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A REVIEW OF THE BEETLE FAMILY CEPHALOIDAE

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The family Cephaloidae consists of only one genus, *Cephaloon* Newman, 1838, with eight known species that are locally rather common but are known only from the Eastern United States, Western United States, Western Canada, Japan, and Amur. All of the species are closely related and quite variable in color. Useful separation characters are to be found in the antennae and various male structures. As yet little is known concerning the habits and life histories of members of this group. All known species of this family are represented in the collections of the U. S. National Museum.

After study of some material from the Ussuri River Valley recently sent to me for determination, it seems desirable to reconsider the taxonomy, affinities, and distribution of this group. The ranking of this small assemblage of species as a family on equal ground with the rest of the families in the order is still somewhat doubtful in my mind. I believe the placing of the Cephaloidae as a satellite of the great family Tenebrionidae is firmly established, but my studies in the Tenebrionoidea have not as yet revealed, on the basis of our present ranking and evaluation of what defines a family, any group with which the genus *Cephaloon* can be incorporated; hence, I retain it as a family.

I wish to thank Mr. Hugh B. Leech and Dr. E. C. Van Dyke, both of the California Academy of Sciences, and Dr. Hans Klapperich of Bonn, Germany, for the loan of several specimens used in this study.

¹ Bureau of Entomology and Plant Quarantine: U. S. Department of Agriculture.

Family CEPHALOIDAE LeConte

Cephaloidae LeConte, Smithsonian Misc. Coll., vol. 3, art. 3, Classification of the Coleoptera of North America, pt. 1, p. 259, 1862.

LeConte originally proposed this family for the North American *Cephaloon lepturides* Newman, but also referred to two species, although not by name, which had been described by Motschulsky from the Amur River Valley. Several genera have since been erected for species in this group, and then synonymized, until in the present study the family contains only the original genus *Cephaloon* Newman.

Family diagnosis.—Size 8–20 mm.; head elongate, diamond-shaped, deflexed; antennae 11-segmented, filiform, with apical segments somewhat enlarged, inserted between the eyes and bases of the mandibles; mandibles elongate, acute at apex, never bifid or otherwise modified; eyes reniform, not prominent; maxillary palpus 4-segmented, first segment small, obscure, apical segment triangular. Pronotum without lateral margins, smooth, always abruptly narrowed anteriorly from the middle. Legs slender; front coxal cavities open behind; front and middle coxae prominent, conical; apical spurs of all tibiae large, two on each tibia; tarsi 5–5–4, the segments all simple, not lobed or tomentose beneath; claws pectinate, with a subequal membranous lobe beneath each claw. Elytra with vague costae, minutely punctate, never striate. Abdomen with 5 visible sternites in the female, 7 in the male (sternites 2 + 3 to 9 visible in the male). Body covered with very fine pubescence.

MALE GENITALIA: Apical abdominal segments (7–9) of the male considerably modified. Segment 7 with sternite and tergite laterally fused, forming a globular shaped segment. Segment 8 with sternite and tergite laterally fused, forming two laterally triangular pieces. Segment 9 closely fitted into segment 8, the tergite and sternite both triangular and filling the emarginations of segment 8. Genital organs themselves quite simple; paramere two short, freely articulate lobes fitted onto the apex of the large troughlike basal piece which more or less envelops a simple, small, somewhat curved, and tubelike median lobe; no evidence of a tegminite.

Affinities of the family.—The heteromerous tarsi place this family in the Tenebrionoidea; the open anterior coxal cavities place it in the group including the Oedemeridae, Pythidae, and Serropalpidae, as distinguished from the group including the Alleculidae, Lagriidae, and Tenebrionidae, all of which have closed coxal cavities. The serrate claws with fleshy pulvilli and the laterally fused eighth abdominal segment of the male separate it from the others of this group of Tenebrionoidea. The very small median lobe and the larger paramere with the small lateral lobes show affinities with the genus *Mycterus* of

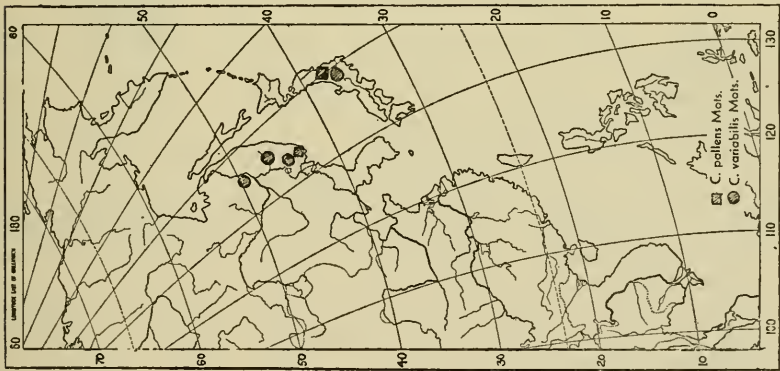
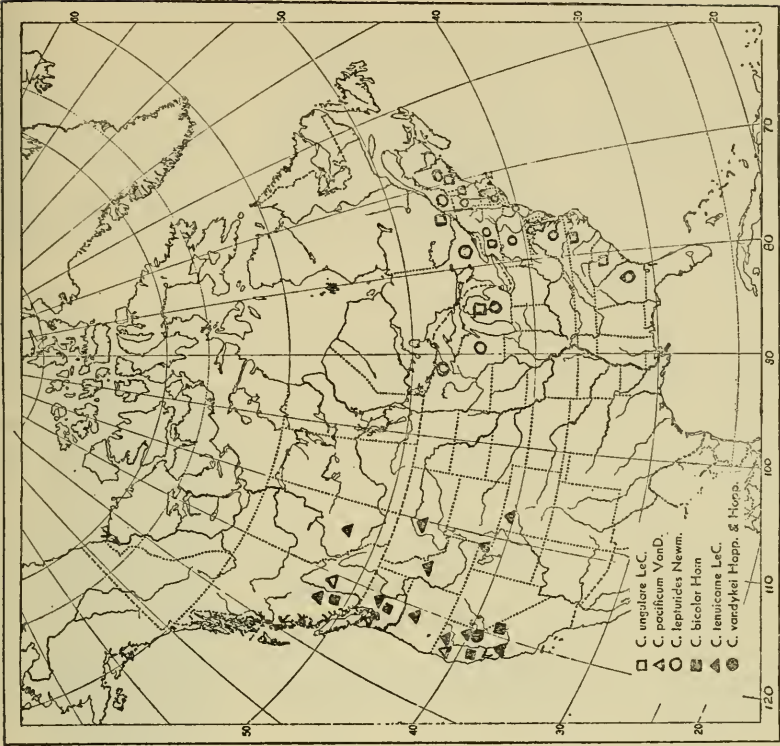


FIGURE 20.—Distribution of the family Cephaloidae.

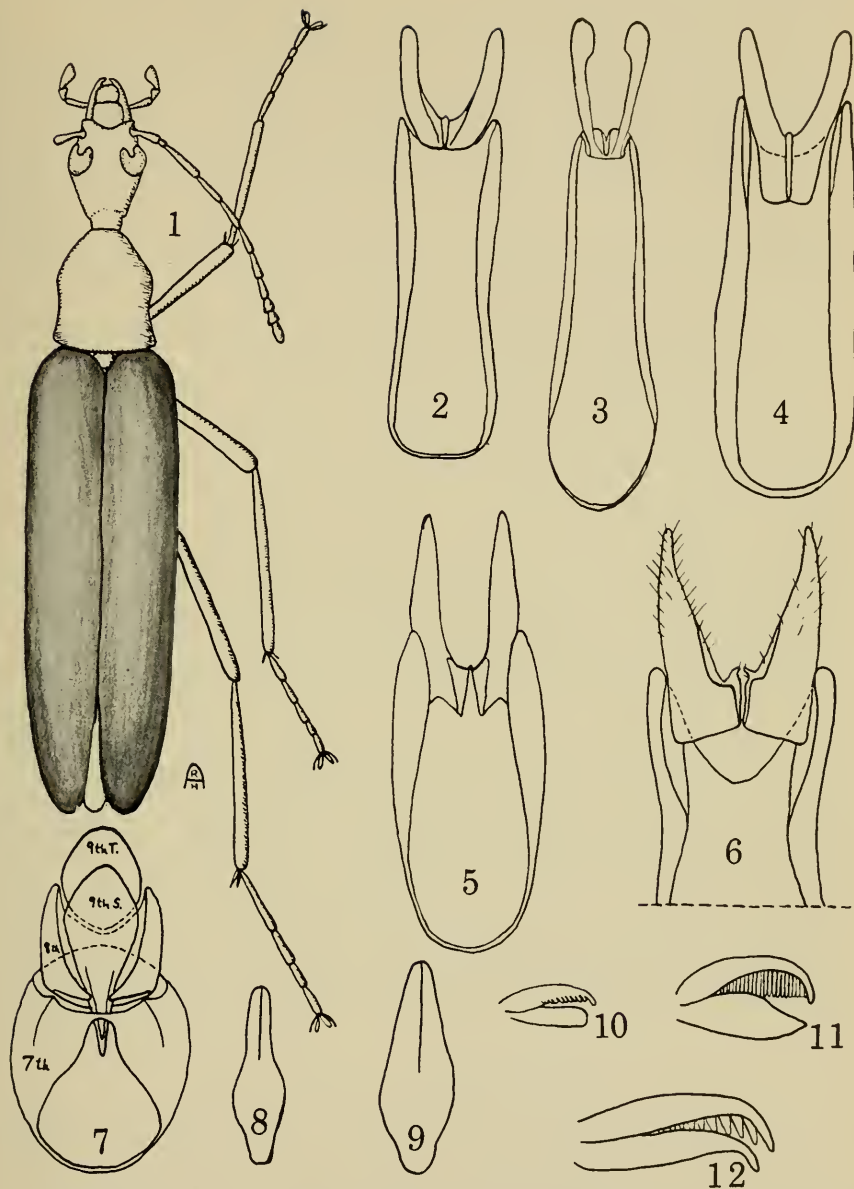
the family Pythidae. In addition, *Mycterus* and *Cephaloon* both have prominent procoxae and mesocoxae and the prothorax is without lateral margins. Most workers in the past have considered the Oedemeridae and Cephaloidae closely allied, but my incomplete studies of the male genitalia of the heteromerous beetles indicate that this is not so. The very different structure of the apical abdominal segments of the species of *Cephaloon* leads me to suppose that these species are far removed from the oedemerids, but their true affinities are not yet recognized.

Notes on the distribution of the species.—As can be seen from the accompanying map (fig. 20), the species of this family show the typical distribution pattern of a Holarctic group which was probably derived from some Asian stock and spread to North America via the Alaskan land bridge. It is interesting to note that, based on both external morphology and the morphology of the male genitalia (in the case of *C. pallens*) both of the Asian species are most similar to two of the Eastern North American species and not to the Western North American species. If these similarities of morphology reflect relationship, as we assume they do, then we again see the often-repeated pattern of a pre-glacial distribution across northern Canada from Alaska, down through Ontario and into Eastern United States. This I believe to be a further stock-piling of evidence against the theories of continental drift and the North Atlantic land bridge idea.

Genus *Cephaloon* Newman

- Ichnodes* Dejean, 1834, Cat. Col. ed. 3, p. 227. (*Nomen nudum*, one ms. trivial name listed.)
- Cephaloon* Newman, Ent. Mag., vol. 4, p. 376, 1838. (Genotype, *Cephaloon lepturides* Newman; 1838; monobasic.)
- Cephaloon* Motschulsky in Schrenck, Reisen und Forschungen in Amurlande, vol. 2, pt. 2, p. 140, 1860. (Error for *Cephaloon*.)
- Typitium* Casey, Ent. News, vol. 9, p. 193, 1898. (Genotype, *Cephaloon unguare* LeConte, Proc. Boston Soc. Nat. Hist., vol. 16, p. 275, 1873; original designation and monobasic. Placed in synonymy by Hopping and Hopping, Pan-Pacific Ent., vol. 10, p. 64, 1934.)
- Sponidium* Casey, Ent. News, vol. 8, p. 193, 1898. (Genotype, *Cephaloon tenuicorne* LeConte, 1873; present designation. Placed in synonymy by Hopping and Hopping, 1934.)
- Ephamillus* Semenow, Horae Soc. Ent. Ross., vol. 34, p. 495, 1900. (New synonymy. Genotype, *Cephaloon variabile* Semenow = *Cephaloon variabilis* Motschulsky in Schrenk, 1860; original designation and monobasic.)
- Drachylis* Casey, 1898, Ent. News, vol. 9, p. 195. (New synonymy. Genotype, *Drachylis simulans* Casey, 1898; monobasic.)

Discussion.—The type and only known specimen of *Drachylis simulans* Casey, the genotype of *Drachylis* Casey, has been examined. This is an unfortunate example of the description of a species on one



Adult, male genitalia, and claws of Cephaloidae: 1, *Cephaloon tenuicorne* LeConte, female, showing general habitus; 2, paramere of male, *C. tenuicorne*; 3, paramere of male, *C. bicolor* Horn; 4, paramere of male, *C. pacificum* Van Dyke; 5, paramere of male, *C. lepturides* Newman; 6, apical portion of paramere of male, *C. unguulare* LeConte; 7 abdominal segments 7-9 of male, *C. unguulare*; 8, median lobe of male, *C. pallens* Motschulsky; 9, median lobe of male, *C. lepturides* Newman; 10, hind claw of *C. tenuicorne*; 11, hind claw of *C. pallens*; 12, hind claw of *C. variabilis* Motschulsky.

poor specimen. Casey was certainly justified in wanting to describe this specimen for he believed that it lacked the comblike claws characteristic of the other species in the family, and therefore, its description, even though based on a single specimen, would alert collectors to hunt for such a strange cephaloid. A close examination, however, reveals it to have been patched, the legs being undoubtedly from some other beetle. It appears to be *Cephaloon bicolor* Horn, with which I synonymize it.

The genus *Ephamillus* Semenow is based on the same variable characters possessed by the other genera erected for species of this family. Kôno (Fauna Nipponica, vol. 10, fasc. 8, No. 10, pp. 76-82, 1937) illustrates three characters, which, if they were constant and as illustrated, would serve for recognition of a genus. However, none of them appears to be constant or as distinctive as thought by Kôno and others. The acute pulvilli, curved at the tips, are found in three species, *C. pacificum*, *C. unguare*, and *C. variabilis*. The shape of the pronotum, as illustrated by Kôno for *C. variabilis*, is subject to the same sort of variation in all the species. Finally, the situation of the hind tibia of *C. variabilis*, reported to be so pronounced that a portion of the tibia is thrown out of line at least a distance equal to the width of the tibia, is often barely perceptible even under a microscope, and on some specimens of the species it cannot be seen at all. For these reasons, I feel that this genus is invalid and I place it in synonymy with *Cephaloon*.

The marginate pronotum eliminates the genus *Stenocephaloon* Pic, 1932 (Mélanges Exotico-Entomologiques, fasc. 59, p. 2; genotype, *Stenocephaloon metallicum* Pic, monobasic) from this family. Until specimens can be studied, it is best placed in the family Serropalpidae near the genus *Stenotrachelus* Berthold.

The following key to the known species of this family is adapted from Hopping and Hopping (Pan-Pacific Ent., vol. 10, pp. 64-70, 1934). For identification purposes, the illustrations which accompany that paper are very useful.

Key to the species of Cephaloidae

1. Pulvilli of tarsal claws slender, acute, and curved at tips (pl. 5, fig. 12)----- 2
- Pulvilli of tarsal claws robust, obtuse, not curved at tips (pl. 5, figs. 10, 11)- 4
2. Three distal antennal segments together approximately 3 mm. long; hind femora at most simply curved; 10 to 15 mm. (United States)----- 3
- Three distal antennal segments together not over 1.5 mm. long; hind femora tending to be sinuate; size 17 to 20 mm. (Amur River, Eastern Siberia, and Japan)----- *C. variabilis* Motschulsky

3. Lateral margins of pronotum behind middle distinctly emarginate; Western United States..... *C. pacificum* VanDyke
Lateral margins of pronotum behind middle almost straight (Eastern United States)..... *C. unguulare* LeConte
4. Antennae with last three segments thickened..... 5
Antennae with last three segments not markedly thickened..... 6
5. Elytra without sutural and marginal black stripes (Eastern United States).
C. lepturides Newman
Elytra with sutural and marginal black stripes (Amur River, Eastern Siberia and Japan)..... *C. pallens* Motschulsky
6. Three distal antennal segments together approximately 1.5 mm. long (West Coast of United States)..... *C. bicolor* Horn
Three distal antennal segments together barely over 1 mm. long (Western United States and Canada)..... 7
7. Male with bifurcate process of third visible abdominal sternite long and finger-like; female with apical abdominal sternite shallowly and narrowly emarginate; color of female black to testaceous..... *C. tenuicorne* LeConte
Male with bifurcate process of third visible abdominal sternite shorter, more triangular; female with apical abdominal sternite deeply emarginate; color of female reddish testaceous with elytra and metasternum black.
C. vandykei Hopping and Hopping

Key to the species of *Cephaloon*, based upon the male genitalia

Male of *Cephaloon variabilis* Motschulsky unknown.

1. Ratio of length of paramere to length of basal piece not over 1:2..... 2
Ratio of length of paramere to length of basal piece not less than 1:3.5..... 3
2. Median lobe tapering abruptly at apical third, slender (pl. 5, fig. 8); paramere lobes long and slender..... *C. pallens* Motschulsky
Median lobe evenly tapering from base, more robust (pl. 5, fig. 9); paramere lobes shorter and heavier (pl. 5, fig. 5)..... *C. lepturides* Newman
3. Paramere lobes acute at apex (pl. 5, fig. 6); median lobe long and slender, sides more parallel..... *C. unguulare* LeConte
Paramere lobes enlarged at apex; median lobe shorter and more robust at apex..... 4
4. Apex of paramere lobes about twice width of base when viewed laterally (pl. 5, fig. 3)..... *C. vandykei* Hopping and Hopping and *C. bicolor* Horn
Apex of paramere lobes about same width as at base..... 5
5. Apex of basal piece laterally extending beyond base of paramere to about one-half length of paramere lobes; paramere lobes stout, blunt at apex, uniform in width (pl. 5, fig. 4)..... *C. pacificum* VanDyke
Apex of basal piece laterally extending only slightly beyond base of paramere; paramere lobes more slender, and slightly enlarged at apex (pl. 5, fig. 2).
C. tenuicorne LeConte

In view of the relatively recent and thorough discussion of the species by Hopping and Hopping (1934), I feel that it is superfluous to repeat it here except to mention that under *C. bicolor* the name *Drachylis simulans* Casey should be added as a synonym (see discussion under generic synonymy preceding).

There follows the bibliographic citations of the two exotic species not mentioned by Hopping and Hopping. The key and illustrations, I believe, sufficiently characterize them. A revised section of the Coleopterorum Catalogus (Junk) is being prepared which will give all of the literature references, therefore they will not be cited here.

***Cephaloon pallens* Motschulsky, 1860**

PLATE 5, FIGURES 8, 11

Cephaloon pallens Motschulsky, in Schrenck, Reisen und Forschungen in Amurlande, vol. 2, pt. 2, p. 140, pl. 9, fig. 15, 1860. (Type locality, Kisi, on the River Amur.)

Cephaloon pallens var. *cinctipennie* Heyden, Deutsche Ent. Zeitschr., p. 167, 1892. (Type locality unknown, except "Amur" as given in the title of the paper.)

Cephaloon pallens var. *koltzei* Heyden, Deutsche Ent. Zeitschr., p. 168, 1892. (Type locality, "Amur," as above.)

Cephaloon pallens var. *maculicolle* Heyden, Deutsche Ent. Zeitschr., p. 167, 1892. (Type locality, "Amur," as above.)

Cephaloon pallens var. *picticolle* Heyden, Deutsche Ent. Zeitschr., p. 167, 1892. (Type locality, "Amur," as above.)

?*Cephaloon pallens* Motschulsky, Solsky, Horae Soc. Ent. Rossicae, vol. 11, p. 295, 1875. (Djalinda River. Note: This is probably a misidentification of *Ephamillus variabilis* var. *tristiculus* Heyden, 1892, judging from the description and locality.)

Cephaloon sakurae Lewis, Ann. Mag. Nat. Hist., ser. 6, vol. 15, p. 444, fig. 10, 1895. (Placed as synonym by Kôno, 1937, Fauna Nipponica, vol. 10, fasc. 8, No. 10, p. 79.)

In a species with the extreme color variation exhibited in all of the species of this family, the naming of a few of the color variants serves no useful purpose and these are therefore here disregarded.

***Cephaloon variabilis* Motschulsky, 1860**

PLATE 5, FIGURE 12

Cephaloon variabilis Motschulsky, in Schrenck, Reisen und Forschungen in Amurlande, vol. 2, pt. 2, p. 141, 1860. (Type locality, Marûnsk on the River Amur.)

Cephaloon variabilis var. *tristiculus* Heyden, Deutsche Ent. Zeitschr., 1892, p. 169. (Type locality, unknown except "Amur.")

Here again, the naming of a single color form can serve no useful purpose.