at basal half. Elytra striate, the inner striæ with coarse, the outer with fine punctures, intervals slightly convex very sparsely punctulate. Body beneath sparsely punctulate. Length .18—.22 inch; 4.5—5.5 mm.

Occurs in New Mexico and Colorado. Females only known.

I am unable to identify the following species.

O. duplex, Lec., Trans. Am. Ent. Soc., 1868, p. 51.

Of this insect I can find no type, and I have seen nothing corresponding with it. I have suspected that it might be a well marked *opacus*, but I do not find any specimens of this from Texas.

MACRODACTYLUS, Latr.

Several important characters appear to have entirely escaped notice, and the species although few in number are in a somewhat confused state.

The antennal club does not differ notably in length between the two sexes.

The pygidium is always much longer in the male, the form being elongate oval in the one case and broadly triangular in the other.

The anterior and posterior tibiæ of the male are without spurs. There are however, stiff bristles around the end of the hind tibiæ which simulate spurs, but no proper spurs. The middle tibiæ have two well defined spurs. In the female the tibiæ are all normally provided, that is, the anterior have one and the four posterior two each.

In the male the post coxal portion of the prosternum is elevated in a long and rather slender process, that of the female is entirely flat and without elevation. The abdominal segments 2—5 of the male have on each side of the middle an oblique row composed of three or four coarse punctures, bearing a stiff and nearly erect bristly hair. The females have a few slender hairs usually arranged without any marked regularity.

The claws of the male, especially those of the anterior tarsi, are very much less cleft than those of the female, and are longer and much less curved.

The discovery of the sexual relations of our species has required a rearrangement of the synonymy, and the following notes are the result of their study.

Males.—Anterior and posterior tibiæ without spurs, prosternum behind the coxæ elevated in a long process, abdomen with stiff hairs arranged in oblique rows on each side of the middle of segments two to five, pygidium elongate.

Thorax always with recumbent pubescence.

Prosternal process long, slender, as long as the coxæ and visible from the front; abdominal bristles slender.....**subspinosus.**

Prosternal process short, not visible from the front; abdominal bristles very short.....**angustatus.**

Prosternal process long, visible from the front, tip broader and emarginate; abdominal bristles stout.....**uniformis.**

Females.—Anterior and posterior tibiæ with spurs, prosternum not elevated behind the coxæ; abdomen with a very few slender hairs, pygidium triangular.

Thorax with recumbent hairs with short vertical setæ intermixed, abdomen with very few median erect hairs.....**subspinosus.**

Thorax with all the hairs of the disc erect, those of the margin recumbent, abdomen with many erect hairs along the middle arising from strong punctures.....**angustatus.**

Thorax with the hairs all recumbent as in the male, abdomen with few erect hairs arising from small punctures.....**uniformis.**

M. subspinosus, Fab.

Females of this species very rarely occur with the pubescence of the thorax flat as in the male, they then resemble *uniformis* which

has however, a denser and longer pubescence especially on the elytra. The prosternal process of the male is as long as the coxæ, arcuate and compressed. The abdominal setæ are rather slender when compared with those of the two following species. In both sexes the elytral vestiture is not dense and there are no erect hairs. The male has a more slender form than the female.

This species occurs especially in the Northern States, northward of a line from Virginia to Colorado.

M. angustatus, Beauv., *setulosus*, ♀, Lec.

The male is a larger insect than the preceding. The prosternal process is short, but little longer than half the coxæ. The abdominal setæ are long and stout. The female has the hairs of the disc of the thorax erect, those of the margin recumbent; the elytra have also erect hairs near the base. The abdominal segments 1—5 have large punctures, varying in number from 4 to 8—10 according to the segment, which give rise to moderately long hairs, while in *subspinosus* these hairs are entirely absent or very inconspicuous.

This species occurs in the Gulf States, but I have seen one female from Pennsylvania.

M. uniformis, n. sp.

Resembles the two preceding in form and differs superficially in the denser and longer vestiture. Both sexes have the thorax clothed with recumbent pubescence, and the surface less deeply punctured than in either of the preceding. The abdominal setæ of the male are very stout and stiff, those of the female few in number and on the first four segments only. The prosternal process of the male is long, wider at tip and moderately deeply emarginate. Length .40 inch; 10 mm.

Occurs in Arizona.

Synonymy.

M. subspinosus, Fab., Syst. Ent., p. 39; Oliv. Ent. I. 5, p. 70; pl. 7, fig. 73, a, b; Lec., Journ. Acad., 1856, p. 277, ♂.

elongatus, || Herbst., Käfer. III., p. 145; pl. 26, fig. 3, ♂.

polyphagus, Burm., Lamell. IV., 2, p. 57.

angustatus, Lec., (in part), loc. cit., p. 278, ♂.

M. angustatus, Beauv., Ins. Afr. et. Amer. I. 2, p. 30; pl. 5, fig. 6.

angustatus, Lec., (in part), loc. cit.

setulosus, Lec., loc. cit., p. 277, ♀.

M. uniformis, Horn, n. sp.

DICHELONYCHA, Kby.

The sexes may be readily distinguished by the structure of the antennæ, the club of the male being nearly as long as the funicle and

in the female much shorter. The abdomen viewed in profile from the side is convex along the median line in the female and concave in the male.

The spurs present no special difference in the majority of the species. In three however, (*valida*, *albicollis*, *sulcata*), the outer spur of the male hind tibiæ is broader than the other and truncate at tip, (being less evident in the first than in the other two), while the females of these and both sexes of all the others the spurs are slender, acute and similar.

The frontal suture is normally deeply impressed, but in five the suture although traceable is not impressed.

The thorax bears a median, moderately deep impression in some species, but is even in the greater number. Behind the apical margin and parallel with it, is a moderately deeply impressed submarginal line which is almost entirely obliterated in two species.

In those species with the sulcate thorax, the posterior tarsal claws are either absolutely or very nearly simple, while in all the others the tip is decidedly bifid. The clypeus is usually rounded in front, the margin more or less widely reflexed, two species (*truncata*, *pusilla*), have the clypeus truncate in front, the sides not arcuate and the angles very distinct.

Based on the above characters, the following table of the species will greatly assist in the identification of our species.

Thorax without median groove.

Clypeus not prolonged.

Frontal suture very indistinct or entirely obliterated.

Sub-apical and basal marginal grooves distinct.

Clypeal margin narrowly reflexed. Anterior tibiæ tridentate.

Apex of hind tibiæ and tarsi piceous.....**elongata.**

Tibiæ and tarsi entirely testaceous.....**subvittata.**

Clypeal margin broadly reflexed. Anterior tibiæ sub-bidentate.

canadensis.

Sub-apical and basal marginal grooves obsolete.

Sides of thorax posteriorly sinuate, angles distinct.....**testacea.**

Sides of thorax posteriorly oblique, angles very obtuse.....**pallens.**

Frontal suture deeply impressed.

Clypeus rounded, angles rounded.

Thorax with basal marginal line entirely obliterated at middle.

Elytra with the punctures nearly obliterated by fine transverse rugæ.....**Crotchii.**

Thorax with basal marginal line entire and very distinct. Elytra with punctures distinct.

Head, thorax and legs very nearly black, elytra brilliant green or bronze, uniform, rarely with pale limb and then very narrow.....**Backii.**

- Head, thorax and legs rufous, the latter very rarely piceous; elytra with broad pale margin.
- Elytra piceous with æneous tinge.....**fuscata**.
- Elytra brilliant metallic green.....**fulgida**.
- Clypeus truncate, angles rectangular.....**truncata**.
- Clypeus prolonged in advance of the labrum.....**clypeata**.
- Thorax with a rather broad and deeply impressed median groove.
- Disc of the thorax on each side of median line punctured.
- Punctures of disc arranged in an even space.
- Outer spur of hind tibiæ ♂, very much broader than the inner and distinctly contorted.....**albicollis**.
- Outer spur of hind tibiæ ♀, somewhat broader, not contorted.....**valida**.
- Punctures of disc arranged in a broad fovea on each side.....**sulcata**.
- Disc of thorax very smooth.
- Clypeus subtruncate anteriorly, sides not rounded. Hind tibial spurs slender, similar and equal in the sexes.....**pusilla**.

D. rotundata, Lec., is omitted from the above table, as it appears to constitute a distinct genus.

D. elongata, Fab.—Body beneath, head and thorax piceous. Elytra variable, testaceous or piceo-testaceous with an æneous surface lustre of variable intensity but evenly disposed. Head and thorax densely punctured, the former sparsely pubescent, the latter sparsely pubescent ♂, or densely pubescent ♀. Clypeal margin moderately reflexed, frontal suture very indistinct, not impressed. Scutellum with moderately dense, yellowish white, recumbent pubescence. Elytra rather coarsely punctured, sparsely pubescent. Body beneath sparsely punctured, rather densely clothed with long scale-like hairs. Anterior and middle legs and hind femora yellowish testaceous, hind tibiæ (except at base) and tarsi piceous.

The sub-apical and basal marginal lines are deeply impressed. The hind tibial spurs are both slender and acute in the two sexes. The pubescence of the thorax is always denser and more persistent in the female, and gives it the appearance of a distinct species, especially as the hind angles of the thorax are less prominent. By an examination of those species in which the hind angles of the thorax are well marked, it will be at once noticed that while the males have the thorax sinuate posteriorly and the angles acute, the females have the sides posteriorly oblique, and the angles obtuse or even indistinct. From this it is evident that too great stress must not be laid on the form of the thorax in the attempt to separate species.

This species occurs rather abundantly from Canada to the Middle States.

D. subvittata, Lec.—Color testaceous, elytra with distinct æneous tinge, frequently with a darker vitta extending from the humeral to the apical umbone with the color always more densely æneous at these points. Head rugosely punctured, sparsely pubescent, frontal suture nearly obliterated,

clypeal margin narrowly reflexed. Thorax rather coarsely but not densely punctured, median line very feebly impressed, surface sparsely pubescent and similar in the sexes, sub-apical and basal marginal lines deeply impressed. Elytra rather coarsely punctured and wrinkled, very sparsely pubescent. Body beneath sparsely punctured and pubescent. Legs testaceous.

This species differs from the preceding in having the thorax less densely and more coarsely punctured, and similarly pubescent in the two sexes, the hind tibiæ entirely testaceous, and finally by the trifling character of the darker spots at the humeral and apical umbones. It is also somewhat larger.

Occurs in Canada.

D. canadensis, n. sp.—Piceo-testaceous, elytra greenish bronze with margin paler. Head densely and rather coarsely punctured, sparsely pubescent, frontal suture nearly invisible, very strongly arcuate at middle, clypeus with rounded angles, margin deeply reflexed. Thorax sparsely punctured, a slight impression near the middle of the side, sub-apical and basal marginal lines distinct. Elytra coarsely punctured, piceo-testaceous, surface uniformly and rather brightly æneous. Legs entirely testaceous. Anterior tibiæ with the upper tooth obsolete. Body beneath sparsely punctured, and sparsely and finely pubescent. Length .36 inch; 9 mm.

This species resembles *elongata*, but the clypeus has a much more broadly reflexed margin, the thorax less punctured, the hind tibiæ entirely testaceous, and the anterior tibiæ bidentate only.

Occurs in Canada.

D. testacea, Kby.—Pale testaceous, elytra with very faint tinge of æneous. Head coarsely and densely punctured, with very few hairs. Clypeus with rounded angles, margin rather broadly reflexed, frontal suture distinct but not impressed. Thorax sparsely punctured, sparsely pubescent, hind angles distinct but not prominent, anterior sub-apical and basal marginal lines feeble. Elytra coarsely punctured, sparsely pubescent. Body beneath sparsely punctured and pubescent. Legs testaceous.

This species might be mistaken for a pale *elongata*, but the thorax is much less densely punctured, and the hind angles of the ♂ thorax less prominent. The punctures of the thorax are finer than in *subvittata*, and there is no trace of the median line as in the latter species. The clypeus is rather more widely reflexed than in either of the two mentioned, though less so than in *canadensis*, from which it also differs in the tridentate anterior tibiæ.

Occurs in Canada and Vermont.

D. pallens, Lec.—Pale testaceous above and beneath, elytra with very faint tinge of æneous. Head very densely and coarsely punctured, very sparsely pubescent, frontal suture obsolete. Clypeus with rounded angles, margin very feebly reflexed. Thorax rather coarsely punctured, punctures at the sides denser and sub-confluent, sides behind the middle oblique, angles obtuse, surface sparsely pubescent. Elytra coarsely but sparsely punctured,

finely rugulose. Body beneath sparsely punctured and finely pubescent. Legs testaceous.

This species, of which I have seen but one female, resembles the preceding, but is shorter and more robust, and with the margin of the clypeus very narrowly reflexed. The basal and sub-apical lines are still more obliterated.

One specimen, California, (Leconte).

D. Crotchii, n. sp.—Form slender as in *subvittata*, color rufo-piceous, elytra bright metallic green with very narrow pale border, legs testaceous or rufo-testaceous. Head piceous, clypeal margin paler, surface moderately densely punctured, sparsely pubescent, frontal suture impressed, clypeal margin moderately reflexed. Thorax piceous, form of *subvittata*, moderately densely punctured, sparsely pubescent, sub-apical line feebly impressed, basal marginal line nearly obsolete. Elytra rather finely punctured, punctures nearly obliterated by the fine transverse wrinkles, surface finely pubescent. Body beneath piceous, sparsely pubescent. Legs testaceous or piceo-rufous. Legs and form of *subvittata*.

This species begins a small series, the members of which are extremely difficult to separate in description. The present species is more especially distinguished from those which follow, by the elytral sculpture and the feeble marginal thoracic lines. At first sight the elytra will be seen to present a much less shining surface.

Several specimens were collected by myself in the high Sierras of California, and others subsequently by my lamented friend G. R. Crotch, in whose memory it is named.

D. Backii, Kby.—Head, thorax, body beneath and legs nearly black, elytra bright green or bronze, with at most a very narrow paler margin. Head black, moderately densely and coarsely punctured, frontal suture impressed, clypeal margin narrowly reflexed. Thorax moderately densely punctured, especially at the sides. Elytra coarsely but not closely punctured. Body beneath sparsely pubescent and punctured.

Specimens of this species rarely occur with the elytra more or less testaceous, these must be considered partially immature, the thorax is however always black, and the clypeal margin never pale.

Occurs in Canada and northward, also in Utah and Oregon.

D. fuscula, Lec.—Rufo-testaceous, elytra piceo-æneous with moderately broad pale margin. Head moderately densely and coarsely punctured, sparsely pubescent, frontal suture impressed, clypeal margin moderately reflexed. Thorax sparsely but moderately deeply punctured, intervals shining, sparsely pubescent. Elytra piceo-æneous with moderately broad pale limb, surface very coarsely punctured, sparsely pubescent. Body beneath sparsely punctured and pubescent.

Specimens often occur with the body beneath, head and thorax piceous, legs rufo-piceous. The especial characteristics of this species

are the sparsely punctured thorax, coarsely punctured elytra and the deep bronze tinge of the surface.

Occurs in the southern Atlantic States from Maryland to Georgia, also in Ohio.

D. fulgida, Lec.—Rufo-testaceous, elytra brilliant green shining with narrow pale limb. Head very coarsely and densely punctured, sparsely pubescent, frontal suture impressed, clypeal margin narrowly reflexed. Thorax rather sparsely but coarsely punctured, sparsely pubescent. Elytra brilliant metallic green, coarsely and deeply punctured, smoother at basal third, surface sparsely pubescent. Body beneath rufo-testaceous, sparsely punctured and pubescent. Legs paler.

I have seen only females of this species. It can only be confounded in description with *fuscata* from which it differs by its larger size, more coarsely punctured thorax and the color of the elytra. Varieties rarely occur with the elytra testaceous.

Occurs in Oregon and Vancouver.

D. truncata, Lec.—Rufo-piceous. Head coarsely punctured, sparsely pubescent, frontal suture deeply impressed. Clypeus truncate in front, sides slightly convergent, angles acute, margin rather broadly reflexed and testaceous. Thorax finely rugulose, sparsely pubescent. Elytra with paler limb, surface bronzed, punctured and coarsely wrinkled. Body beneath sparsely punctured and pubescent. Legs testaceous or piceo-testaceous.

This species which is about the smallest, is easily known by the truncate clypeus and the thoracic sculpture.

Occurs in Colorado, Oregon and California.

D. clypeata, n. sp.—Form robust, color piceous, elytra luteous without metallic lustre. Head coarsely and densely punctured, frontal suture not impressed. Clypeus prolonged over the labrum, rounded in front, slightly dilated at the sides, margin moderately reflexed. Thorax coarsely and densely punctured especially toward the sides, sub-apical line obliterated at middle, basal marginal line feeble, disc moderately convex, sides very obtusely sub-angulate, posteriorly oblique, hind angles obtuse, margin in front crenulate. Elytra luteous without surface lustre, obsoletely tricostrate, surface coarsely punctured. Body beneath sparsely punctured, abdomen and sternal side pieces finely alutaceous, surface sparsely pubescent. Legs piceo-testaceous. Length .42 inch; 10.5 mm.

This species has somewhat the aspect of the succeeding group, but has no median thoracic line. The prolonged clypeus will serve to distinguish it at once from all others in our fauna.

One specimen ♀, California. Henry Edwards.

D. albicollis, Burm.—Testaceous or piceo-testaceous, elytra with moderate æneous tinge. Head coarsely and densely punctured, moderately pubescent, frontal suture feebly impressed, clypeus testaceous, margin moderately reflexed. Thorax coarsely but sparsely punctured, a deep median groove, surface sparsely hairy, sides obtusely angulate at middle, posteriorly oblique

angles broadly rounded. Elytra faintly piceous with æneous tinge, margin and suture paler, disc faintly sub-tricostate coarsely punctured, sparsely pubescent. Body beneath sparsely punctured, moderately densely pubescent. Legs testaceous, tibiæ and tarsi usually darker.

The males have the outer spur of the hind tibiæ much broader than the inner, truncate at tip and distinctly twisted.

Occurs in the Middle States and Canada.

D. valida, Lec.—Resembles the preceding in form and sculpture and differs as follows:—Head, thorax, body beneath and legs ♂ piceous, ♀ rufous. Elytra brilliant metallic green with very narrow pale margin. Hind tibiæ ♂ with the outer spur very little stouter than the inner, not twisted but obtuse at tip.

Occurs in California and Oregon.

D. sulcata, Lec.—Piceous, elytra deeply bronzed. Head coarsely and densely punctured, frontal suture impressed, occiput with vague chevron-like impression, clypeal margin feebly reflexed. Thorax very sparsely punctured, the punctures being more densely crowded in the median impression, and a vague fovea on each side, surface sparsely pubescent. Elytra coarsely punctured, surface deeply bronzed, sparsely pubescent. Body beneath sparsely pubescent and hairy. Legs testaceous, hind tibiæ and tarsi darker.

In the male of this species, the hind tibial spurs are slender and equal.

Occurs in New Mexico.

D. pusilla, Lec.—Piceo-testaceous. Head rugulose, frontal suture very vague, clypeus subtruncate, sides slightly convergent, margin moderately reflexed. Thorax with fine, very sparsely placed punctures, median groove moderately impressed, surface rather shining, sparsely pubescent. Elytra punctured, sparsely pubescent, surface with very faint bronze tinge. Body beneath sparsely punctured and pubescent. Legs piceo-testaceous, hind tibiæ and tarsi darker.

In both this species and the preceding, the pubescence has a silken aspect. The hind tibial spurs are slender and similar in the sexes.

Occurs in California.

Bibliography.

- D. elongata**, Fab., Ent. Syst. I. 2, p. 170; Lec., Journ. Acad. 1856, p. 279.
elongatula, Schonh., Syn. Ins. I. 3, p. 210.
linearis, ♀, Gyll., Sch. Syn. Ins. I. 3, App. p. 103; Burm., Handb. IV. 2, p. 74; Lec., loc. cit.
hexagona, Germ., Ins. Spec., Nov., p. 124.
virescens, Kby., Fauna Am. Bor. IV., p. 134.
backii, † Burm., Handb. IV. 2, p. 536.
- D. subvittata**, Lec., loc. cit., p. 279.
virescens, var. c., Kby., loc. cit.
- D. canadensis**, Horn, n. sp.
D. testacea, Kby., loc. cit., p. 135; Lec., loc. cit., p. 279.
D. pallens, Lec., Proc. Acad., 1859, p. 283.

- D. Crotchii**, Horn, n. sp.
D. Backii, Kby., loc. cit., p. 134, pl. 2, fig. 6; Lec., Journ. Acad., 1856, p. 280.
D. fuscula, Lec., loc. cit., p. 281.
D. fulgida, Lec., loc. cit., p. 279.
D. truncata, Lec., loc. cit., p. 281.
D. clypeata, Horn, n. sp.
D. albicollis, Burm., Handb. IV. 2, p. 74; Lec., loc. cit., p. 281.
D. valida, Lec., loc. cit., p. 281.
D. sulcata, Lec., loc. cit., p. 281.
D. pusilla, Lec., loc. cit., p. 282.

CENONYCHA, n. g.

This genus agrees with *Dichelonycha* in all respects, except in the following characters.

Head moderately deeply inserted, eyes partially concealed by the anterior angles of the thorax. Thorax without trace of sub-apical, impressed line. First abdominal segment in great part concealed by the coxæ, abdomen apparently with five segments only.

In *Dichelonycha* the head is prominent, the eyes distant from the thoracic angles, the first abdominal segment at least half visible at the sides, and distinctly visible at middle. The antennæ of *Dichelonycha* are nine-jointed.

Three species are referred to this genus, differing especially as follows:

- Elytra oblong, body winged. Antennæ ten-jointed.....**rotundata**.
 Elytra oval, body with very feeble wings. Antennæ nine-jointed...**socialis**.
 Elytra oval, body apterous. Antennæ eight-jointed.....**ovipennis**.

C. rotundata, Lec., (*Dichelonycha*), Journ. Acad., 1856, p. 281.—Form oblong, color brownish testaceous without metallic lustre. Head coarsely and moderately deeply punctured, frontal suture distinct, feebly impressed. Clypeus truncate in front, margin feebly, angles more broadly reflexed and slightly prominent. Thorax rather more than twice as broad as long, sides gradually divergent posteriorly, hind angles very broadly rounded, disc shining, coarsely but sparsely punctured, margin with rather long fimbriæ. Elytra oblong, slightly broader behind, coarsely punctured, slightly rugulose at middle, and with very sparse and inconspicuous pubescence. Body beneath very sparsely punctured and pubescent. Length .32—.40 inch; 8—10 mm.

This species may be known by its ten-jointed antennæ. Its form and general appearance cause it to resemble some of the members of the group *Rhizotrogi*.

Occurs from Oregon to Fort Yuma, Cal., but rare.

C. socialis, n. sp.—Form oblong oval, narrower in front, color brownish testaceous, sides of elytra somewhat paler. Clypeus hemihexagonal, margins reflexed, more broadly in front, anterior edge emarginate, angles moderately prominent, surface roughened by the confluence of large but superficial punc-

tures. Head densely and coarsely punctured in front, gradually more sparsely posteriorly. Thorax twice as broad as long, anterior angles prominent and partially concealing the eyes, sides slightly sinuate in front, rather broadly arcuate at middle, hind angles broadly rounded, surface sparsely punctured and with a few short recumbent hairs; margins fimbriate. Elytra oval, broadest behind the middle, humeri feebly prominent, apex subtruncate, surface very finely alutaceous and sub-opaque, sparsely and finely punctured, each puncture with a very short hair. Body beneath paler than above, sparsely punctured and sparsely hairy. Legs pale testaceous. Length .40—.50 inch; 10—12.5 mm.

The sexes are distinguished by a slightly longer club of the male antennæ. This species agrees with *rotundata* in the form of the clypeus, its form is however more robust, the humeri much less distinct, and the sides of the elytra less parallel. It differs from both species by the number of the joints of the antennæ.

Several specimens were collected by Dr. Edward Palmer, on the island of Guadalupe, on the coast of Lower California.

C. ovipennis, n. sp.—Form elongate oval, color testaceous. Head coarsely but very sparsely punctured, frontal suture distinct, feebly impressed. Clypeus rounded in front, margin moderately reflexed. Thorax twice as broad as long, sides gradually divergent posteriorly, hind angles broadly rounded, surface smooth, sparsely and not coarsely punctured, margins with long fimbriæ. Elytra oval, slightly broader behind the middle, humeri obtusely rounded, surface very sparsely punctate and with inconspicuous pubescence. Body beneath very sparsely punctured and sparsely hairy. Length .30 inch; 7.5 mm.

The apterous body and eight-jointed antennæ serve to distinguish this species. The clypeus also differs considerably in form from *rotundata*.

The third and fourth joints of the antennæ are moderately long and appear to be connate, each one having the appearance of being formed by the fusion of two joints. This will account for the antennæ being eight-jointed in this, and ten-jointed in the preceding species.

I have but one specimen ♀, from Nevada.

The three species present an extremely interesting series, their salient characters being as follows:

C. rotundata, Lec.

Clypeus emarginate and angulate on each side. Antennæ ten-jointed. Elytra oblong, humeri distinct, wings well developed and flexed, adapted for flight.

C. socialis, Horn.

Clypeus as in *rotundata*. Antennæ nine-jointed. Elytra oval, humeri obtuse, wings rudimentary not flexed, and not adapted for flight.

C. ovipennis, Horn.

Clypeus broadly rounded. Antennæ eight-jointed. Elytra oval, humeri obliterated, wings entirely wanting.

TRICHIUS, Fab.

The sexual characters of the species require primary attention. The pygidium of the male is always more convex than that of the female, and the tip somewhat inflexed. This affords the means of distinguishing the sexes at all times.

In *delta* the males have the anterior tibiæ bidentate, in the female tridentate, the anterior tibial spur is less developed in the male, and the hind tibiæ of the same sex have a small obtuse tooth at the middle of the inner side. The middle of the posterior margin of the fourth ventral segment is elevated in the male and flat in the other sex. This species has been separated by Burmeister, and with its congeners named *Trigonopeltastes*. The tibial differences in the sexes form the characters of the genus which may for convenience be continued.

The other species of *Trichius* have the tibiæ similar in their dentation in the sexes. *T. piger* and *texanus* have no anterior tibial spur in the male, while it is always present in the males of the other species, although much feebler in the males than in the females.

In *bibens* and *viridulus* the females have the pygidium sinuate on each side near the tip, the tip being truncate. This sinuation is hardly observable in the males.

These characters reduced to the tabular form give the following result:

Anterior tibiæ similarly dentate in the sexes. (TRICHIUS.)

Anterior tibiæ ♂ without spur.

Body beneath and pygidium rufous; anterior tibiæ ♂ moderately stout.

piger.

Body beneath and pygidium black; anterior tibiæ ♂ with inner edge very broad.....**texanus.**

Anterior tibiæ ♂ with spur, more slender and straight than in the ♀.

Pygidium oval at tip in both sexes. Elytra with lateral velvety space.

Third and fifth elytral intervals subcostiform; two oblique white fasciæ.

affinis.

Pygidium sinuate on each side and truncate at tip. Elytra without lateral velvety space, intervals equal.

Elytra orange red with tinge of æneous.....**bibens.**

Surface brilliant metallic green.....**viridulus.**

Anterior tibiæ dissimilarly dentate in the sexes. (TRIGONOPELTASTES.)

Thorax with reversed deltoid mark.....**delta.**

T. piger, Fab.—Head and thorax densely punctulate, sparsely clothed with short, yellowish, erect hairs, surface slightly tinged with green. Elytra rufous

or rufo-piceous, third and fifth intervals more convex, subcostiform, second and fourth intervals moderately densely punctate, moderately hairy; two white fasciæ one slightly in front of, the other slightly posterior to the middle, extending obliquely forward from the margin, attaining the fifth, rarely the third interval; a space of velvety aspect, exterior to the fifth interval and posterior to the forward band and divided by the posterior. Body beneath and femora piceous with æneous tinge, clothed with long white silken hairs. Abdomen, pygidium, tibiæ and tarsi, rufous. Pygidium with alutaceous surface clothed with short hairs at middle, at sides frequently a white scaly space with longer hairs.

The male has no anterior tibial spur, and the tibia at tip is very obliquely truncate, the inner face being moderately broad.

This species occurs more especially in the Northern States as far west as Missouri.

T. texanus, n. sp. (Candeze mss.)—Body above and beneath black, shining. Head densely punctulate. Thorax moderately densely punctured, and with the head, clothed with short erect pubescence. Elytra with intervals three and five more elevated and smoother, two and four flat, moderately densely punctured and pubescent; two oblique white bands and lateral velvety spot as in *piger*, frequently also a subscutellar short white line, and another on the second interval. Pygidium alutaceous pubescent, a white space on each side. Body beneath and legs black, moderately hairy. Similar in size to *piger*.

The male has the anterior tibiæ very stout, the inner face broad and without terminal spur. The thorax equally punctured and with whitish hairs. The pygidium is much less conspicuously pubescent than in the female.

The female has the thorax more coarsely punctured and a smoother space within each hind angle. The angles have a narrow white space on each, and the hairs are longer than in the male and yellowish. The pygidium is also more densely hairy, the hairs yellow and longer than in the male.

In both sexes the thorax is less densely punctured than in *piger*.

Occurs in Texas and Florida.

T. affinis, Gory.—Body above and beneath and legs black, with slight tinge of bronze, disc of elytra usually paler. Head moderately densely, thorax sparsely punctured, sparsely pubescent. Elytra with intervals three and five slightly more convex, two and four very sparsely punctured; two white bands, subsutural white line and velvety space as in *texanus*. Pygidium with lateral white space moderately densely alutaceous and pubescent. Usually smaller than *piger*.

Resembles *piger*, but with a smaller and less punctured thorax, and differs especially in the sexual characters and the very sparse punctures of the second and fourth elytral intervals.

In the female the pygidium is slightly flattened near the tip.

Occurs from Canada and New Hampshire to Georgia.

T. bibens, Fab.—Body above, beneath, and legs bright metallic green, elytra rufo-testaceous with slight æneous lustre. Head densely punctured. Thorax more coarsely but less densely punctured, clothed with short erect hair.

Elytra with intervals very nearly equal, the second and fourth more densely punctured and hairy. Body beneath moderately hairy. Pygidium punctured and alutaceous, moderately hairy, with narrow lateral white space.

The male has a slender, straight anterior tibial spur. The pygidium of the female is distinctly sinuate on each side near the tip, and the tip truncate. There are no oblique transverse bands on the elytra and no trace of them, and no lateral velvety space.

This species is especially abundant in Virginia, rarely occurring north of there, although extending its habitat toward the Gulf States.

T. viridulus, Fab.—Entire surface brilliant metallic green. Head sparsely and finely, thorax more coarsely punctured, sparsely clothed with short erect hair. Elytra with intervals equal and nearly equally punctate. Pygidium coarsely alutaceous. Body beneath sparsely pilose.

This species more nearly resembles *affinis* in form. The elytra with, at most, mere traces of the transverse bands but no lateral velvety space. The pygidium of the female is very decidedly sinuate on each side near the tip, and the tip truncate. Both sexes have anterior tibial spurs, that of the male more slender and straighter than the female.

The color is apt to vary somewhat, the green becoming dark blue, in which case the elytral bands are somewhat more evident.

Occurs in the Gulf States.

T. (*Trigonopeltastes*) delta, Fab.—Clypeus sparsely punctate and hairy, hairs recumbent; front velvety black, a transverse band of yellow scales between the eyes. Thorax velvety black, entire margin and reversed delta yellow, covered with scales and with very short hairs. Elytra with rows of indistinct punctures, intervals equal, color orange or paler with black markings arranged as follows; an oblique band extending from the humeri toward the middle of the suture and prolonged parallel with the latter, a triangular space exterior to this; also a subscutellar short yellow line. Scutellum yellow, divided. Pygidium densely clothed with yellow scales, sparsely pubescent, tip and median line usually abraded. Body beneath densely clothed with yellow scales and sparsely hairy. Legs rufous with very few scales, hind tibiæ and tarsi darker.

The elytral markings are subject to extreme variation, that above described being the typical form. The sexual characters have already been noticed.

Occurs from Delaware to Texas.

GNORIMUS, Lep.

In this genus the sexual distinctions are also well marked. In the male the pygidium does not differ essentially in form from that of the female, there is however on each side a vague longitudinal impression. The middle tibiæ of the female are straight, those of the male are

more slender at base and very suddenly flexed or arcuate. The anterior tibial spur is stouter in the female.

G. maculosus, Knoch.

Occurs in the Middle States and Canada.

Bibliography.

TRICHIUS, Fab.

- T. piger**, Fab., Syst. Ent., p. 40; Gory et Perch. Mon., p. 89, pl. 10, fig. 5, Schaum, Ann. Fr., 1849, p. 292.
Drummondi, G. et P. Mon., p. 88, pl. 10, fig. 4.
rotundicollis, Kby., Fauna Am. Bor. IV., p. 138, ♀.
- T. texanus**, Horn, n. sp.
- T. affinis**, G. et P. Mon., p. 93, pl. 11, fig. 1; Schaum, loc. cit., p. 293.
bibens, † var. d Burm., Handb. III., p. 275.
mutabilis, Schaum, Ann. Fr., 1844, p. 400, pars.
piger, † var. b Schaum, Germ. Zeitschr. II., p. 413.
variabilis, var. a Schaum, Germ. Zeitschr. III., p. 240.
assimilis, Kby., Fauna Am. Bor. IV., p. 137.
viridans, Kby., Fauna Am. Bor. IV., p. 137.
bistriga, Newm., Ent. Mag. V., p. 170.
- T. bibens**, Fab., Syst. Ent., p. 49; G. et P. Mon., p. 93, pl. 11, fig. 2; Burm., Handb. III., p. 754.
bidens, Ol. Ent. I. 6, p. 62, pl. 10, fig. 87.
- T. viridulus**, Fab., Syst. App., p. 820; G. et P. Mon., p. 94, pl. 11, fig. 3; Schaum, Ann. Fr., 1849, p. 293.
lunulatus, Fab., Syst. Ent., p. 41; G. et P. Mon., p. 90, pl. 10, fig. 6.
bibens, † var. b Burm., Handb. III., p. 755.
mutabilis, Schaum, Ann. Fr., 1844, p. 400, pars.
variabilis, var. b and c, Schaum, Germ. Zeitschr. III., p. 240.
virens, Linn., Syst. Nat. Ed. Gmel. I. 4, p. 1584.
- T. delta**, Forst., Cent. Ins. I., 1771, p. 7; G. et P. Mon., p. 91, pl. 10, fig. 7; Burm., Handb. III., p. 748.

GNORIMUS, Lep.

- G. maculosus**, Knoch, Neu. Beytr., p. 109, pl. 2, fig. 2; Burm., Handb. III., p. 727; Schaum, Ann. Fr., 1849, p. 291.
Bigsbyi, Kby., Fauna Bor. Am. IV., p. 136.
dissimilis, G. et P. Mon., p. 102, pl. 2, fig. 6.