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NOTES ON SOME AMERICAN BEROSUS (S. STR.) (COLEOPTERA-PALPICORNIA-HYDROPHILIDAE),

by Armand D'ORCHYMONT (Brussels).

This paper gives first original descriptions of some new species with testaceous heads. Having been compelled to classify a series of American *Berosus* with obscure metallic-colored heads and having studied for comparison what is accepted to be *infuscatus* LECONTE and *striatus* (SAY), I have come to the conclusion that several different species had been confounded under these names not only in collections but in the literature as well. G. H. HORN said in his revision that he was « entirely unable to separate the Pacific forms (of *infuscatus*) from those found on the Atlantic slope » (1). To verify this assertion, it was necessary to separate the males from the females and then to extract and study the aedeagi. By applying this proceeding further to some quite closely related species, the errors of identification could no longer escape.

A. SPECIES WITH TESTACEOUS HEAD.

Berosus (s. str.) *ruffinus* n. sp.

Recalls *B. rufulus* KNISCH but is entirely of a clear yellow, including the scutellum, with faint traces of two geminate and brownish spots on back of head, two others also geminate near

(1) Trans. Amer. Phil. Soc. XIII, 1873, p. 123.

the anterior margin of pronotum, the striae and punctures of elytra moderately obscure and with some faint, small brownish and elongate spots beyond the middle, forming a faint transverse and undulate band, and also another transverse but shorter and more distal one, reaching not beyond the 5th interstice externally; humerus yellow and not spotted. Only the first abdominal segment of the male is carinate at base, the four others are unarmed in the middle near the posterior border, and in both sexes the external margin of the last two segments are not microscopically denticulate. The terminal emargination of the 5th abdominal segment has no teeth at the bottom. The median lobe of the aedeagus is somewhat thickened as an elongate club at the apex and extends a little beyond the parameres; the latter end dorsally in a sharp spinulose point and bear ventrally at the place where this point originates an equally long arista (fig. 1). This species bears a resemblance to a spe-

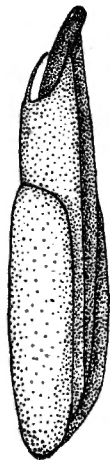


Fig. 1. — *Berosus* (s. str.) *ruffinus* n. sp.
Aedeagus seen from aside. $\times 50$.

cies of *Enoplurus* but the elytra are not spiny. The sutural angle is only a little prolonged (σ φ), as in *rufrenus*, described later on.

Head finely punctured, the punctures of moderate density, becoming larger toward the extremity and intermixed here with some scarce and extremely fine punctures.

Pronotum transverse, oily nitid and not very smooth; punctuation moderate, not very dense, with extremely fine punctures

intermixed; sides faintly reticulate chiefly near the posterior angles.

Scutellum with some punctures, faintly reticulate.

Elytra nitid, non reticulate in female, with fine but well impressed striae; punctures of striae very fine, longitudinally very closely placed, becoming scarcely larger but more broadly spaced towards the sides. Interstices plane with punctures of same size as those of striae, irregularly arranged in twos or sometimes threes in front upon the 2^d and 3^d, in a single irregular or in places nearly regular row on the other intervals. These punctures are setigerous and the short reddish recumbent spinous setae are very conspicuous beyond the middle towards the extremity, where the pores also become somewhat larger.

Mesosternal lamina with a small anterior projection, followed by an arcuate wide-opened emargination.

Anterior tarsi of male, as always, 4-articulate, the two basal joints of which are scarcely thickened.

Type. Bolivia, Beni, Blanca Flor, January (W. M. Mann, Mulford Biological Exploration 1921-22, U. S. National Museum), ♀, 4, 1 × 2 mm. Also Cavinass (Rio Beni), January (M. R. LOPEZ, same expedition), a mutilated ♂ (without head or pronotum) from which the aedeagus has been extracted.

Berosus (s. str.) *rufrenus* n. sp.

Also near *B. rufulus* KNISCH, with the male second to fifth ventral segments denticulate in the middle, near the posterior margin, thus somewhat concealing on the fifth the two little teeth at the bottom of the terminal emargination. But the lateral margin of the last two ventral segments are unarmed, while microscopically denticulate in *rufulus*. Aedeagus very different: very elongate with parameres much longer than the median lobe, attenuated and pointed at tip (fig. 2). In *rufulus*, the parameres are not longer than the median lobe, they are not slender, but abruptly rounded externally at the extremity, the terminal internal angle only being indicated.

Of a yellow testaceous color, obscured behind the head, pronotum with two blackish geminated, non metallic, irregular and narrow lines in the middle, scutellum obscure, elytra with some dark spots forming two faint oblique bands placed one after the other, the first directed towards the darkened humerus.

Punctuation of head moderate, not very dense, becoming larger behind, where there are a few much finer punctures intermixed.

Pronotum unevenly punctured (as in *rufulus*), with extremely fine punctures, as on the head, intermixed with the much larger and irregularly spaced punctures, which are largest on

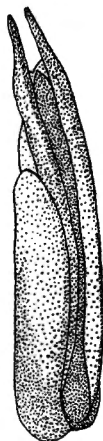


Fig. 2. — *Berosus* (s. str.) *rufrenus* n. sp.
Aedeagus seen from aside. $\times 50$.

the sides. Shape of pronotum transverse, nearly the same as in *rufulus*.

Scutellum with some punctures as in the latter.

Elytra somewhat shorter as in the same but with the sutural angles (σ φ) although rounded, somewhat prolonged. The striae are equally deep and narrow, with the punctures correspondingly larger towards the exterior, but the punctuation of the interstices is less dense, finer and irregularly distributed, becoming, however, a little larger towards the apex.

Mesosternal lamina anteriorly with a microscopical tooth. The longitudinal carina of first ventral segment extends nearly to the middle.

The two basal articulations of the male anterior tarsi are but feebly thickened, still more feebly than in *rufulus*; the female pronotum is reticulate towards the sides, the elytral interstices non reticulate.

Type. Panama (Canal Zone), Tabernilla (Aug. Busck), June 4; σ , 3.5×1.6 mm. (U. S. National Museum). Some paratypes of both sexes, all from Panama (Cabina and Trinidad River), and of same collector, May-June.

Berosus (s. str.) rufulus KNISCH, 1924.

The venter of this argentinian species is finely denticulate along the exterior margin of the last segment and also more or less along the same margin of foregoing segment; both sexes have this hitherto not observed particularity. The type is a female and has no ventral carina at the base of the first segment. The male seems not to have been studied in this respect by the author; otherwise he would have observed on the specimen of that sex, labeled by him in his collection, that the 2^d to 4th abdominal segments have a little dentiform carina in the middle, near their posterior margin. There is also a carina, but much less conspicuous just before the two little teeth at the bottom of emargination of 5th segment and these teeth are not concealed by it.

Berosus (s. str.) stratonicus n. sp.

Much like *stramineus* KNISCH, a little smaller, the large punctures of pronotum more dense at the sides and the claws of the intermediate male tarsi strongly lobed at base, unequal, the internal one more arcuate toward the tarsus than the external claw, whereas in *stramineus*, and also *exiguus* (SAY) and *minimus* KNISCH, they are equal, and the two extended, feebly arcuate. The aedeagus (fig. 3) is also different, resembling more that of *minimus* than *stramineus*.



Fig. 3. — *Berosus* (s. str.) *stratonicus* n. sp.
Aedeagus seen from aside. $\times 50$.

Of a testaceous color even on head which may be only faintly darkened behind. Pronotum without geminate stripes, entirely testaceous. Striae of elytra narrowly dark brown, two brownish

spots, entire or subdivided, along the suture on the second and third interstices, placed one behind the other, of which the more anterior are sometimes obliquely prolonged on each side towards the equally brownish humerus.

Punctuation of head variable, of same size and spacing as on the pronotum however somewhat larger on postfrons than on prefrons. Maxillary palpi not darkened at the apex.

Pronotum transverse with sides straight, anterior angles very broadly rounded but of less than 90° ; posterior angles obtuse, also broadly rounded.

Elytra with very narrowly impressed striae, becoming wider towards the sides, their internal border abrupt while the external gradually merges into the interstice. Their punctures are more widely separated longitudinally than in *exiguus*, are small along the internal striae, becoming gradually larger towards the exterior and occupying more and more of the interstice. These interstices are plane and smooth, very finely and quite sparsely, irregularly punctured, the 3^d and 5th alone possessing some distinctly larger and separated pores. Sutural angles rounded, more angulate in females.

Metasternal lamina not very high, declivous anteriorly and armed there with a triangular projecting tooth. Abdomen only carinate at the base of the first ventral segment, the fifth with an emargination that is somewhat convex at the bottom in both sexes.

Upperside nitid between the punctures, without reticulations in males and females.

Type. Panama (Canal Zone), Ancon, 12, V, 1911 (A. H. JENNINGS, at light), ♂, 2.2×1.2 mm. (U. S. Nat. Mu.). Paratypes, one ♂ of same origin (27-IV-11) and 2 ♀♀ from Las Cruces and Colima (Panama).

A single female from Cayamas (Cuba, in same museum) has the side of pronotum reticulate between the strong punctuation; it may belong to a different species, but males from the same island are necessary to decide.

B. SPECIES WITH DARK, METALLIC HEAD.

Berosus (s. str.) *infuscatus* LECONTE, 1855.

B. punctulatus LECONTE, 1852 (non BOHEMAN, 1851).

B. flavicornis SHARP, 1882.

B. bermudanus KNISCH, 1924.

The Mexican specimens attributed with doubt by SHARP (2) to *infuscatus* are in fact undescribed (see further, *ingratus*). That author, as he said, could not see North American individuals; he redescribed the species under the name *flavicornis* after specimens, also from Mexico. I have seen both sexes of others from Lerdo-Durango (same country), answering well to the diagnosis of 1882: they have the same aedeagus (fig. 4)



Fig. 4. — *Berosus* (s. str.) *infuscatus* LÉCONTE.
Aedeagus. Dorsal view. $\times 30$.

as dissected *infuscatus* from Florida, Arkansas, Texas and Louisiana. These I consider as being of typical form; indeed the species was described from the « middle and southern states ». G. H. HORN (l. c.) said that spread over all the « Gulf States, Colorado, Arizona, it reaches southeastern California. » Florida is cited by SHARP (3), Leng and Mutchler (4) and Blatchley (5). I have not seen a male, with the typical aedeagus (fig. 4) from Colorado, Arizona or California. Perhaps the last two states have been cited by HORN because he placed *punctulatus* LÉCONTE, from the Colorado River (California) and Gila River (Arizona), as a synonym of *infuscatus*. Wrongly or rightly, one cannot say because the peculiarities of the aedeagus of the types are not known. However, the name, being preoccupied by *punctulatus* BOHEMAN, 1851, from

(2) Biol. Centr. Americana I (2) 1882, p. 81.

(3) Without specimens, however, the words « all the Gulf States » of G. H. HORN being replaced by « Florida ».

(4) Bull. Amer. Mus. Nat. Hist., XXXVIII, 1918, p. 104.

(5) Ibid., XLI, 1919, p. 320.

Africa (6), has no right to priority. I must add that all Californian « *infuscatus* » that I have seen are either *ingeminatus* or *fraternus* LECONTE. *B. infuscatus* seems to be a rather southern species, but Colorado, Arizona and California are not proven regions for it.

B. bermudanus was described from two specimens from the Bermudas collected in brackish water near Hamilton, by Dr. Carl FORSTRAND, according to the label of the type in the KNISCH Collection. This specimen, however, has no conspicuous reticulation between the punctures on the disc of the head — the author alluded to this peculiarity at the end of his description —, while the second specimen in the Stockholm Museum, which I have not seen, should be very conspicuously reticulated on that part of the body. KNISCH was thus inclined to think that this was the only secondary sexual differentiation. But the individual with unreticulated head, labeled type, which he no doubt considered as being a male, is in reality a female (the mesocerci protrude, the anterior tarsi are 5-articulated and their basal joints are not incrassate) and the species thus seems established exclusively on females. To obtain males was necessary. Mr. T. A. RUSSELL, the Director of the Department of Agriculture at Paget (East) — Bermudas — was so kind as to search for them, and he captured for me a good series of both sexes from the brackish waters of Pembroke Marsh near Hamilton. A study of these specimens proved that they belonged in fact to *bermudanus*, but that this name is merely a synonym of *infuscatus* LECONTE. The aedeagus extracted from several males is identical with that of *infuscatus*; the lateral lobes are also a little inflated and widened dorsally before the extremity, this expanded part being of a lighter color. Most of the females have the disc of the head reticulated between the punctures, but one is nearly smooth only with faint traces of reticulation on the back of the head. This synonymy could be guessed as LAWRENCE OGILVIE (7) called attention in the introduction of his list to the old statement of T. M. JONES that most insects of these Atlantic islands are imported from the nearest portion of the American continent, North Carolina [where

(6) Ins. Caffr., I, 1851, p. 592.

(7) LAWRENCE OGILVIE. The Insects of Bermuda (Department of Agriculture, Bermuda), 1928, p. 5 and T. M. JONES « Naturalist in Bermuda », London, REEVERS and TURNER, 1859.

infuscatus occurs at Southern Pines according to BRIMLEY (8)] and the Virginia Coast for instance.

As for *B. californicus* MOTSCHULSKY, considered by LECONTE as a synonym of his *punctulatus* and therefore according to G. H. HORN, of *infuscatus*, I do not consider belongs here because of its small size (3.5 mm.) and the fact that the elytral striae are described as deep. To establish this synonymy LECONTE (9) relied upon a specimen from the Sacramento Valley (Arizona) received from MOTSCHULSKY, with the collection name *californicus*, before 1855. But MOTSCHULSKY no doubt altered the significance of his name, for in the description of *californicus* published four years later, in 1859 (10), San Francisco (California) is the only locality given, and the species is considered as being distinct from *punctulatus*, although the author had known of LECONTE's publication. However, since the beetle is insufficiently described, it will have to remain unknown.

Berosus (s. str.) ingeminatus n. sp.

?*B. punctulatus* LECONTE, 1852 (non BOHEMAN, 1851).

The « *infuscatus* » specimens from Santa Barbara (California, KNISCH Coll.) and Berkeley, San Diego (VAN DYKE leg.), one male too labeled « Nor^d America », *striatus* KNISCH det., have a well differentiated aedeagus (fig. 5) as compared with that

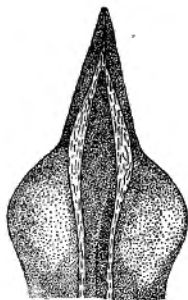


Fig. 5. — *Berosus* (s. str.) *ingeminatus* n. sp.
Extremity of parameres and median lobe. Dorsal view. × 50.

(8) C. S. BRIMLEY, « The Insects of North Carolina » (North Carolina Department of Agriculture), 1938, p. 133.

(9) Proc. Ac. Nat. Sc., 1855, p. 365.

(10) Bull. Soc. Imp. Nat. Mosc., XXXII, 2, III, 1859, p. 179.

of typical *infuscatus* (fig. 4): the parameres are much swollen dorsally before the extremity, then abruptly slender and extended dorsally as a terminal and very narrow ridge, much longer than wide, not placed in the same plane, the outer portion forming with the swollen part, an obtuse angle with rounded bottom. The surface of the pronotum is less distinctly reticulate, with an oily and not very smooth nitid appearance. On the other hand I have not been able to distinguish the females from those of *infuscatus*. These have the surface of the pronotum and elytra distinctly reticulate. The very different aedeagus, in spite of these resemblances, however, compels us to consider this form as a valid species.

Type. Santa Barbara (E. F. WINTERS, det. 1921), *infuscatus*, KNISCH det. et coll., ♂, 4.6×2.4 . Some ♂♂ paratypes and several ♀♀ of same origin, somewhat variable as to size, one male paratype and a female from Berkeley (California), two ♂♂ from San Diego (California), and one ♂ paratype, without locality. I only consider the males as paratypes.

If this is *punctulatus* LÉCONTE, which I am not able to say, the name would not be valid. It cannot be *californicus* MOTSCHULSKY either, for the reasons already given.

Berosus ingratus n. sp.

B. infuscatus SHARP, 1822 (non LÉCONTE, 1855).

This species differs from the true *infuscatus* by the series of elytral punctures being not deep and finer, especially around the scutellum, the intervals wider and quite plane, the surface of the elytra reticulate in both sexes, though less marked in the male, and by the aedeagus not having the parameres somewhat swollen before the extremity as in figure 4. Dorsally the aedeagus bears a strong resemblance to that organ in *stribalus* (see further fig. 8), but the parameres are somewhat thicker and less sharp in front of the extremity, and the base internally truncate and rounded (fig. 6), not pointed as in *stribalus* (fig. 8). The pronotum of the male is reticulated as in *infuscatus*.

Type. Mexico (T. FLOHR G.), Puebla 26, *infuscatus* KNISCH det. et coll., ♂. 5.75×2.9 mm. Paratypes. Mexico (T. FLOHR G.), Valle de Mexico, *infuscatus* KNISCH det. et coll., 1 ♂; Mexico City, 1 ♂♀; Oaxaca, 3 ♂♂, all five determined by SHARP as *infuscatus* (part of the material of the Biologia Centrali Americana); Mexico, 1 ♂; Cajaca, 1 ♀; one ♂, dist. fed. Mex.

(L. CONRADT), identified as *infuscatus* and one ♀, Mexico City (O. W. BARRETT, U. S. Nat. Mu.); one ♀ also, Tupatara (E. DUGÈS) in the Brussels Museum.

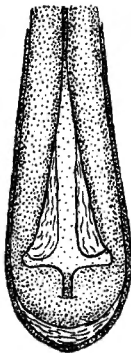


Fig. 6. — *Berosus* (s. str.) *ingratus* n. sp.
Base of aedeagus. Dorsal view. $\times 50$.

Berosus (s. str.) *styliifer* G. H. HORN, emend.

B. styliiferus G. H. HORN, 1873, 1874 (recte *styliifer*) (11).

B. falcatus SHARP, 1882.

The synonymy of *falcatus*, already accepted by KNISCH in his catalogue, is even more definitely proven by comparing the aedeagus of a specimen from Guanajuato (E. DUGÈS) in the Brussels Museum, labeled *falcatus* and thus belonging to the original series, with another marked Ks. (= ? Kansas) and a third ♂ from Colorado, the typical region of HORN's unique type, also a ♂. The organ is especially short and robust and the end of the very wide and vertically disposed parameres is in the form of an obtuse tooth. There is also a ♀ from New Mexico labeled « *infuscatus* » in the Brussels Museum, one from ? Kansas, one from Ohio and two from Mexico, one of the latter identified as « *infuscatus* » by KNISCH.

Berosus (s. str.) *striatus* (SAY).

Hydrophilus striatus SAY, 1825.

Berosus striatus LECONTE, 1855.

? *Berosus ordinatus* LECONTE, 1855.

(11) As alifer, florifer, frugifer, etc.

Under this name two species are mixed besides *pennsylvanicus* KNISCH (see further). The original diagnosis of SAY (12) is silent as to the part of the United States of America from whence the type originated (13), but as the description is based principally upon the color of the upperside, it is more comprehensive than the complementary description published later by LECONTE (14). According to SAY *striatus* has the elytra « with small remote black spots » « a small spot on the humerus, and two others arranged in a very oblique series, with respect to the first: then a transverse, much undulated series of five or six small spots; then two small spots near the sutural tip, black. » What I have considered as being typical *striatus* answers tho this description, much better than the specimens of the two following species: *pennsylvanicus* and *fraternus*, except that between humerus and suture the internal spot is geminate (a small elongate spot on both the second and third interstices), which makes in fact three spots and not two as pointed out by SAY. The large transverse and lateral spot which terminates exteriorly the undulate median series is always very conspicuous. The uneven intervals have some setigerous pores that are larger than the surrounding punctuation though not so large as they are in *fraternus*. The sides of the pronotum in

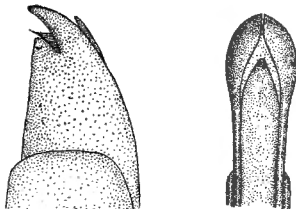


Fig. 7. — *Berosus* (s. str.) *striatus* (SAY). Left, extremity of aedeagus seen from aside, right, same extremity in dorsal view. $\times 50$.

the female may be, or may not be reticulate between the punctures, but the intervals of the elytra are not reticulate in the 29 females examined under the microscope. The aedeagus (fig. 7) shows that the affinities of *striatus* are with the palearctic *signaticollis* (CHARPENTIER); the two aedeagi are nearly identical,

(12) Jour. Acad. Nat. Sc. Philad., V, 1825, p. 188.

(13) According to Leng and Mutchler, l. c. p. 105, it should be Pennsylvania.

(14) Proc. Acad. Nat. Sc. Philad. VII, 1855, p. 365.

the parameres taken together are in the first only a little shorter at the extremity, more rounded at apex, distally more arcuate in lateral view, than in the second.

B. ordinatus LECONTE, a name based on a single specimen of large size from New York, has been printed as a synonym in HORN'S paper (15), but without justification. It is, perhaps, a female of *striatus*? Nothing is said in SAY'S and LECONTE'S description about sexes.

Material studied (all ♂♂, 20, have been dissected): Bon Accord (Brit. Col.) 1 ♂; Tacoma (Washington), *striatus* KNISCH det., 2 ♂♂, 2 ♀♀; Corvallis (Oregon), 1 ♂; Rochester (Minnesota), 1 ♂♀; St. Paul (Minn.), 1 ♀; Berrien Co. and Washtenau Co., Ann Arbor (Michigan), *striatus* KNISCH det., 2 ♀♀; Burlington (Iowa), *striatus* RÉGIMBART det., 1 ♂; Tyngsboro (Mass.), 6 ♂♂ 15 ♀♀; New York, 1 ♀; Catskill Mounts (New York), 1 ♂♀, *striatus* WINTERSTEINER and KNISCH det.; Mobile (Alabama), 1 ♂; Georgia, 1 ♀, *striatus* KNISCH det.; U. S. A. without locality, 5 ♂♂ 5 ♀♀; Bakersfield (California), in the San Joaquin Valley and east of the Coast Range of mountains, 1 ♂♀ (no specimens have been seen from west of this range. Does the species occur there?). Other specimens seen listed as from California belong to *fraternus* LECONTE. Florida, cited by LENG and MUTCHLER (l. c. p. 105) and BLATCHLEY (l. c. p. 320), seems possible, unless the Cuban *tribalus* extends into the peninsula? Florida, however, never had dry land connections with any of the Antillean islands (16).

Berosus (s. str.) *tribalus* n. sp. (17).

Very closely akin to *striatus* (SAY), veriss. But the punctuation of head is somewhat finer and better spaced, the pronotum also with finer punctures, not or indistinctly reticulate at sides, with the two median metallic, geminate spots sometimes united, the elytral striae somewhat less deep, the intervals less strongly punctured, the projecting part of parameres taken together, longer and narrower, more lanceolated.

Coloration. Head of a nitid and metallic greenish black, pronotum testaceous with a median spot indistinctly geminated,

(15) L. c., p. 123.

(16) See C. FRANCIS BYERS, Univ. Florida publication, Biol. Sc. Series, Vol. I (1), 1930, p. 218.

(17) Name without signification.

scutellum metallic black, elytra as in *striatus*, and testaceous with the striae and punctures slightly dark, two interrupted bands of small elongated spots which are directed, the first obliquely towards the dark humerus, the second less obliquely towards the mediolateral dark spot.



Fig. 8. — *Berosus* (s. str.) *stribalus* n. sp.
Aedeagus. Dorsal view. $\times 30$.

Head very nitid, without reticulation even in the female, its punctuation rather fine and well spaced, not double, yet more dense and finer near the eyes. Maxillary palpi with last joint larger than preceding darkened at tip.

Pronotum transverse, of same shape as in *striatus*, its punctuation a trifle finer as on the head and somewhat more distant, with here and there between the large punctures, some extremely fine ones which are visible only with strong magnification; it is nitid in the middle, indistinctly reticulate at sides in the male, more distinctly so in the female.

Scutellum of a dark greenish, metallic color, with some punctures, reticulate in the female.

Scutellum of a dark greenish, metallic color, with some punctures, reticulate in the female.

Elytra with sutural angle more acute, somewhat protruding, with striae as narrow as in *striatus* but a trifle less deep, especially behind, with the punctures somewhat finer and longitudinally more closely placed. Intervals of same width, becoming narrower behind, where they are less flat, their punctuation here also stronger; the surface nitid, even in females.

Mesosternal lamina with very small dentiform, downward projection, the anterior part as a long inclined line. First ventral segment with basal carina which does not reach the middle, the following segments not carinate, terminal emargination of fifth bidentate at bottom. Anterior male tarsi with basal joint, as in *striatus*, provided beneath with long cups, less swollen than in *infuscatius*, second joint scarcely wider than third, the fourth and last as long as the three preceding together or much longer if claws are included. More than basal half of intermediate and posterior femora pubescent, the distal border of pubescence transverse, not oblique.

Type. Cuba, 10 Km. S. of Pinar del Rio, Sep. 23, XII, 1913, ♂, 5.25 × 2.4 mm., KNISCH Coll. Paratypes: Cuba, Cayamas, May, E. A. SCHWARZ, 1 ♂ 3 ♀♀; Haiti, Bayeux, Tx, 1925, 1 ♂ U. S. Nat. Mu.; also Porto Rico, I, 1899, 1 ♂ and San Domingo, 1 ♀, taken by me several years ago as being *striatus*.

Berosus (s. str.) *pennsylvanicus* KNISCH, 1922.

B. (s. str.) striatus subsp. *pennsylvanicus* KNISCH, 1922.

Separated from *striatus* by its narrower shape, above all by punctuation of elytral intervals being irregular, equally strong and tolerably dense, and by the absence of larger setigerous punctures upon the uneven intervals (18). This form is entitled to specific rank. The aedeagus (fig. 9) is also different from



Fig. 9. — *Berosus* (s. str.) *pennsylvanicus* KNISCH.
Extremity of aedeagus, in dorsal view. × 50.

that of *striatus*: the parameres, instead of being rounded at the tip, are sharply pointed and, seen from the side, the apex projects more widely than in *striatus*. The punctures of the outer intervals are much larger than in the latter and distinctly crenulate anteriorly when seen with strong light and magnified;

(18) In fact it is difficult to distinguish them from the strong punctures which surround them.

even the stria punctures seem strongly crenulated when thus observed and much more so than in *striatus*. The fifth ventral segment of the male bears in the middle a stronger and more projecting dentiform carina, which extends under the two little teeth at the bottom of the terminal emargination. A male and female from Mobile which agree and have nitid elytra are also in agreement with two females from St. John's Bluff which have strongly reticulate wing cases. A similar dimorphism can be observed in the following species.

B. pennsylvanicus cannot be *ordinatus* LECONTE, the elytral intervals of which are described as being more regularly punctured than in *fraternus* and the size of which is said to be larger than the last mentioned species. *B. pennsylvanicus* seems to be rarer than any of the preceding or following species.

Examined material, all males of which (7) were dissected : Pennsylvania, ZIMMERMANN S. G. (or S5), No. 10653, No. 108, labeled « Typus » by KNISCH, 1 ♂ KNISCH Coll. ; Marion (Mass.), 1 ♂ ; Tyngsboro (Mass.), 2 ♂♂ ; Lakehurst (N. Jersey), received from KNY SCHEERER as *peregrinus*, 1 ♂ ; Mobile (Alabama), 1 ♂ ♀ ; St. John's Bluff (E. Florida), 1 ♂ 2 ♀♀.

Berosus (s. str.) *fraternus* LECONTE, 1855.

Described from a single specimen from Fort Laramie (Wyoming) (19), this species has been placed as a synonym of *striatus* by G. H. HORN (20), but without explanation. However, the specimens listed below present the distinguishing particulars enumerated by LECONTE, viz. the pronotum more densely punctured, the intervals of elytra with less regular punctuation and above all the large setigerous pores of the uneven intervals conspicuously stronger than in *striatus*. The dark spots of the elytra are smaller and less numerous, more effaced, not so « remote », viz. not so definitely appearing to the eye upon the testaceous background ; especially the transverse lateral spot, at the end toward the outer side of the median undulated band which is often obsolete or even absent ; the anterior transverse oblique band ordinarily is composed of three spots including

(19) Nebraska according to LECONTE but Stieler's Atlas places Fort Laramie in Wyoming. (Wyoming was made a territory, later a state, subsequent to 1855, and from parts of the old Nebraska, EDWIN C. VAN DYKE).

(20) L. c., p. 123.

the humeral one when this is present, the internal spot not geminate, placed on the third interval, while the second is unspotted. The males, all dissected, have an aedeagus (fig. 10).



Fig. 10. — *Berosus* (s. str.) *fraternus* LÉCONTE.
Extremity of aedeagus, seen from aside. $\times 50$.

very different from that of *striatus*, *pennsylvanicus* or *signaticollis*, longer, with the apex of parameres, seen from the side, undulatingly sinuate dorsally. The females may be without reticulations on the pronotum and elytra, or more or less reticulate on the sides of the first and strongly reticulate on elytral intervals. But a female from Corvallis, with others of same origin and normally reticulate, forms a transition: it is not really smooth nor strictly reticulate. The same dimorphism has been observed in the ordinarily reticulate females of *signaticollis* (CHARPENTIER): for females from the south of France (St. Julien de Ratz) and from Emilia (Spilamberto) have reticulate elytra from the former locality and smooth elytra from the latter, while the males captured with these females all have the same aedeagus.

B. fraternus is phylogenetically more distant from *striatus* than is *pennsylvanicus*.

Examined material: Males (all 27, dissected). Bon Accord (Brit. Col.), 3; Montreal (Quebec), 1; Corvallis (Oregon), 4; Berkeley (Calif.) *infuscatus* VAN DYKE det., 1; Facht (Lassen Co. Calif.), 2; Volga (S. Dakota) *striatus* unknown det., 1; Wastenau Co. Pittsfield Twp. (Michigan) *striatus* KNISCH det., 2; Hamilton Co. (Kansas) 3350 ft. 1; New York, 2; Texas, 4. Canada: Medicine Hat, 2; Quebec: St. Remi, 1.

Females (with smooth elytra). Corvallis (Oregon), 2 (including transition); Nevada, *striatus* KNISCH det., 1; Texas, 3.

Females (with reticulate elytra). Corvallis (Oregon), 5; Santa Monica (Calif.), *striatus* KNISCH det., 1; San Francisco (Calif.), *infuscatus* VAN DYKE det., 1; Volga (S. Dakota) *striatus* unknown det., 1; Catskill Mts. (New York) *striatus* KNISCH det., 1; Fayetteville (W. Virginia), 2; Texas, 2; Canada, Quebec : St. Remi, 3.

The distribution seems to be almost the same as that for *striatus*, but it includes without doubt coastal California.

***Berosus* (s. str.) *metalliceus* SHARP, 1882; KNISCH, 1922.**

B. salinus FALL, 1902.

A female of *salinus* from San Diego (Calif.), identified by the author, which I owe to the liberality of Prof. VAN DYKE and of the California Academy of Sciences, cannot be distinguished from a female paratype of *metalliceus* described from Tres Marias Islands, off the Pacific coast of Mexico. Additional specimens of both sexes, from Isabel Island (Sinaloa, Mexico), submitted by Prof. EDWIN C. VAN DYKE, have also been seen. The aedeagus of this species, examined from a male paratype of SHARP, is very different from that of the species named hitherto in this paper; the median lobe extending far beyond the end of the parameres; the protruding part of the latter with the addition of that part of the median lobe projecting beyond it being nearly as long as the basal lobe. Dorsally seen (fig. 11, right)

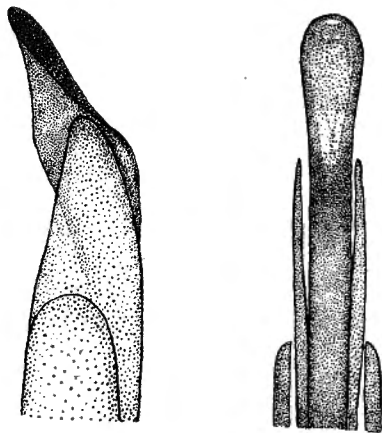


Fig. 11. — *Berosus* (s. str.) *metalliceus* SHARP. Left, extremity of aedeagus seen from aside; right, same extremity in dorsal view. $\times 50$.

the median lobe terminates in a gradually widened spatula; seen from the side (fig. 11, left), this lobe is geniculate dorsally not far from the extremity.

Berosus (s. str.) moerens SHARP, 1882.

B. debilis SHARP, 1887.

These two names apply to the same species. A male from Mexico (HÖGE), *moerens* KNISCH det., has its pronotum finely reticulate between the punctuation; this is not the case with the other males from Guanajuato, Colima (Vulcano) and Guatemala, but the extracted aedeagi are the same. It is only a sculptural variety.

The bottom of the emargination of the fifth ventral segment (♂ ♀) is bidentate, or with a fine bifid tooth; a peculiarity not seen hitherto is the fine denticulation existing at the sides of the ventral segments, but this is only conspicuous when the abdomen (♂ ♀) has been removed from beneath the elytra. Two females from Las Parras (Baja California) have also been seen.

Mr. J. BALFOUR-BROWNE has examined for me, the two male types of *moerens* and *debilis* and extracted the aedeagi. These being identical, his conclusion is that they are synonyms. Finally I have seen a male and female paratype of *debilis* and a female paratype of *moerens*. In the first two the metallic spot of the pronotum is less trilobed, viz. less deeply incised on each side by the yellow color of the anterior margin, but is variable according to individuals. I have even seen a specimen, showing clearly that this spot results from the coalescence of a median, wide and elongate spot, with spots on each side which are rounded and generally separated.

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