A REVISION OF THE FAMILY PYROCHROIDAE (COLEOPTERA: HETEROMERA) FOR NORTH AMERICA BASED ON THE LARVAE PUPAE, AND ADULTS

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ABSTRACT

A REVISION OF THE FAMILY PYROCHROIDAE
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The four genera and fifteen species of North American Pyrochroidae are revised. All available taxonomic, biological, and distributional data for the known larvae, pupae, and adults are incorporated, and diagnostic keys to the subfamilies, genera, and species are presented. All taxa are described or redescribed and pertinent diagnostic features illustrated. Larval, pupal, and adult descriptions are provided for one new species. The North American history and present world status of the family are discussed.

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INTRODUCTION

The family Pyrochroidae is a relatively small group of inadequately defined heteromerous beetles represented by a modest number of genera and species throughout the world. As is the case for several closely related heteromerous families, much controversy exists concerning the limits of the family. In North America, the pyrochroids consist of the subfamilies Pyrochroinae and Ischaliinae. The Pyrochroinae is composed of three genera: Dendroides with six species, Schizotus with two species, and the endemic Neopyrochroa with four species. The three species of the genus Ischalia form the subgenus Eupleurida and are placed in the subfamily Ischaliinae.

An attempt has been made in the present revision to incorporate all available taxonomic, biological, and distributional data for the known North American larvae, pupae, and adults.

HISTORICAL REVIEW FOR NORTH AMERICA

Adults

The Pyrochroidae of North America were first treated by LeConte (1855) who listed and briefly described the species then known. Along with the conventional genera of the time (*Pyrochroa* Geoffry, *Schizotus* Newman, and *Dendroides* Latreille), he also included several others which have subsequently been removed to various other heteromerous families.

In 1860, Pascoe erected the genus *Ischalia* for his *indigacea* of Borneo. He placed the taxon, with doubts, in the family Pedilidae. Two years later, LeConte (1862) described *Eupleurida costata* from "the southern states", placing it in the family Pyrochroidae. He subsequently became aware of *Ischalia* and synonymized *Eupleurida* since the former had two years priority and according to him differed primarily in color (LeConte, 1873). LeConte's 1862 work also characterized the entire family and gave a simple generic key.

In 1888, Horn published the first species key when he revised the genus *Dendroides*. Unfortunately, the key is based largely on characters presently considered to be too variable for taxonomic use. Only *Dendroides canadensis* Latreille (using *bicolor* as the name) is accurately characterized.

Blatchley's (1910) coverage of the Pyrochroidae followed the general classification established by LeConte in 1862. He included a brief characterization of the family, a key to the genera and short descriptions and comments on the species known to inhabit Indiana. Except for the outdated and incorrect names, the work is still valid for the eastern adults and contains occasional ecological notes.

Blair (1914) published a world revision of the family which did much to clarify the generic classification. In terms of relevance to the North American fauna, the generic name Neopyrochroa was erected for the species previously assigned to the palearctic genus Pyrochroa.

Several species had been added to Ischalia since the 1873 note by LeConte including one from North America. The generic concept of the genus Ischalia remained unaltered until 1920 when, in a paper describing two new Philippine species, Blair noted distinct differences between the Asian and North American species. The Asian species were described as having well developed metawings which contrast with the nearly wingless North American species, and an additional humeral carina on each elytron. With these distinctions, he resurrected Eupleurida. He also initiated the subfamily system at this time, recognizing the Pyrochroinae which contained most of the genera, Ischaliinae with Ischalia and Eupleurida, and Pedilinae containing only Pedilus.

Van Dyke (1938) noted that the Japanese I. patagiata Lewis has the hind wings incompletely developed. He also took exception to Blair's interpretation of the significance of the humeral carina. Van Dyke was, however, willing to accept Eupleurida as a subgenus.

The species of the Pacific Northwest were presented in the prodigious work of Hatch (1965) which included brief generic descriptions, keys, and illustrations of Dendroides ephemeroides (Mannerheim) and Ischalia vancouverensis Harrington.

Larvae and Pupae

Moody (1880) was first to publish on the larvae. He presented the results of having reared four species, discussing their general habitus and characteristics by which they could be separated.

The first morphologically detailed larval description and figures were given by Wickham (1894) for Pyrochroa flabellata Fabricius, now Neopyrochroa. He also included a simple sketch of the pupa.

Classical works dealing with the larval family characteristics were provided by Böving and Craighead (1931) and Peterson (1951).

Spilman and Anderson (1961) provided a redescription of the larvae after Peterson and a key to the species known to them. The work also included a key to the known genera of pupae.

WORLD STATUS

As previously alluded to, Blair's 1914 world revision did much to aid the generic level classification of the family. But even at this early point in time it was quite clear that defining the family limits would be difficult. The position of several anomalous genera was discussed, and Lemodes Boheman (Australia) was removed to the Anthicidae (sensu stricto) where it seems to have found a good home. The plight of the others has not been so easily rectified. Blair deferred judgement on Ischalia Pascoe and Pedilus Fischer, and sloughed off Pilipalpus Fairmaire (Chile) along with Cycloderus Solier (South America), Techmessa Bates (Australia, New Zealand), Pseudananca Blackburn (New South Wales), and "Pseudolycus (?) apicalis Macl." referring to them as a "rather aberrant group of Oedemeridae"; the oedemerid taxonomists were probably somewhat less than elated over the gift.

Blair (1920) alluded to the fact that the Pedilidae had been abandoned as untenable by Seidlitz, Reitter, and others; "Pedilus with which would go Ischalia, being referred to the Pyrochroidae".

Arnett (1951) expressed great doubt that Cycloderus was validly placed in the Oedemeridae, although he did not speculate where it should go.

Crowson (1955, and in litt.) has added to the list of possible pyrochroid genera Techmessodes Broun (Australia, New Zealand) and

perhaps Paromarteon of Australia. With the aid of Abdullah (1964, 1967) Pilipalpus has journeyed from the Pyrochroidae to the Anthicidae (sensu lato) and back. Blackwelder (1945) placed Pilipalpus in the subfamily Ischaliinae of the Pyrochroidae. Abdullah (1965a, 1965b) has also added Exocalopus Broun (New Zealand), Paleopyrochroa Abdullah (Baltic Amber), and Incollogenius Pic (Madagascar) to the dreadful list of questionable pyrochroid genera.

While Pedilus is no longer considered a valid pyrochroid, it and related genera are also in a precarious state. Crowson (1955) has abandoned the Pedilidae, placing its members into the Anthicidae; however, many coleopterists, including Arnett (1968) and Werner (1964), have rejected this move.

DESCRIPTION

Arriving at a description of the Pyrochroidae at the world level is impossible at this time. The adult taxonomy of the higher categories of the Heteromera is presently too unstable to draw any meaningful conclusions. Specimens of many of the aberrant genera are extremely rare in collections which compounds the problem for they are generally unavailable for study.

Throughout the course of this study, larvae have proven to be of great value. Unfortunately, larval systematics as a whole is still in its elementary developmental stage. The larvae of all but two of the anomalous genera are unknown; none were available for the present study. Even the more common genera and species of related families are as yet poorly described.

With the above problems in mind, the following description of the family is limited to the adults of North America. The Ischaliinae is retained within the Pyrochroidae because, based on adult characters, it seems to fit no better anywhere else. Until positively associated larvae can be found, the status of the group will remain questionable.

The Pyrochroidae may be characterized as being elongate, somewhat flattened beetles of a fragile, loosely constructed Malocoderm habitus. Dorsal and ventral surfaces covered with slender, moderately elongate setae.

Head deflexed, strongly constricted behind eyes forming distinct neck. Eyes emarginate; moderately granulated in the Pyrochroinae, coarsely so in Ischalia. Antennae 11-segmented, second segment the shortest. Antennae inserted at sides of frons in emargination of eyes; filiform in Ischalia and serrate, subpectinate, or plumose in the Pyrochroinae. Labrum distinct. Mandibles short, flattened; broad at bases, curved and narrowed at bifid apices. Inner margins with basal molar area; fleshy, setiferous mesal prostheca. Maxillae consist of basal cardo, bipartite stipes (basistipes and mediostipes), lacinia, bipartite galea (basigalea and distigalea), palpifer, and four-segmented palpi. Terminal segment of palpus strongly securiform in Ischalia, elongate-oval in Pyrochroinae. Labium comprised of submentum, mentum, ligula, palpifer, and three-segmented palpi. Ligula simple in Ischalia, broadly bilobed in the Pyrochroinae.

Pronotum narrower than elytra at base, without lateral margins. Hind pronotal angles of Ischalia project posteriorly beyond base; pronotal disk with prominent median carina which extends posterad beyond hind margin, and a single circular impression or pit on each side of the carina. Scutellum shield-shaped; prominent and broadly convex in Ischalia, flat in the Pyrochroinae. Front coxal cavities widely open behind externally exposing trochantins, and open internally. Internal opening narrower in Ischalia due to sclerotized bar between and behind coxae. Mesosternum prolonged behind, keel-like between mesocoxae. Mesocoxal cavities open, the mesepimera reaching mesocoxal cavities. Metasternum long, broad. Legs elongate, slender. Procoxae confluent, conical and prominent; mesocoxae broadly conical, recessed along length

into cavities thus appearing flattened. Metacoxae transverse; slightly separated in the Pyrochroinae, moderately so in Ischalia. Trochanters triangular, or moderate size. Femora slender at bases, slightly swollen apically. Tibiae slender, as long as femora; two short, simple apical spurs present in the Pyrochroinae, lacking in Ishalia. Tarsal formula 5-5-4, penultimate segment bilobed below, claws simple. Elytra elongate, covering abdomen, broader posteriorly; possessing well developed sutural, lateral discal, and lateral carinae in Ischalia, simple in the Pyrochroinae. Metawings of the Pyrochroinae (Figure 10) well developed; radial cell open, wedge cell distinct, and pigmented areas present posterad of radius and in distal region. Metawings of Ischalia vestigial.

Abdominal tergites 1-7 or 1-8 visible, first six poorly sclerotized. Spiracles visible on lateral margins, those of first segment much larger than remainder. Sternites 3-7 or 3-8 visible, freely articulated, more sclerotized than tergites. First two sternites rudimentary, hidden by posterior projection of metacoxae. Female abdominal segments 7-9 telescoped, eighth and ninth poorly sclerotized. Mesal endoskeletal rod-like spiculum ventrale visible anterad of seventh sternite. Posterad of male eighth abdominal segment are the spicule plates which are best developed laterally, and produced ventroanteriorly forming two elongate spicules. Sclerotized area, perhaps tergite ten, present dorsad between hind margins of spicular plates. Lightly sclerotized area ventrad may be remains of ninth sternite. Female genitalia (Figure 9) arise distally from ninth segment which is divided into first and second valvifers and has well sclerotized

rod-like baculi. Coxite postero-ventrad of proctiger and anus, two-segmented with apical stylus. Vulva mesal. Male genitalia elongate consisting of basal piece, parameres, and elongate aedeagus with basal aedeagal apodemes. Parameres of Ischalia ventrad of aedeagus, fused along entire length with elongate setae on lateral and apical margins. Pyrochroinae with parameres dorsad or dorso-laterad of aedeagus, apically separated, without marginal setae.

BIOLOGY

Larvae of the Pyrochroidae, or fire-colored beetles, occur under bark and to some extent within decaying wood of dead deciduous and coniferous trees. Numerous field observations concerning hosts and attempts at rearing larvae indicate that host selection is more closely related to the state of decay of the tree than to the species of tree selected. The larvae prefer somewhat cool, moist conditions beneath bark which has already been slightly loosened by the activity of earlier invaders such as the Buprestidae, Cerambycidae, and Scolytidae. Under such conditions, they frequently become one of the most abundant groups associated with the tree.

Both finely granulated woody and fungal materials are found in the gut, but fungi probably play the more significant dietary role. The orthosomatic larvae are well adapted for moving along the length of the tree in the frass layer between the bark and cambium where fungal mycelium is usually abundant. Larvae have never been observed to do any actual boring in sound wood. However, their flattened shape allows them to work their way between xylem layers of more decomposed tissue. This type of burrowing occurs rarely, but is more common in those species, i.e. Neopyrochroa flabellata (Fabricius), which are restricted to the undersides of logs where decay occurs earlier in the succession.

A xylophagous habit would necessitate specializations for taking in and obtaining nutrients from the woody material. Such specializations include mandibles with well developed molar areas and a highly developed proventriculus for grinding the wood, and gastric caecae for the harboring of xylophagous symbionts. Adaptations of this nature are not found in the pyrochroid larvae. Only one of the asymmetrical mandibles possesses a well developed molar area. The gut is a simple, elongate tube. The poorly developed proventricular region is weakly sclerotized, and the elongate mesenteron bears no gastric caecae or any other observable specialization.

Additional evidence relative to the significance of fungi is provided in work published by Payne (1931). Larvae of Dendroides canadensis Latreille and the melandryid beetle Synchroa punctata Newman were collected in April of 1924 and reared on "sterilized oak bark free from Armillaria nigra, a fungus which is often present in dead and dying trees". When larvae of this experimental group were removed and fed unsterilized oak bark or rhizomes of A. nigra, they subsequently pupated and emerged as adults. The data are given for six years; both D. canadensis and S. punctata are thought to normally complete their life cycle within 1-2 years. "Thus the diet of sterilized food prolonged their lives to over six times the normal length." Using sterile bark and frass, the author has kept larvae of Neopyrochroa flabellata alive without additional molts for three years.

The literature has often characterized pyrochroid larvae as being predaceous or carnivorous (e.g. Arnett, 1963; Borror and White, 1970; Swan and Papp, 1972). Observations from rearing as well as in the

field have offered no supportive evidence. The movements of the larvae were more defensive than aggressive. However, the larvae did occasionally become cannabalistic, presumably due to such adverse conditions as overpopulation.

From one to several years are spent in the larval stage, with several instars usually present together at any time of the year. Head capsule measurements taken by Van Emden (1943) for the European Pyrochroa coccinea (Linnaeus), P. serraticornis (Scopoli), and Schizotus pectinicornis (Linnaeus) seem to indicate four larval instars.

At times, especially in early spring, larval mortality may become quite high. This may be due to the relative instability of temperatures early in the year, with alternate freezing and thawing, or to the general increase in moisture within the larval microhabitat. Fungal diseases may also increase mortality, again due to an increase in moisture.

Pupation in Michigan and other areas where living material has been available for study generally occurs in late April and early May, though somewhat earlier in the south and on the West Coast. The pupal stage was spent in the same habitat as the larva, commonly beneath the bark in an ovate, frass-walled chamber prepared by the larva just prior to pupation. In reared specimens, duration of the pupal stage was, depending upon the species, from 1-2 weeks, at room temperatures under laboratory conditions. During this time the pupa remained relatively active and used the urogomphi in conjunction with the abdominal muscles to move about.

Adults of the Pyrochroinae are present from late spring to midsummer. They appear to be primarily nocturnal which, in addition to

larval mortality in the spring, probably accounts for the apparent discrepancy between abundance of larvae and scarcity of adults.

Adults of Dendroides and Neopyrochroa have been collected at lights. Adults of Neopyrochroa have also been taken in the evening at fermenting baits such as beer and molasses. Procter (1938) further suggested looking under decayed bark and placing pieces of fruit under bark to ferment. Adults have also been collected in window pane and malaise traps set up at the edges of forested areas. Because adults hide beneath the foliage of trees and shrubs during the day, beating has proven to be a good collecting technique.

Adults of Ischalia are known to overwinter as adults, whereas the Pyrochroinae overwinter in the larval stage.

Predators of the pyrochroids include the chilopod Lithobius sp. and an undetermined elaterid larva. Both were feeding on larvae of D. canadensis.

The internal parasite Zelia vertebrata (Say), a tachinid fly, was reared from Neopyrochroa flabellata and Dendroides canadensis. This is the first known parasite record for the Pyrochroidae. The parasitized larvae appeared normal until the prepupal stage (1-2 days prior to pupation), whereupon they became discolored, abnormally distended, and swollen. In the following 2-3 days, the maggot was seen within the body of the dead host as it fed and moved about. When the host's fleshy tissues were totally consumed, the maggot ate a hole through the exoskeleton, usually between abdominal segments, and exited. Within 8-12 hours, the maggot, which was in a small frass-filled petri dish, became quiescent and the puparium was formed. Adults emerged in 15-20 days.

Other records for Zelia include "elaterid and scarabaeid" larvae (Townsend, 1936), and larvae of the tenebrionid Meracantha contracta (Beauvois) (Townsend, 1942). The author has also reared Z. vertebrata from M. contracta. The larvae came from the same locality as several of the flabellata and canadensis records. According to Townsend (1936), the females larviposit in areas where the maggots can find their way to the host. It would appear that selection is more closely related to habitat than to the species of host involved.

MORPHOLOGY

Adult

Males of Neopyrochroa and Schizotus, as well as the foreign Pseudopyrochroa, have highly modified, species specific, structures associated with the head. Blair (1914) referred to the structures as frontal excavations, Kôno (1929) simply called them excavations. They are herein termed cranial pits.

Terminology used for the wings follows that of Forbes (1922) and Doyen (1966). Crowson (1955) figured a wing of the European Schizotus pectinicornis (Linnaeus), the only previous pyrochroid wing illustration.

Abdominal terminology associated with the spicule apparatus of the male is similar to that of Doyen (1966).

Terminology used for the female genitalia is modified from Tanner (1927), Lindroth (1957), and Doyen (1966).

The male genitalia follow the common tripartite theme found in most Coleoptera. The well developed anterior region is referred to as the basal piece (sensu Sharp and Muir, 1912; Lindroth, 1957). The parameres (sensu Lindroth, 1957; Snodgrass, 1957) are closely associated with the distal aspect of the basal piece. Finally, the fused penis valves (sensu Wood, 1952) and the penis sensu stricto make up the aedeagus.

Larva

The posterior end of the pyrochroid larva (Figures 22-24) possesses many taxonomically significant structures which are without established terminology. As is well established, the immovable paired projections from the ninth abdominal segment are termed the urogomphi. The two deeply pigmented, heavily sclerotized excavations between the urogomphi are termed here urogomphal pits; the ledge-like area beneath the pits is termed the urogomphal lip. The entire ninth abdominal segment including the above modifications is termed the urogomphal plate.

The urogomphal plate possesses many slightly raised wart-like protuberances which may or may not be more deeply pigmented than the surface, and may or may not be setiferous. These are termed calli. The dorsum of the urogomphal plate bears but two setiferous calli, one anterad of each urogomphus. These are termed the dorsal setiferous calli.

Well developed raised lines are usually present on the dorsum of the abdominal segments just posterad of their anterior margins; they are termed here the parabasal ridges (Figure 20).

Pupa

Terms used in naming the abdominal tubercles have been previously established (Rozen, 1959; Young and Fischer, 1972).

SYSTEMATICS

KEY TO ADULT PYROCHROIDAE

1. Antennae filiform; pronotum carinate mesally, hind angles and carina produced beyond base; tibial spurs lacking; elytra carinate. . . . . .ISCHALIINAE (2)

   Antennae serrate, supectinate, or plumose; pronotum without mesal carina, hind angles not produced; two apical tibial spurs present on all tibiae; elytra not carinate . . . . . PYROCHROINAE (4)

2. Head primarily piceous; Eastern North America . . . . *Ischalia costata* (LeConte)

   Head primarily testaceous to yellow-orange; West of Rockies. 3

3. Black elytral vitta widely expanded beyond basal half but not attaining lateral margins; basal half of lateral discal carinae testaceous to yellow-orange, remainder black; elytral punctation between lateral discal carinae and sutural carinae uniformly course-reticulate. . . . . *Ischalia vancouverensis* Harrington

   Black elytral vitta widely expanded beyond basal two-thirds, attaining lateral margins; basal two-thirds and apex of lateral discal carinae testaceous to yellow-orange,

remainder black; elytral punctation between lateral discal carinae and sutural carinae of two types; fine and dense near sutural carinae and coarse-reticulate near lateral discal carinae. . .*Ischalia californica* Van Dyke

4. Eyes separated dorsally by more than width of eye across the top; eyes of male widely separated dorsally; male with cranial pits. 5

Eyes separated dorsally by less than width of eye across the top; eyes of male nearly contiguous dorsally; male without cranial pits . . . . . .*Dendroides* (10)

5. Genal area between neck and hind margin of eye less than minimal distance across eye (anterior to posterior margin at emargination); length 11 mm or greater; cranial pits interocular . . . . . *Neopyrochroa* (7)

Genal area much greater than minimal distance across eye; length 9 mm or less; cranial pits postocular . . . . . .*Schizotus* (6)

6. Elytra black with yellow to yellow-orange margins . . . . . .*Schizotus cervicalis* Newman

Elytra concolorous, yellow-orange . . . . . *Schizotus fuscicollis* (Dejean)

7. Metasternum piceous to black; cranial pits not dorsally concealed. 8

Metasternum yellow-orange to orange; cranial pits largely concealed dorsally by anterior projection of vertex and mesally elevated frons; East of Rockies. . . . . .*Neopyrochroa flabellata* (Fabricius)

8. Legs and coxae black; California (presently known only from female holotype) . . . . . .Neopyrochroa californica (Horn)

Legs and coxae not entirely black 9

9. Legs yellow-orange to orange; vertex of male elevated and projecting slightly anterad; Sierra Nevada Mountains, California . . . . . .Neopyrochroa sierraensis sp. nov.

Femora piceous to black at base, distally testaceous to rufotestaceous, tibiae and tarsi piceous to black; vertex of male not elevated; East of Rockies . . . . . Neopyrochroa femoralis (LeConte)

10. Dorsal surface of pronotum as deeply and densely punctate as elytra. . . . . .Dendroides canadensis Latreille

Dorsal surface of pronotum but shallowly and sparcely punctate, punctures much less developed than those of elytra. 11

11. Elytra primarily black; West of Rockies 12

Elytra testaceous (or if piceous with testaceous margins, then East of Rockies). 13

12. Elytra entirely black; legs testaceous from base to mid-femora, remainder black; underside of abdomen primarily black . . . . . .Dendroides picipes Horn

Elytra black with lateral margins testaceous; legs and underside of abdomen rufo-testaceous . . . . . .Dendroides marginata Van Dyke

13. Pigmentation areas of metawings testaceous in color and reduced (Figure 11). . . . . Dendroides concolor (Newman)

Pigmentation areas of metawings piceous in color and normal (Figure 10) 14

14. Femora densely punctate, distance between punctures usually much less than diameter of a puncture; surface of femora usually glabrous between punctures; East of Rockies . . . .Dendroides testacea LeConte

Femora moderately punctate, distance between punctures usually greater than diameter of a single puncture; surface of femora conspicuously rugulose between punctures; West of Rockies . . . . . Dendroides ephemeroides (Mannerheim)

KEY TO MALE PYROCHROIDAE BASED ON GENITALIA

1. Parameres ventrad of aedeagus, fused along entire length with sparce elongate setae arising from lateral and apical margins (Figures 7-8) . . . . . .ISCHALIINAE (2)

Parameres dorsad or dorso-laterad of aedeagus, their apices separate, without sparce elongate marginal setae (Figures 1-6). . . . . PYROCHROINAE (3)

2. Apex of parameres convex (Figure 8) . . Ischalia costata (LeConte)

Apex of parameres broadly emarginate (Figure 7) . . . . . Ischalia vancouverensis Harrington & I. californica Van Dyke

3. Parameres fused basally, widely separated distally, their apices dorso-laterad of aedeagus; apical width of parameres but slightly greater than average distal width of aedeagus (Figure 1) . . .Schizotus cervicalis Newman

Parameres fused basally and separated distally, but with apices dorsad of aedeagus. 4

4. Apical width of parameres but slightly greater than average distal width of aedeagus; parameres narrowly separated distally (Figure 2). . . . . .*Dendroides* spp.

Apical width of parameres several times greater than average distal width of aedeagus; parameres widely separated distally . . . . . *Neopyrochroa* (5)

5. Inner margins of parameres with many short, stout setae (Figure 3) . . . . . .*Neopyrochroa sierraensis* sp. nov.

Parameres without setae 6

6. Apical bulb of aedeagus dorsally recurved with a hook-like projection; inner ventro-lateral margins of parameres with a single subapical tooth (Figures 4-5). . . . . .*Neopyrochroa flabellata* (Fabricius)

Apical bulb of aedeagus and margins of parameres simple, without hooks or teeth (Figure 6). . . . . *Neopyrochroa femoralis* (LeConte)

KEY TO KNOWN LARVAL PYROCHROIDAE

1. Spiracles of eighth abdominal segment equidistant from lateral line and tergo-sternal suture; urogomphi with little if any inward curvature; inner faces of urogomphi with coarse projections (Figures 23-24) . . . . . *Neopyrochroa* (3)

Spiracles of eighth abdominal segment closer to lateral line; urogomphi curved inward (or if nearly straight, then apices of urogomphi strongly recurved); inner faces of urogomphi without coarse projections (Figures 20, 22) 2

2. Spiracles of eighth abdominal segment nearly equidistant from anterior and posterior margins of the segment, its length about one and one-half times the length of abdominal segment seven . . . .Schizotus cervicalis Newman

Spiracles of eighth abdominal segment much closer to posterior margin of the segment, its length slightly more than twice the length of abdominal segment seven. . . . . Dendroides (5)

3. Wart-like calli of dorsal urogomphal plate distributed generally over entire surface; width of urogomphal plate (taken across bases of urogomphi) 2-3 times its mesal length (from anterior margin posterad to bases of urogomphi) (Figure 23). 4

Calli limited primarily to urogomphi; width of urogomphal plate 4-6 times its length (Figure 24) . . . . . Neopyrochroa femoralis (LeConte)

4. Dorsal setiferous calli much larger (in diameter and elevation) than surrounding calli of dorsal urogomphal plate; urogomphal pits separated by a distance of nearly one-half the width of a single pit; East of Rockies . . .Neopyrochroa flabellata (Fabricius)

Many dorsal calli as large as dorsal setiferous calli; urogomphal pits nearly contiguous; Sierra Nevada Mountains, California. . . .*Neopyrochroa sierraensis* sp. nov.

5. Urogomphi long, curved inwardly 6

Urogomphi short, nearly straight, their apices strongly recurved . . . . . *Dendroides concolor* (Newman)

6. Parabasal ridge of eighth abdominal segment inconspicuous, discontinuous (Figure 20). . .*Dendroides canadensis* Latreille

Parabasal ridge of eighth abdominal segment conspicuous and continuous . . . . .*Dendroides ephemeroides* (Mannerheim), *D. picipes* Horn, *D. marginata* Van Dyke

KEY TO KNOWN PUPAL PYROCHROIDAE

1. Two lateral marginal tubercles, one simple tubercle anterad and one large, bifurcate tubercle posterad; setae on these and all other tubercles arising preapically (Figure 18). . . . . *Neopyrochroa* (3)

Three lateral marginal tubercles, one simple tubercle anterad and two approximate simple tubercles posterad; setae apical on all tubercles (Figure 17). 2

2. Posterior marginal tubercles greatly narrowed at the middle, being one-half or less the distance across the base (Figure 17) . . . . . *Dendroides* (5)

Posterior marginal tubercles but slightly narrowed at the middle, being one-half or more the distance across the base (Figure 19). . . .*Schizotus cervicalis* Newman

3. Posterior lateral marginal tubercle widely bifurcate (Figure 15), distance from point of bifurcation to apex of tubercle much greater than half the total tubercle length; Sierra Nevada Mountains, California . . . . . .Neopyrochroa sierraensis sp. nov.

   Posterior lateral marginal tubercle bifurcate more toward apex, distance from point of bifurcation to apex usually much less than half the length of the tubercle; East of the Rockies. 4

4. Hind margin of posterior lateral marginal tubercle usually greatly arched (Figure 16); posterior arm often much longer than the anterior . . Neopyrochroa femoralis (LeConte)

   Hind margin of posterior lateral marginal tubercle usually not arched (Figure 14); anterior and posterior arms usually subequal in length . . . . . .Neopyrochroa flabellata (Fabricius)

5. Setae on ventral surface of metafemur (including setae arising from protuberances and any other setae) not more than nine in number, usually 4-6. . . . . .Dendroides canadensis Latreille

   Setae on ventral surface of metafemur not fewer than 12 in number . . . . . .Dendroides concolor (Newman) & D. ephemeroides (Mannerheim)

Subfamily Ischaliinae

The adults lack secondary sexual dimorphic characteristics.

As previously stated, two morphologically distinct yet closely related elements make up the subfamily; an Asian group and a North American group. The author has had an opportunity to examine Asian material from the CASC through the courtesy of Dr. Hugh Leech, and has decided to follow Van Dyke's interpretation of one genus and two subgenera. Until more material, including larvae as well as adults, can be critically examined further splitting appears unjustifiable.

Genus Ischalia Pascoe

Ischalia Pascoe, 1860, J. Entomol. 1: 54. (Type species indigacea Pascoe).

Eupleurida LeConte, 1862, Smiths. Misc. Coll. 3: 267. (Type species costata LeConte).

Ischalia, subgenus Eupleurida LeConte (reduced to subgeneric rank Van Dyke, 1938, Entomol. News 49: 193).

Ischalia (Eupleurida) costata (LeConte)

(Figure 8)

Eupleurida costata LeConte, 1862, Smiths. Misc. Coll. 3: 267.

(not LeConte, 1866: 142. Leng, 1920, Cat. Coleop. Amer., p. 161).

Ischalia costata (LeConte). LeConte, 1873, Proc. Acad. Nat. Sci. Philadelphia 25: 335.

Description

Length 4-6.5 mm.

Mouthparts and antennal segments 3-8 yellow-testaceous, remainder of head piceous. Vertex distinctly gibbose.

Pronotum, ventral thorax, and legs yellow-testaceous; scutellum variable, yellow-testaceous at base and piceous distally, entirely yellow-testaceous, or entirely piceous. Elytra piceous with latero-mesal elongate patches and apices yellow-testaceous. Patches extending along length of lateral discal carinae, continuous across lateral carinae to margins, or discontinuous between the two carinae forming two patches on each elytron.

Abdomen ventrally yellow-testaceous with piceous maculae on lateral margins of segments 3-6 or 4-6; maculae continuous in some specimens making segments 3-6 or 4-6 piceous. Parameres (Figure 8) convex at apex.

Type Information

The type is in the LeConte collection (MCZC) and bears the determination label "Euplura costata LeC" along with an MCZC type label (number 4934). An orange disk indicating southern states is also present on the pin. This agrees with the type locality mentioned in the original description.

Distribution

Eastern North America; east of the Mississippi, southward from Duparquet, Quebec to Tennessee and North Carolina. Adults have been taken during every month but January and February; they are probably to be found in the adult stage throughout the year.

Remarks

This species may be immediately separated from the other members of the subgenus by the color of the head, which is primarily piceous instead of yellow-testaceous or yellow-orange.

Label data indicate that specimens have been collected by sifting leaves and other decaying vegetative material, and by searching beneath boards.

Ischalia (Eupleurida) vancouverensis Harrington

Ischalia vancouverensis Harrington, 1892, Can. Ent. 24: 132.

Description

Length 5-7.5 mm.

Antennal segments 3-9 piceous, remainder of head yellow-testaceous to yellow-orange. Vertex weakly to moderately gibbose.

Pronotum, scutellum, ventral thorax, and legs yellow-testaceous to yellow-orange. Elytra as pronotum, with piceous to black vitta one-half width of disk for basal third, then expanded across width of elytra but not reaching lateral margins. Vitta ending near apex of elytra leaving but a narrow margin; distal lateral carinae black. Elytral punctures between lateral discal and sutural carinae uniformly coarse-reticulate.

Abdominal sternite eight (and in some specimens also sternite three) yellow-testaceous, remainder of sternum piceous to black. Parameres broadly emarginate at apex.

Type Information

The holotype and paratypes are in the CNCI. They bear the locality label "Vancouver Island, B. C.". Three paratypes were examined, the number 441 is on each type label. Additional information from the original description indicates Comox as the specific type locality.

Distribution

BRITISH COLUMBIA: Comox, Vancouver Island; Vancouver, Crown Mt. Pass, 3500 ft.; Vancouver; Terrace; near Canyon, International Mts., East Kootenay Dist., 6500 ft. (underside of charred stump); Langley; Laidlaw (under log); Wynndel (under bark Thuja plicata). WASHINGTON: Mt. Rainier, Paradise Park, 6000 ft. OREGON: Benton Co., Berry Cr., 9 mi. N. Corvallis; Benton Co., McDonald Forest, nr. Corvallis (decayed Douglas fir stump).

Remarks

This species is closely related to californica, differing primarily in its more developed elytral vitta which does not reach the lateral margins, and in the uniformly coarse-reticulate elytral punctation between the lateral discal and sutural carinae. It is easily separated from costata on the basis of head color.

Specimens have been collected from late March to the middle of November.

Ischalia (Eupleurida) californica Van Dyke

(Figure 7)

Ischalia (Eupleurida) californica Van Dyke, 1938, Entomol. News 49: 192.

Description

Length 4.5-7 mm.

Antennal segments 3-9 black, remainder of head yellow-testaceous to yellow-orange. Vertex weakly to moderately gibbose.

Pronotum, scutellum, ventral thorax, and legs yellow-testaceous to yellow-orange. Elytra as pronotum, with piceous to black vitta one-half width of disk for basal two-thirds, then expanded across width of elytra, reaching lateral mergins. Vitta ending preapically, distal lateral discal carinae and apex of elytra yellow-testaceous to yellow-orange. Elytral punctations between lateral discal and sutural carinae of two types, being fine and dense near the sutural carinae and coarse-reticulate near the lateral discal carinae.

Ventral abdomen entirely yellow-testaceous to yellow-orange, or with segments 4-6 piceous and the remainder yellow-testaceous to yellow-orange. Parameres broadly emarginate at apex (Figure 7).

Type Information

The holotype (CASC number 4684) and according to the original description, "numerous designated paratypes" from a large series collected near Weott, Humboldt Co., California. Seven paratypes examined from the CASC.

Distribution

CALIFORNIA: near Weott, Humboldt Co.; "Cal."; Humboldt Co.; Arcata. OREGON: Marshfield [Coos Bay]; Vicinity of McKenzie Pass (under bark); Lane Co., Salt Creek Pass, 5128 ft. (under bark spruce).

Remarks

This species is similar to vancouverensis, differing in its less developed vitta which reaches the lateral margins of the elytra, and in having both fine and coarse-reticulate types of elytral punctation between the lateral discal and sutural carinae, uniformly coarse-reticulate in vancouverensis. It is easily separated from costata on the basis of head color.

Specimens have been collected from the middle of May to late September.

In his original description of californica, Van Dyke stated, "I have always found our two Pacific Coast species about fungus growth on old decaying logs. At one time I split open a small hollow log of tanbark oak, Lithocarpus densiflora (H and A.), and found the entire cavity lined with white mycelium upon which numerous larvae and adults of californica were feeding."

The shriveled remains of a single larva are mounted with Van Dyke's topotypical series of californica but it bears no remote resemblance to any known heteromerous larva and must be discounted at this time.

Subfamily Pyrochroinae

Unlike the Ischaliinae, adults of the Pyrochroinae all exhibit some sort of secondary sexual dimorphism. In all but Dendroides males possess cranial pits; in Dendroides the size of the eyes is dimorphic. In all three genera, the antennae show sexual dimorphism, with females serrate and males pectinate or plumose.

Larvae: Mature larvae (Figure 20) attain lengths of 14-35 mm and widths of 2-5 mm. The body is orthosomatic, subparallel or slightly broader posteriorly. The head and body are yellowish-brown, amber, or dirty-yellow with an olive green tint; darker in areas of heavy sclerotization such as the mandibles and urogomphal plate.

Head prognathous, depressed, and exerted from prothorax. Epicranial suture lyre-shaped, stem indistinct and short. Four ocelli usually present on each antero-lateral aspect of head, just posterad of the prominent three-segmented antennae (the second segment of which bears a small supplemental process). Symmetrical labrum present anterad of fused frons and clypeus. Mouthparts retracted, with strong asymmetrical mandibles (Figure 21), the right one bearing a well developed molar area and the left a prominent molar tooth. Apices of mandibles dentate, teeth interlocking; usually with three large teeth on right mandible and two on the left. Maxillae movable, composed of a cardo which is diagonally folded upward toward the stipes, thus appearing two segmented; a pad-like maxillary articulating area, a mala maxilla which is formed by the fusion of the galea and lacinea, and a three-segmented palpus. The mala maxilla bears the uncus, which

is heavily sclerotized and dentiform in Neopyrochroa and less developed in Schizotus and Dendroides. Labium with ligula elongate, apically rounded; palpi two-segmented.

A three-segmented thorax bears six well developed legs, each of which is four-segmented with a terminal tarsungulus. Thoracic spiracle ovate, located on antero-lateral mesothorax.

Abdomen depressed, moderately sclerotized, segments 1-7 and nine (excluding urogomphi) subequal in length, eighth either slightly more than twice the length of seventh, as in Dendroides and Neopyrochroa, or slightly less than twice the length of seventh, as in Schizotus. Tenth segment much reduced, visible ventrally surrounding anus. Circular spiracles of similar size on ventro-lateral margins of tergites 1-7, spiracles of eighth segment usually somewhat larger, circular or oval. Ninth segment (Figures 22-24), the urogomphal plate, with two heavily sclerotized deeply pigmented pits between urogomphi; ledge-like urogomphal lip ventrad of pits. Ventro-anterior margin of ninth segment with a single, continuous, semi-circular row of asperites.

Pupae: Pale, elongate; head strongly deflexed, usually not visible from above; short, upturned, sharply pointed urogomphi terminally (Figure 12).

Head with many setiferous tubercles distributed as follows: 4-6 on vertex or dorsal area; one on each eye near inner margin; three near base of each antenna; 1-2 on each side of clypeo-labral area; 1-2 on outer margins of mandibles. Antennae with small calli scattered over surfaces.

Pronotum commonly with 20 prominent setiferous tubercles, 10 on the anterior margin, and 10 along the posterior margin. Mesonotum

and metanotum each with two small setiferous tubercles, one on either side of the meson of each segment.

Each side of abdominal segments 2-7 with 2-3 lateral marginal setiferous tubercles, 1-2 pleural tubercles, two posterior marginal tubercles, and two large ventral setiferous tubercles. Tubercles of segments one and eight reduced. Ninth tergite reduced to urogomphi, each bearing one dorsal, three lateral, and three ventral setiferous tubercles. Genitalia posterad of reduced ninth sternite; female appearing two-lobed on each size (Figure 12), male smaller and single-lobed on each side (Figure 13). Tenth sternite posterad of genitalia, between urogomphi, reduced and bearing the anus.

Remarks

Larvae: The preanal row of asperites separates the pyrochroid larvae from all but the Elacatidae (Othniidae) and some Salpingidae (for example Pytho). Pyrochroids have two well developed urogomphal pits and an asperite series in the form of a continuous single arch. The Elacatidae on the other hand have a single poorly developed pit and a mesally discontinuous double arch of asperites, and the Salpingidae have a single well developed pit and a continuous double arch of asperites.

Pupae: Since so little work has been done on the pupae of Coleoptera, it is impossible to provide characters by which the Pyrochroidae can be distinguished from other families.

Rozen (1959) has provided a short diagnosis to help separate oedemerid pupae from those of a number of other heteromerous families, including the Pyrochroidae.

Genus Schizotus Newman

Schizotus Newman, 1837, Entomol. Mag. 5: 374. (Type species cervicalis Newman).

Pyrochroella Reitter, 1911, Fauna Germanica 3: 385 (as a subgenus of Pyrochroa).

Description

Adult: Antennae serrate in the females, subpectinate in the males. Eyes moderate, dorsal separation much greater than maximal width across one eye; length of genal area between eye and neck much greater than minimal distance across eye (anterior to posterior margin at emargination). Cranial pits consisting of two annular, densely setiferous, postocular holes.

Parameres dorso-laterad of aedeagus, widely separated at apex; distal aedeagus nearly as wide as apical width of parameres (Figure 1).

Larva: Only larvae of S. cervicalis were available for study. The larvae are discussed in the treatment of that species.

Pupa: As above, see description of S. cervicalis.

Remarks

Adult: The genus is boreal in distribution with cervicalis Newman in the Nearctic region, fuscicollis (Dejean) from Northeast Asia and Alaska, and cardinalis (Mannerheim) and pectinicornis (Linnaeus) from the boreal Palearctic areas.

Schizotus is the only North American pyrochroine not known to be attracted to light.

Schizotus cervicalis Newman

(Figures 1-19)

Schizotus cervicalis Newman, 1837, Entomol. Mag. 5: 374.

Description

Adult: Length 5.5-9 mm.

Head, including antennae, black with frons, inner surface of cranial pits (♂), transverse postocular maculae (♀), and gular area rufous-orange; mentum and bases of maxillae yellow-testaceous; clypeus and mandibles testaceous to piceous. Rufous-orange frontal area of male usually divided into two maculae by black transverse band which extends across from bases of antennae.

Pronotum and anterior margin of prosternum rufous-orange, remainder of thorax, including legs, black. Elytra black with yellowish to yellowish-orange lateral and sutural margins. Metawings with darkly pigmented areas well developed.

Ventral abdomen piceous.

Larva: Living mature specimens often darker than other pyrochroid larvae with a pale olive-green tint.

Eighth abdominal segment one and one-half to slightly less than two times the length of the seventh, its parabasal ridge well developed, its spiracles close to the lateral line and nearly equidistant from the anterior and posterior margins of the segment.

Urogomphal plate with pits shallow, lip reduced to nearly absent; urogomphi with strong inward curvature.

Pupa: Abdominal segments 2-7 generally with three simple lateral marginal tubercles, one anterad and two posterad; one pleural tubercle. Posterior marginal tubercles but slightly narrowed at middle (Figure 19), one-half or more the distance across the base. Setae on all tubercles arise apically.

Type Information

The type is in the British Museum (Natural History). Data from the original description indicate that the type is a male; the type locality is given as Trenton Falls [New York].

Distribution

CANADA: British Columbia, Alberta, Manitoba, Ontario, Quebec, and New Brunswick. UNITED STATES: Maine, New Hampshire, Vermont, Massachusetts, New York, Connecticut, New Jersey, Maryland, Pennsylvania, northern Indiana, northern Illinois, Michigan, Wisconsin, eastern Minnesota, and Spearfish, South Dakota.

Adults have been collected from 3 May to 30 July, with the greatest abundance of material from the middle of May to the middle of June.

Remarks

Adult: This species is easily distinguished from fuscicollis by its elytra which are black with yellowish to yellow-orange margins, as opposed to the concolorous yellow-orange elytra of fuscicollis.

Adults have been taken from beneath bark and by sweeping.

Larva: Larvae of cervicalis are unique among the known species in that their eighth abdominal segment is less than twice the length

of the seventh, as opposed to more than twice as long in all other species.

In the southern extensions of its range, cervicalis is limited to relict boreal-like ecosystems such as low, cool bogs. In suitable areas larvae are usually found in and under decaying wood, and under moss growing on logs.

Pupa: The pupae are distinct in having posterior marginal tubercles which are tapered instead of being widely expanded basally. They also have three simple lateral marginal tubercles instead of one simple anterior tubercle and one posterior, bifurcate tubercle.

The duration of the pupal stage was 4-6 days.

Schizotus fuscicollis (Dejean)

Pyrochroa fuscicollis Dejean, 1836, Cat. Coléopt. de la Collection Dejean, 3rd ed. Paris p. 237.

Pyrochroa (Pyrochroella) fuscicollis Mannerheim. Rietter, 1911, Fauna Germanica 3: 385.

Schizotus fuscicollis (Mannerheim). Blair, 1914, Ann. & Mag. Nat. Hist. 13 (ser. 8): 317.

Description [based on female]

Adult: Length 9 mm.

Mentum, basal maxillae, and mandibles testaceous, remainder of head, including antennae, black.

Margins and lateral aspects of pronotum, excluding pronotal lobe, yellow-orange; pronotal lobe and remainder of thorax, including legs, piceous to black. Elytra concolorous yellow-orange.

Ventral abdomen rufo-piceous.

Larva: None available for examination.

Pupa: None available.

Type Information

Sex unknown, probably in Dejean material at Paris Museum. Type locality unknown.

Distribution

ASIA: Kamchatka, Kuril Islands, Sakhalin Islands, southeastern Siberia. NORTH AMERICA: Alaska.

Remarks

Readily distinguishable from cervicalis on the basis of elytral color, being yellow-orange in fuscicollis and black with yellow-orange margins in cervicalis.

The description is based upon a single female from "Amur". The Alaskan specimens alluded to by Horn (1888) were not available for examination.

Genus Neopyrochroa Blair

Neopyrochroa Blair, 1914, Ann. Mag. Nat. Hist. 13(Ser. 8): 315.

(Type species Pyrochroa flabellata Fabricius).

Description

Adult: Antennae serrate in the females, subpectinate in the males. Eyes moderate, dorsal separation much greater than maximal width across one eye; length of genal area between eyes and neck very

reduced, less than minimal distance across eye (anterior to posterior margin at emargination). Cranial pits interocular.

Parameres dorsad of aedeagus, widely separated at apex; apical width of parameres several times greater than distal width of aedeagus.

Larva: Eighth abdominal segment slightly more than twice the length of the seventh, its parabasal ridge well developed, its spircles equidistant from lateral line and tergo-sternal suture. Urogomphal plate with well developed pits and lip (Figures 23-24); urogomphi with little if any inward curvature, their inner faces with coarse projections.

Pupa: Abdominal segments 2-7 (Figure 18) with two lateral marginal tubercles, one simple tubercle anterad, the anterior lateral marginal tubercle, and one large bifurcate tubercle posterad, the posterior lateral marginal tubercle; generally two pleural tubercles, though anterior one commonly reduced or absent. Setae arise preapically on all tubercles.

Remarks

Neopyrochroa is the only genus of pyrochroids endemic to North America. It has a very disjunctive distribution with two eastern species attaining distributions as far west as Kansas, and two western species which are limited to small areas within the Sierra Nevada Mountains of California.

Neopyrochroa flabellata (Fabricius)

(Figures 4, 5, 13, 14, 21, 23)

Pyrochroa flabellata Fabricius, 1787, Mant. Ins. 1: 162.

Lampyris flabellata (Fabricius). Gmelin, 1790 in Linn. Syst. Nat., edition 13, 1(4): 1886.

Schizotus flabellata (Fabricius). Newman, 1837, Entomol. Mag. 5: 375.

Neopyrochroa flabellata (Fabricius). Blair, 1914, Ann. & Mag. Nat. Hist. 13(Ser. 8): 315.

Description

Adult: Length 13-19 mm.

Head, including antennal segments 1-2, yellow-orange to orange; antennal segments 3-11 and apices of mandibles piceous to black. Cranial pits of male largely concealed dorsally by anterior projection of vertex and mesal elevation of frons.

Pronotum, scutellum, ventral thorax, and legs yellow-orange to orange. Elytra black, often with violaceous tint; metawings with well developed pigmented areas.

Ventral abdomen variable; concolorous yellow-orange or yellow-orange with two black triangular maculae on each sternite, maculae small and inconspicuous to large and fused, leaving only margins yellow-orange. Apical bulb of aedeagus dorsally recurved with a hook-like projection (Figure 5); inner ventro-lateral margins of parameres with a single subapical tooth (Figures 4-5); parameres without setae.

Larva: Wart-like calli of urogomphal plate distributed over entire dorsal surface (Figure 23), their size much smaller (in diameter and elevation) than dorsal setiferous calli. Width of urogomphal plate across bases of urogomphi 2-3 times its mesal length (measured from anterior margin to bases of urogomphi). Urogomphal pits separated by a distance of nearly one-half the width of a single pit.

Pupa: Posterior lateral marginal tubercle apically bifurcate (Figure 14), distance from point of bifurcation to apex of tubercle usually much less than half the length of the tubercle; hind margin of tubercle usually not arched; anterior and posterior arms usually subequal in length.

Type Information

The holotype male is in the Hunterian Collection at Glasgow University. The type locality is given in the description as "America".

Distribution

Eastern North America from Canada (Ontario and Quebec) south to Alabama, Georgia, and South Carolina; eastward from eastern Nebraska, Kansas, and Texas to East Coast.

Adults have been taken from 10 April to 28 September, with the greatest numbers from late May to late July. Emergence southward from Tennessee appears to be 1-2 weeks earlier than northward.

Remarks

Adult: The yellow-orange to orange metasternum, as opposed to piceous or black, immediately separates flabellata from all other Neopyrochroa. In addition, only in flabellata are the cranial pits largely concealed dorsally. The male genitalia are unique in having a recurved aedeagal hook and teeth on the parameres.

Adults are commonly collected at light and at fermenting baits.

Larva: The relatively small dorsal calli on the urogomphal plate as compared to the dorsal setiferous calli separate flabellata

larvae from those of sierraensis, in which many dorsal calli are as large as the dorsal setiferous calli. The length of the urogomphal plate as compared with its mesal width gives a ratio which easily distinguishes flabellata from femoralis, as does the distribution of dorsal calli on the urogomphal plate. The width of the urogomphal plate in flabellata is but 2-3 times its mesal length, as opposed to 4-6 times in femoralis. The dorsal calli of flabellata are generally distributed over the surface of the urogomphal plate, whereas in femoralis, they are restricted primarily to the urogomphi.

Larvae of flabellata are found almost exclusively on the underside of the log, either beneath the bark or just within the decaying wood itself. The apparent active selection of this microhabitat may be related to such climatic conditions as moisture and/or temperature. The conditions are probably cooler, more moist, and less susceptable to abrupt changes than are those of the more exposed sides of the log.

Pupa: In flabellata the posterior lateral marginal tubercle bifurcates in the distal half of its length, whereas in sierraensis pupae the point of bifurcation is in the basal half. The hind margin of the tubercle is usually not strongly arched in flabellata as it is in femoralis, and the anterior and posterior arms are usually subequal in length whereas in femoralis the posterior arm is usually much longer.

The duration of the pupal stage was 4-9 days, most commonly six days.

Neopyrochroa femoralis (LeConte)

(Figures 6, 16, 24)

Pyrochroa femoralis LeConte, 1855 Proc. Acad. Nat. Sci. Philadelphia, 7: 274.

Neopyrochroa femoralis (LeConte). Blair, 1914, Ann. & Mag. Nat. Hist. 13(Ser. 8): 316.

Description

Adult: Length 11-19 mm.

Head, including first antennal segment, yellow-orange to orange; second antennal segment, apices of mandibles, and maxillary palpi piceous to black; antennal segments 3-11 black. Cranial pits of male completely visible dorsally, vertex simple.

Mesosternum, metepisternum, metasternum, and in some specimens hind margin of prosternum black with violaceous tint; remainder of thorax yellow-orange to orange. Coxae and distal femora yellow-orange to orange, remainder of legs pigmented as mesosternum. Elytra black, often with violaceous tint; metawings with well developed pigmented areas.

Ventral abdominal sterna 3-6 black mesally, often with violaceous tint, yellow-orange to orange laterally. Seventh sternite antero-mesally black, remainder yellow-orange to orange; eighth sternite concolorous yellow-orange to orange. Apical bulb of aedeagus and parameres simple (Figure 6).

Larva: Dorsal wart-like calli of urogomphal plate limited primarily to urogomphi (Figure 24); width of plate across bases of

urogomphi 4-6 times its mesal length, as measured from anterior margin to bases of urogomphi.

Pupa: Posterior lateral marginal tubercle apically bifurcate (Figure 16), distance from point of bifurcation to apex usually much less than half the length of the tubercle; hind margin of tubercle usually greatly arched; posterior arm often much longer than the anterior.

Type Information

The holotype male (MCZC number 4935) is in the LeConte collection and bears the label "P. femoralis LeC.", and a yellow disk indicating mid-western states. Second and third specimens have pink disks indicating middle eastern states, a fourth specimen has a yellow disk, and a fifth is from Virginia. The type locality as given in the original description is middle and western states.

Distribution

Eastern North America from southern Canada (Ontario and Quebec) south to Alabama, Georgia, and South Carolina; eastward from eastern Kansas, Oklahoma, and Texas to East Coast.

Adults have been taken from 18 April to 20 August with the greatest numbers from the middle of May to early July.

Remarks

Adult: The bicolorous legs separate femoralis from all other Neopyrochroa. In addition, the cranial pits of the male are completely visible dorsally and the vertex is simple. In flabellata the vertex projects forward and the frons is mesally elevated to conceal the pits

dorsally, and in sierraensis the vertex is elevated. The parameres of the male have no teeth as do those of flabellata, and no setae as do those of sierraensis.

Adults of femoralis are commonly collected at lights and are occasional visitors at fermenting baits.

Larva: Only femoralis has the dorsal calli of the urogomphal plate primarily limited to the urogomphi. It is further distinguished from the sympatric flabellata by the length to width ratio of the urogomphal plate. The width of the plate in flabellata is but 2-3 times its mesal length, whereas in femoralis it is 4-6 times the mesal length.

Many host records for the larvae come from standing dead elm; other hosts include Quercus sp. (Mich. & Va.), Castanea dentata (Va.), and Liriodendron tulipifera (Va.).

Pupa: In femoralis the posterior lateral marginal tubercle bifurcates in the distal half of its length, whereas in pupae of sierraensis the point of bifurcation is in the basal half. The hind margin of the tubercle is usually greatly arched in femoralis, unlike flabellata in which it is usually not arched, and the posterior arm is usually much longer than the anterior, whereas the two are usually subequal in flabellata.

Pupal stage duration was determined for only one female; the duration was six days.

Neopyrochroa sierraensis sp. nov.

(Figures 3, 12, 15, 18)

Description

Adult: Length 12.5-15 mm.

Head, including first antennal segment, yellow-orange to orange; second antennal segment orange to piceous; antennal segments 3-11 and apices of mandibles piceous to black. Cranial pits completely visible dorsally, partially separated anteriorly by the posteriorly projecting frons. Vertex elevated, crest-like.

Metasternum and metepisternum black, occasionally with violaceous tint, remainder of thorax yellow-orange to orange. Legs, except metacoxae, yellow-orange to orange; metacoxae bicolorous, yellow-orange to orange near articulation with legs and colored as metasternum distally. Elytra black; metawings with well developed pigmented areas.

Ventral abdominal sterna 3-6 black mesally, yellow-orange to orange laterally. Seventh sternite black antero-mesally, remainder yellow-orange to orange; eighth sternite concolorous, yellow-orange to orange. Parameres (Figure 3) with many short, stout, anteriorly directed setae on inner surfaces.

Larva: Dorsal calli of urogomphal plate generally distributed over entire surface, many as large (in diameter and elevation) as dorsal setiferous calli. Urogomphal pits nearly contiguous.

Pupa: Posterior lateral marginal tubercle widely bifurcate (Figure 15), distance from point of bifurcation to apex of tubercle much greater than half the total tubercle length.

Type Information

HOLOTYPE: (♂), Yosemite Valley, California; 3 June 1921 (Van Dyke Collection), [CASC].

ALLOTYPE: (♀), same locality as holotype; 23 June 1921 (Van Dyke Collection), [CASC].

PARATYPES: 3♂♂ with same data as above from 5, 13, and 16 June, [CASC]; 1♂, Cedar Creek, Tulare Co., California, 4500 ft., 10 June 1905 (Hopping; R. Hopping Collection), [CASC]; 1♂, Fish Camp, Mariposa Co., California, 2 June 1942 [UICM]; 1♂, Sierra Nat. Forest, Summerdale Campgd., Mariposa Co., California, 5000 ft., In Flight, 11-15 June 1973 (D. K. & D. C. Young), [DYCC]; 2♂♂, same data as preceeding except Taken from Beneath Bark of Populus trichocarpa [1 in DYCC, 1 in MSUC]; 1♀, Yosemite, California, alt. 3880-4000 ft., 8 June 1938 (B. E. White Collection, 1962 Gift), [CASC]; 1♀, Sequoia Nat. Park, California, 2000-5000 ft., Potwisha, 19 May 1929 (Presented by E. C. Van Dyke collector), [CASC]; 1♀, Northfork, California, 23 May 1920 (H. Dietrich), [CUIC]; 1♀, Madera Co., California, Chiquito Creek, 5 July 1920, 4100 ft. (H. Dietrich), [CUIC]; 1♀, Sierra Nat. Forest, Summerdale Campgd., Mariposa Co., California, 5000 ft., Reared from pupa collected beneath bark of Populus trichocarpa, 11-15 June 1973 (D. K. & D. C. Young), [DYCC].

Distribution

As detailed above, south-central Sierra Nevada Mountains of California; May to early July.

Remarks

Adult: This species is easily recognized by possessing both a darkly colored metasternum and concolorous yellow-orange to orange legs. It can also be separated from other known males of the genus by its dorsally visible cranial pits and elevated vertex, and its setose parameres.

Larva: The large dorsal calli on the dorsal urogomphal plate and the narrowly separated urogomphal pits easily distinguish this species from all other known Neopyrochroa larvae.

Pupa: The widely bifurcate posterior lateral marginal tubercles, in which the distance from the point of bifurcation to the apex of the tubercle is much greater than half the total tubercle length, is diagnostic for sierraensis.

Biology: The only available data comes from observations made by the author and his wife.

On 11 June 1973, a single adult male was found along with a female pupa and several larvae (two mature and a few earlier instars). They were all taken from beneath the bark of a standing black cottonwood stump (Populus trichocarpa Torr. & Gray) at and below ground level. The following morning, an adult male was collected while in flight.

An extensive search of the area over the next two days yielded another adult male and several more larvae. They were all taken from

beneath bark or just within the rotting wood of fallen P. trichocarpa logs which were scattered along the banks of a stream. The larval microhabitat was similar to that of flabellata in that all specimens were found on the undersides of the logs, adjacent to the soil.

Neopyrochroa californica (Horn)

Pyrochroa californica Horn, 1891 Trans. Amer. Ent. Soc. 18: 45.

Neopyrochroa californica (Horn). Blair, 1914, Ann. & Mag. Nat. Hist. 13 (Ser. 8): 316.

Schizotus californica (Horn). Leng, 1920, Cat. Coleopt. Amer. p. 161.

Description

Adult: Length 13 mm.

Head, including antennae, black.

Pronotum and scutellum orange-yellow, ventral thorax and legs black. Elytra black.

Ventral abdomen black.

Larva: None available for examination.

Pupa: None available.

Type Information

The holotype female is in the Horn collection at the PASC, and was not available for examination. The type locality is given in the original description as "near Los Angeles, Cal.".

Distribution

As mentioned above.

Remarks

This species is distinguished by its entirely black legs and underside.

Because the type is the only known specimen of the species and it was not available to the author, the description is based upon Horn's original description.

Genus Dendroides Latreille

Dendroides Latreille, 1810, Considér. Générales ordre Nat. Animaux, ..., Insectes Paris, p. 212. (Type species Dendroides canadensis Latreille, 1810, p. 430).

Description

Adult: Antennae serrate in the females, plumose in the males. Eyes very large, dorsal separation less than maximal dorsal width across one eye, often nearly contiguous in the males. Cranial pits absent.

Parameres dorsad of aedeagus with apices narrowly separated (Figure 2); distal aedeagus nearly as wide as apical width of parameres.

Larva: Eighth abdominal segment slightly more than twice the length of seventh, its barabasal ridge well developed or not, its spiracles near lateral line, close to posterior margin of the segment. Urogomphal plate with well developed pits and moderately developed lip; urogomphi with strong inward curvature (or if nearly straight, then apices strongly recurved).

Pupa: Abdominal segments 2-7 with three simple lateral marginal tubercles (Figure 17), one anterad and two posterad; one pleural tubercle. Posterior marginal tubercles greatly narrowed at middle, one-third or less the distance across the base. Setae apical on all tubercles.

Remarks

On the basis of adult characters, Dendroides appears to be the most unique of the North American pyrochroine genera. It is easily separated from Schizotus and Neopyrochroa in having no cranial pits, much larger eyes in both sexes, especially the males, and more highly developed antennae, again, especially the males. And, unlike the other genera, adults of Dendroides are very homogeneous at the species level. The male genitalia, for example, are quite useful in separating the species of Neopyrochroa, while in Dendroides they appear to be nearly identical from species to species.

Most of the morphological features used by previous workers have proven to be too variable to be of taxonomic value. Thus, color has been greatly relied upon in the present study. Such a reliance adds the problem of accurately determining teneral specimens, but color seems to be the best solution at present.

The systematics of Dendroides will probably become much clearer once definitely associated larval material for the western species becomes available.

Dendroides canadensis Larreille

(Figures 9, 17, 20, 22)

Dendroides canadensis Latreille, 1810, Considér. Générales ordre Nat. Animaux,....., Insectes. Paris p. 212, 430.

Dendroides cyanipennis Latreille, 1816, in Cousin-Desprenux Nouveau Dictionnaire d' Hist. Nat., Paris, edition 2, 9: 251.

Pogonocerus bicolor Newman, 1837, Entomol. Mag. 5: 375.

Dendroides bicolor (Newman). Lacordaire, 1859, Genera Coléopt., Paris 5: 603, footnote 3.

Pogonocerus ruficollis Dejean, 1836, Cat. Coléopt. de la Collection Dejean, 3rd ed. Paris p. 237.

Dendroides canadensis LeConte. Leng, 1920, Catalog Coleopt, Amer. N. of Mexico p. 161.

Dendroides canadensis Latreille. Barber, 1932, Psyche 39: 36.

Description

Adult: Length 7-16 mm.

Mouthparts, except apices of mandibles, yellow-testaceous to rufo-testaceous; remainder of head, including antennae and apices of mandibles, rufo-testaceous to black.

Thorax and legs rufo-testaceous; pronotum deeply, densely punctate. Elytra piceous to black with sutural and lateral margins commonly rufous at bases; metawings with post-radial pigmentation area inconspicuous, poorly developed, distal areas normal.

Ventral abdomen yellow-testaceous to rufo-testaceous, occasionally with two piceous triangular maculae on mesal aspects of sternites 4-6.

Larva: Urogomphi long, with conspicuous inward curvature. Parabasal ridge of eighth abdominal segment inconspicuous and discontinuous (Figure 20).

Pupa: Total number of setae on ventral surface of metafemur, including setae arising from protuberances and all others, not more than nine, commonly 4-6.

Type Information

Type repository unknown, type probably lost. The original description gives "Canada" as the type locality.

Distribution

Eastern North America, from south-central Canada to northern Florida; from central Manitoba, eastern North Dakota, Nebraska, and Kansas to East Coast.

Clark (1956) also recorded canadensis, under the synonym bicolor, from northwestern British Columbia. This record remains questionable.

Adults have been taken from 2 April to 1 October, but are most abundant from early June to late July in the North and from the middle of May to late August in the South.

Remarks

Adult: The coarse, dense punctation on the pronotum serves to separate canadensis from all other Dendroides.

Dendroides canadensis is our most common North American pyrochroid. Adults are commonly taken at lights and by beating foliage.

Larva: The inconspicuous, discontinuous parabasal ridge of the eighth abdominal segment separates canadensis from all other pyrochroid larvae.

Larvae of this species are the most commonly encountered members of the family. This is due in part to their general abundance, but is also related to their microhabitat selection. Unlike several other common pyrochroids, the larvae of canadensis are found primarily beneath the bark of the exposed areas of the log. The larvae of the others are not normally encountered unless the log is rolled over to expose the underside.

Pupa: The total number of setae on the ventral surface of the metafemur (not more than nine, usually 4-6) separates canadensis from the other two known Dendroides pupae, which have not fewer than 12 setae.

The duration of the pupal stage was 5-6 days.

Dendroides picipes Horn

Dendroides picipes Horn, 1880, Trans. Entomol. Soc. Amer. 8: 154.

Description

Adult: Length 9.5-16 mm.

Head rufo-testaceous to piceous with antennae and apices of mandibles black. First segment of maxillary palpi and inner margin of terminal segment testaceous, remainder black.

Metasternum piceous, remainder of thorax rufo-testaceous. Punctures of pronotum small, shallow, sparce. Coxae and basal femora yellow-testaceous, remainder of legs piceous to black. Elytra piceous to black.

Ventral abdominal sternites 3-7 piceous to black anteromesally, margins testaceous to rufo-testaceous; eighth sternite concolorous testaceous to rufo-testaceous.

Larva: No definitely associated larvae were available for study.

Pupa: None available for examination.

Type Information

The holotype male is in the Horn collection at the ANSP. The type locality is given in the original description as California.

Distribution

CANADA: Victoria, British Columbia. UNITED STATES: Oregon (Lincoln, Klamath, and Jackson Co's.), California (Humboldt, Mendocino, Tehama, Plumas, Sonoma, Marin Co's., and Felton, Santa Cruz Co.).

Adults have been collected from 15 April to 15 August.

Remarks

This is the most distinctive western species due to the bicolorous legs which are yellow-testaceous basally and piceous to black distally. Both marginata and ephemeroides have testaceous to rufo-testaceous legs.

Specimens have been taken at lights (Newport, Oregon), and reared from pupae which were found beneath bark of Alnus rubra (Sonoma Co., California).

Dendroides marginata Van Dyke

Dendroides marginata Van Dyke, 1928, Bull. Brooklyn Entomol. Soc. 23: 259.

Dendroides pacificus Barrett, 1932, Pan-Pacific Entomol. 8: 171.

Description

Adult: Length 10-18 mm.

Head and antennal segments 1-2 testaceous to rufo-testaceous, antennal segments 3-11 piceous to black.

Pronotum, scutellum, ventral thorax, and legs rufo-testaceous. Punctures of pronotum small, shallow, sparce. Elytra piceous to black with testaceous to rufo-testaceous lateral margins.

Ventral abdomen testaceous to rufo-testaceous.

Larva: A single exuvium from a mature larva was labeled as marginata, but without larvae of the sympatric picipes any description of this exuvium would be meaningless. It did have a well developed parabasal ridge, however, as did all the undeterminable western Dendroides.

Pupa: None available for examination.

Type Information

From the original description, the holotype is a male, allotype female (CASC numbers 2588 and 2589) and "several designated paratypes from a series of 14 specimens". The type locality is Muir Woods, Marin Co., California. Four of the paratypes (CASC) were examined.

The type of pacificus, a male, is in the SEMC. From the original description, "this species is described from a specimen which was

reared from a larva collected at Inverness, Marin County, California, March 20, 1926. The larva was taken in the rotten trunk of red alder, Alnus rubra Bong., which was also inhabited by Platycerus oregonensis Westw. The adult emerged April 2, 1926".

The type was examined; unfortunately Barrett apparently did not keep the larval exuvium or mention the duration of the pupal stage.

Distribution

CANADA: British Columbia (Nelson, Atbara). UNITED STATES: Oregon (Coos, Curry, and Josephine Co's.), California (Humboldt, Trinity, Sonoma, Marin, Santa Cruz, and Santa Clara Co's.).

Specimens have been collected from 6 April to 28 July with most of the material from the month of May.

Remarks

Adults can usually be readily separated from other western Dendroides by the bicolorous elytra, black with testaceous to rufo-testaceous lateral margins. However, teneral specimens tend to resemble ephemeroides very closely.

Dendroides concolor (Newman)

(Figures 2, 11)

Pogonocerus concolor Newman, 1837, Entomol. Mag. 5: 375.

Dendroides concolor (Newman). LeConte, 1855, Proc. Acad. Nat. Sci., Philadelphia 7: 275.

Description

Adult: Length 9-17 mm.

Apices of mandibles piceous, remainder of head, including antennae, yellow-testaceous to testaceous.

Thorax, including legs, yellow-testaceous to testaceous. Punctures of pronotum very small, shallow, and sparce. Elytra colored as thorax; metawings (Figure 11) with post-radial and distal pigmentation areas very much reduced, yellow-testaceous in color instead of the normal piceous coloration.

Ventral abdomen yellow-testaceous to testaceous.

Larva: Parabasal ridge of eighth abdominal segment well developed, conspicuous.

Urogomphi short, nearly straight, their apices strongly recurved.

Pupa: Total number of setae on ventral surface of metafemur, including setae arising from tubercles and all others, not fewer than twelve, commonly 13-15.

Type Information

The type, sex unknown, is in the British Museum (Nat. Hist.). The type locality is given in the original description as Trenton Falls [New York].

Distribution

Northeastern North America. CANADA: Ontario, Quebec, Nova Scotia, Newfoundland. UNITED STATES: Maine, Vermont, New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Virginia, North Carolina, eastern Tennessee, northern Ohio,

northern Indiana, northern Illinois, Michigan, Wisconsin, Minnesota, and a single female from Wyandott County, Kansas.

Adults have been taken from 18 May to 17 August, with the greatest amount of activity apparently from early June to early July.

Remarks

Adult: The completely yellow-testaceous color separates concolor from all but ephemeroides and testacea. These species are very similar in adult morphology. In the past, the width of the dorsal interocular area, antennal and maxillary palpi structure, and length versus width pronotal ratios have been used to separate them. However, these characters have all proven to be too variable to be of diagnostic value. They can, however, be separated by the degree of development and coloration of the pigmented areas on the post-radial and distal regions of the metawings. In concolor, these areas are poorly developed and of a yellow-testaceous color, whereas in ephemeroides and testacea they are normally developed and piceous.

Adults are commonly taken at lights and by beating forest foliage.

MacGillivary and Houghton (1902) recorded an interesting note on concolor. They noted that "thirty-five males of this species were taken as they were flying about over a patch of raspberry bushes, at the edge of the woods, just at dusk: only one female was secured".

Larva: The relatively short, nearly straight, apically recurved urogomphi distinguish concolor from all other Dendroides larvae, in which the urogomphi are elongate and conspicuously curved inwardly.

The larvae are most frequently encountered on the underside of the log, especially in the southern-more extents of its range.

Pupa: Dendroides concolor possesses no fewer than 12 setae on the ventral surface of the metafemur, whereas canadensis has no more than nine. The available pupae of concolor and ephemeroides could not be separated; the ephemeroides examined had no fewer than 14 setae with a range of 14-19.

The duration of the pupal stage was 5-7 days, most commonly six days.

Dendroides ephemeroides (Mannerheim)

(Figure 10)

Pogonocerus ephemeroides Mannerheim, 1852, Bull. Soc. Imper. Nat. Moscou 25: 348.

Dendroides ephemeroides (Mannerheim). LeConte, 1855, Proc. Acad. Nat. Sci. Philadelphia 7: 275.

Description

Adult: Length of males 11-15 mm (mean 13.4 mm); females 12-17.5 mm (mean 14.8 mm).

Apices of mandibles piceous, remainder of head, including antennae, yellow-testaceous to rufo-testaceous.

Thorax, including legs, yellow-testaceous to rufo-testaceous. Punctures of pronotum very small, shallow, sparce. Punctation on femora moderate, the punctures usually separated by a distance greater than the diameter of a single puncture; surface between

punctures highly rugulose. Elytra yellow-testaceous to testaceous; metawings (Figure 10) with pigmented areas well developed, piceous in color.

Ventral abdomen yellow-testaceous to testaceous.

Larva: Parabasal ridge of eighth abdominal segment well developed, conspicuous and continuous. Urogomphi elongate with obvious inward curvature.

Pupa: Total number of setae on ventral surface of metafemur, including setae arising from tubercles and all others, not fewer than 14, range 14-19.

Type Information

A female in the LeConte collection (MCZC) bears the name label and the locality "Sitkha" along with the type label (number 4937). It is thought to be a cotype from Mannerheim's material. The specimen was examined.

Distribution

Along the Pacific Coast from Kodiak Island, Alaska southward to northern California (Trinity and Humboldt Co's.). In the northern portion of its range, it is found as far east as the Rocky Mountains (southeastern British Columbia, northern Idaho), while in the southern extremes, it is recorded as far east as Eldorado Co., California.

Remarks

Adult: The testaceous coloration distinguishes this species from all but concolor and testacea. From concolor it differs in having well developed pigmented areas in the metawings. It can usually be

separated from testacea on the basis of punctation and surface sculpturation of the femora. The femora of ephemeroides are moderately punctate, densely so in testacea; the surface between punctures is conspicuously rugulose, usually glabrous in testacea.

Larva: The presence of a well developed parabasal ridge on the eighth abdominal segment separates this species from canadensis, in which the ridge is inconspicuous and discontinuous. Larvae of ephemeroides are distinguished from those of concolor by the shape of the urogomphi, being elongate and curved inwardly in the former and short and nearly straight in the later.

Larvae collected in Oregon by Loren Russell (in litt.) were most frequently observed on the sides of the logs (Populus trichocarpa).

Pupa: The total number of setae on the ventral surface of the metafemur (no fewer than 14) separates ephemeroides pupae from those of canadensis, which have no more than nine, usually 4-6. Pupae of ephemeroides and concolor could not be distinguished.

Duration of the pupal stage (Russell, in litt.) was 7-11 days, most commonly 9-10 days.

Dendroides testacea LeConte

Dendroides testaceus LeConte, 1855, Proc. Acad. Nat. Sci. Philadelphia 7: 275.

Dendroides testacea LeConte. LeConte, 1866, Smiths. Misc. Coll. 140: 64.

Description

Adult: Length of males 9-12 mm (mean 10.7 mm); females 10-14.5 (mean 12.2 mm).

Apices of mandibles piceous, remainder of head, including antennae, yellow-testaceous to rufo-testaceous (females often with vertex rufo-testaceous and remainder of head yellow-testaceous).

Thorax, including legs, yellow-testaceous to rufo-testaceous. Punctures of pronotum very small, shallow, sparce. Punctation on femora dense, punctures usually separated by a distance much less than the diameter of a single puncture; surface between punctures usually glabrous. Elytra yellow-testaceous to piceous with testaceous sutural and lateral margins; metawings with pigmented areas well developed, piceous in color.

Ventral abdomen yellow-testaceous to testaceous.

Larva: None available for examination.

Pupa: None available.

Type Information

A female is in the LeConte collection (MCZC) and bears the name label "D. testaceus Lec." and a light green disk indicating Lake Superior. The type label is numbered 4936. Type examined.

Distribution

CANADA: Alberta; Saskatoon and Regina, Saskatchewan; Manitoba; Ontario; and Quebec. UNITED STATES: Laramie, Wyoming; northern Wisconsin and Michigan; and Upper Saranac, New York.

Remarks

The testaceous coloration and well developed pigmentation areas in the metawings separates this species from all but ephemeroides. It can usually be distinguished from this closely related species by its densely punctate femora, moderately so in ephemeroides, and the glabrous femoral surface between punctures which is very rugulose in ephemeroides.

PLATE I

1. Distal parameres and aedeagus of Schizotus cervicalis Newman; dorsal view.

2. Distal parameres and aedeagus of Dendroides concolor (Newman); dorsal view.

3. Distal parameres and aedeagus of Neopyrochroa sierraensis sp. nov.; ventral view.

4. Distal parameres of Neopyrochroa flabellata (Fabricius); dorsal view.

5. Distal parameres and aedeagus of Neopyrochroa flabellata (Fabricius); lateral view.

6. Distal parameres and aedeagus of Neopyrochroa femoralis (LeConte); lateral view.

7. Distal parameres of Ischalia (Eupleurida) californica Van Dyke; dorsal view.

8. Distal parameres of Ischalia (Eupleurida) costata (LeConte); dorsal view.

9. Female genitalia of Dendroides canadensis Latreille; ventral view.

10. Left metawing of Dendroides ephemeroides (Mannerheim).

11. Left metawing of Dendroides concolor (Newman).

PLATE II

12. Female pupa of *Neopyrochroa sierraensis* sp. nov.; ventral view.

13. Ninth segment and male genitalia of pupa of *Neopyrochroa flabellata* (Fabricius); ventral view.

14. Posterior lateral marginal tubercle of *Neopyrochroa flabellata* (Fabricius).

15. Posterior lateral marginal tubercle of *Neopyrochroa sierraensis* sp. nov.

16. Posterior lateral marginal tubercle of *Neopyrochroa femoralis* (LeConte).

17. Fourth abdominal segment of *Dendroides canadensis* Latreille; dorsal view.

18. Fourth abdominal segment of *Neopyrochroa sierraensis* sp. nov.; dorsal view.

19. Posterior marginal tubercles of *Schizotus cervicalis* Newman.

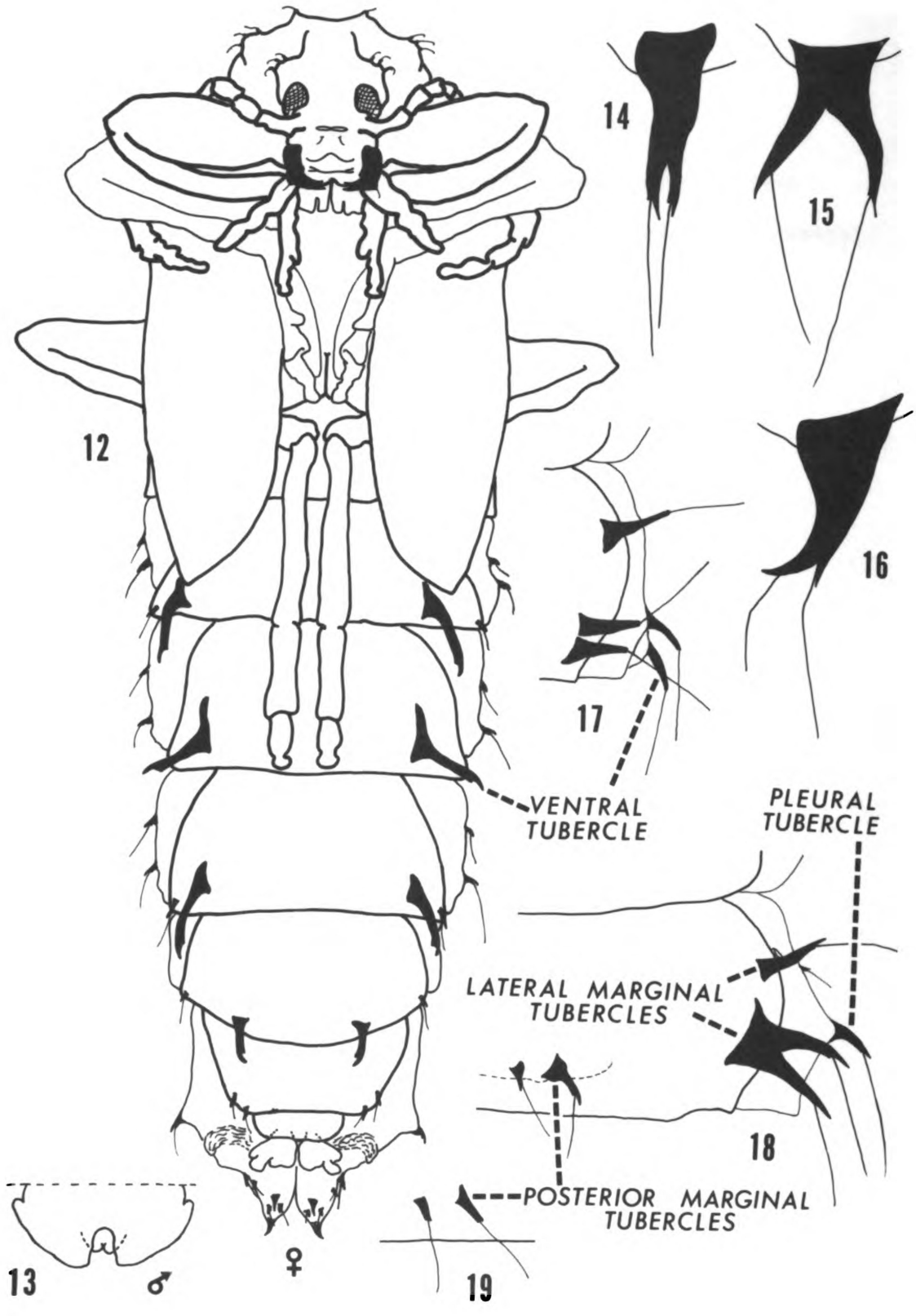
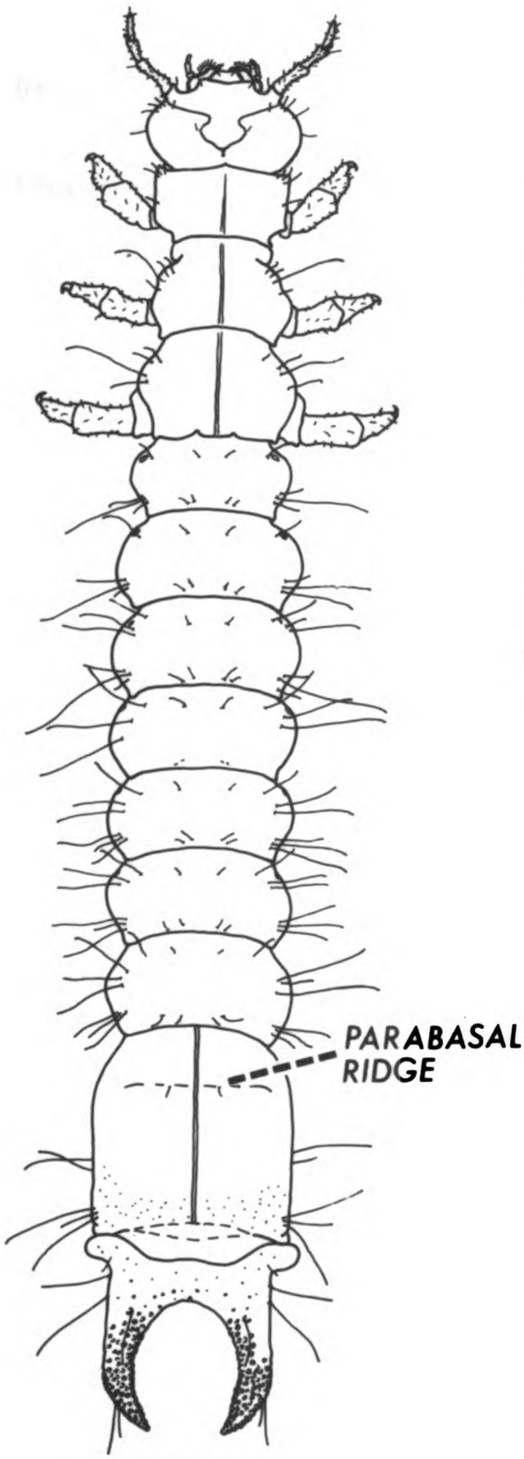

12
14
15
16
17
VENTRAL TUBERCLE
PLEURAL TUBERCLE
LATERAL MARGINAL TUBERCLES
18
POSTERIOR MARGINAL TUBERCLES
19
13
♂
♀

PLATE III

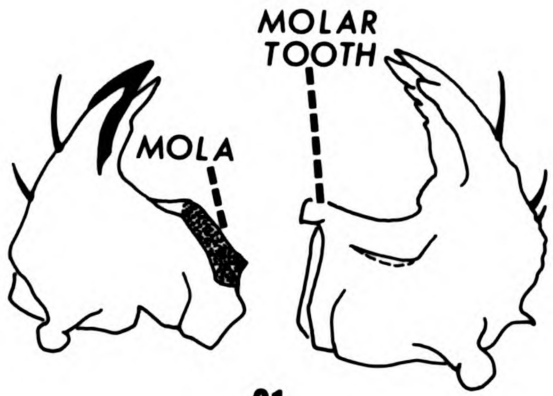
20. Larva of Dendroides canadensis Latreille; dorsal view.

21. Mandibles of Neopyrochroa flabellata (Fabricius); ventral view.

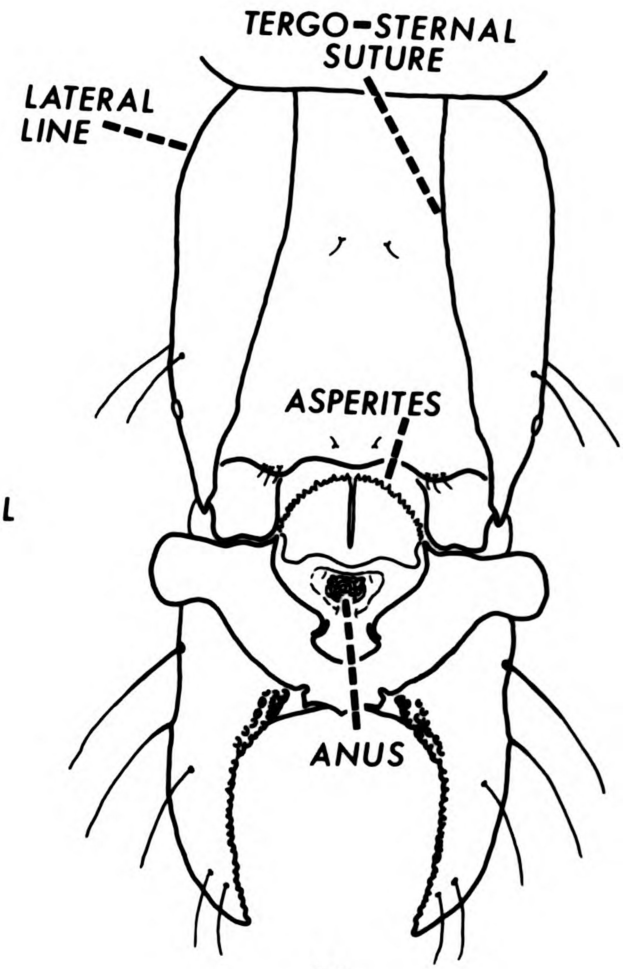
22. Abdominal segments 8-10 of Dendroides canadensis Latreille; ventral view.


PARABASAL
RIDGE

20


MOLAR
TOOTH
MOLA

21


TERGO-STERNAL
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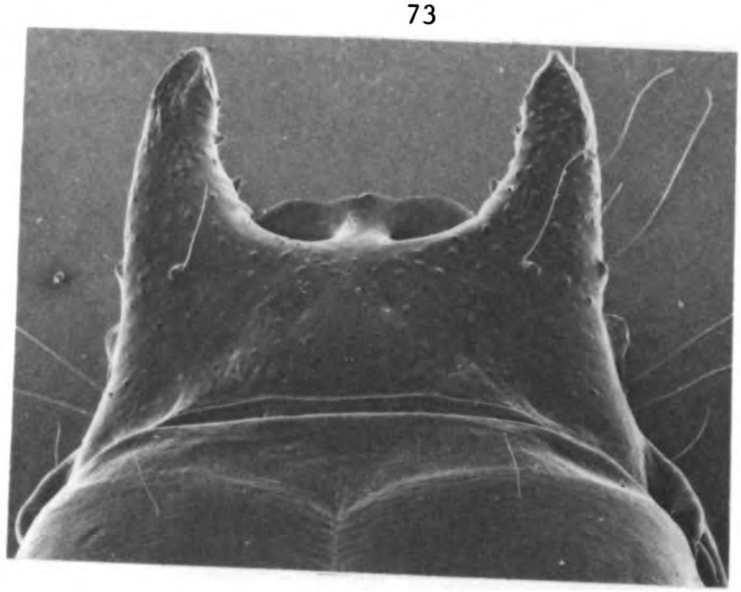
LATERAL
LINE
ASPERITES
ANUS

22

PLATE IV

23. Urogomphal Plate of Neopyrochroa flabellata (Fabricius); dorsal view.

24. Urogomphal Plate of Neopyrochroa femoralis (LeConte); dorsal view.



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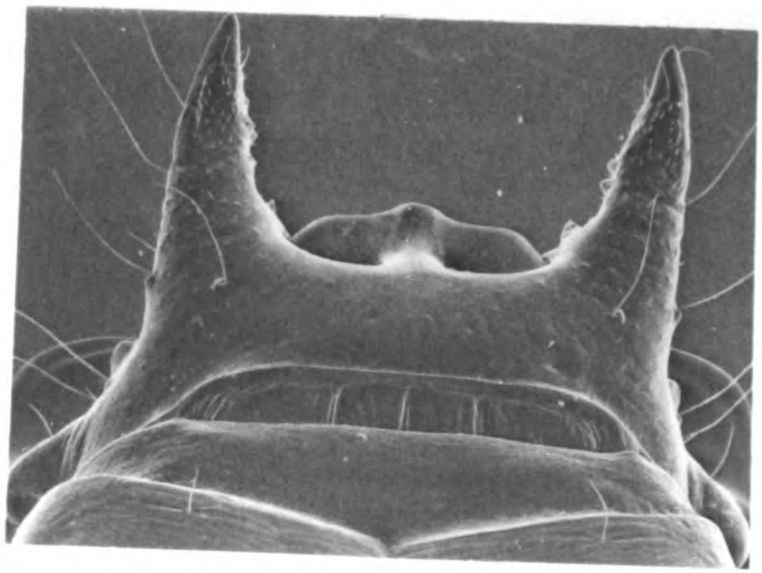

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REFERENCES

REFERENCES

Abdullah, M. 1964. A revision of the genus Pilipalpus (Coleoptera, Anthicidae: Pedilinae). Beitr. z. Entomol. 14: 3-9.

_____. 1965a. New Anthicidae and Pyrochroidae (Coleoptera) from the Baltic Amber (Oligocene). The Entomol. 98: 38-42.

_____. 1965b. A revision of the Madagascan genus Incollogenius Pic, with remarks on the primitive and advanced characters of the family Pyrochroidae (Coleoptera). Entomol. Mo. Mag. 100: 241-245.

_____. 1967. Observations on the Chilean Pilipalpus (Coleoptera, Pyrochroidae) including new synonymy and transfer from Anthicidae (sensu lato). Entomol. Tidskr. 88: 63-65.

Arnett, R. H., Jr. 1951. A preliminary key to the neotropical genera of Oedemeridae. Coleopt. Bull. 5: 57-59.

_____. 1963. The beetles of the United States: A manual for identification. Catholic Univ. Press: Washington, D.C. 1112 pp.

Blackwelder, R. E. 1945. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. Part 3. Bull. U. S. Nat. Mus. 185: 343-550.

Blair, K. G. 1914. A revision of the family Pyrochroidae (Coleoptera). Ann. & Mag. Nat. Hist. 13 (ser. 8): 310-326, 1 pl.

_____. 1920. Notes on the coleopterous genus Ischalia Pascoe (Fam. Pyrochroidae), with descriptions of two new species from the Philippine Islands. Entomol. Mo. Mag. 56: 133-135.

Blatchley, W. S. 1910. An illustrated descriptive catalogue of the Coleoptera or beetles (exclusive of the Rhynchophora) known to occur in Indiana. The Nature Publ. Co.: Indianapolis 1386 pp.

Borror, D. J. and R. E. White. 1970. The Peterson field guide series. A field guide to the insects of America north of Mexico. Houghton Mifflin Co.: Boston 404 p.

Böving, A. G. and F. C. Craighead. 1931. An illustrated synopsis of the principal larval forms of the order Coleoptera. Entomol. Americana 11 (NS): 1-351, 125 pls.

Clark, M. E. 1956. An annotated list of the Coleoptera taken at or near Terrace, British Columbia. Part 3. Proc. Entomol. Soc. British Columbia 52: 39-43.

Crowson, R. A. 1955. The natural classification of the families of Coleoptera. Nathaniel Lloyd and Co., Ltd.: London 187 p.

Doyen, J. T. 1966. The skeletal anatomy of Tenebrio molitor (Coleoptera: Tenebrionidae). Misc. Publ. Entomol. Soc. Amer. 5: 101-150.

Forbes, W. T. M. 1922. The wing-venation of the Coleoptera. Ann. Entomol. Soc. Amer. 15: 328-352, 7 pls.

Hatch, M. H. 1965. The beetles of the Pacific Northwest. Part IV: Macrodactyles, Palpicornes, and Heteromera. Univ. Washington Publ. Biol. 16: 1-268, 28 pls.

Horn, G. H. 1888. Miscellaneous coleopterous studies. Trans. Amer. Entomol. Soc. 15: 26-48.

Kôno, H. 1929. Die Pyrochroiden Japans. Ins. Matsumurana 3: 62-72.

LeConte, J. L. 1855. Synopsis of the Pyrochroides of the United States. Proc. Acad. Nat. Sci. Philadelphia 7: 270-277.

_____. 1862. Classification of the Coleoptera of North America. Smiths. Misc. Coll. 3: 209-286.

_____. 1873. Synonymical remarks upon the North American Coleoptera. Proc. Acad. Nat. Sci. Philadelphia 25: 321-336.

Lindroth, C. H. 1957. The principal terms used for male and female genitalia in Coleoptera. Opusc. Entomol. 22: 241-256.

MacGillivray, A. and C. O. Houghton. 1902. A list of insects taken in the Adirondack Mountains, New York, I. Entomol. News 13: 247-253.

Moody, H. L. 1880. Larvae of the family Pyrochroidae. Psyche 3: 16.

Pascoe, F. P. 1860. Notices of new or little known genera and species of Coleoptera. J. Entomol. 1: 36-64, 98-132.

Payne, N. M. 1931. Food requirements for the pupation of two coleopterous larvae, Synchroa punctata Newn. and Dendroides canadensis LeC. (Melandryidae, Pyrochroidae). Entomol. News 42: 13-15.

Peterson, A. 1951. Larvae of insects. An introduction to Nearctic species. Part II. Coleoptera, Diptera, Neuroptera, Siphonaptera, Mecoptera, Trichoptera. Alvah Peterson: Columbus, Ohio 416 p.

Procter, W. 1938. Biological survey of the Mount Desert region, Part VI: The insect fauna with references to methods of capture, food plants, the flora and other biological features. Mem. Wistar Institute Anat., Biol. Philadelphia 1938: 1-496.

Rozen, J. G. 1959. Systematic study of the pupae of the Oedemeridae (Coleoptera). Ann. Entomol. Soc. Amer. 52: 299-303.

Sharp, D. and F. Muir. 1912. The comparative anatomy of the male genital tube in Coleoptera. Trans. Entomol. Soc. London 1912: 477-642, 78 pls.

Snodgrass, R. E. 1957. A revised interpretation of the external reproductive organs of male insects. Smiths. Misc. Coll. 135: 1-60.

Spilman, T. J. and W. H. Anderson. 1961. On the immature stages of the North American Pyrochroidae. Coleopt. Bull. 15: 38-40.

Swan, L. A. and C. S. Papp. 1972. The common insects of North America. Harper and Row Publ.: New York 750 p.

Tanner, V. M. 1927. A preliminary study of the genitalia of female Coleoptera. Trans. Amer. Entomol. Soc. 53: 5-50.

Townsend, C. H. T. 1936. Manual of Myiology. Part 4: Oestroid classification and habits. Charles Townsend & Filhos, Itaquaquecetuba: Saõ Paulo 365 pp., 84 pls.

Van Dyke, E. C. 1938. New species of Pacific Coast Coleoptera (Cleridae, Pyrochroidae, Chrysomelidae). Entomol. News 49: 189-195.

Van Emden, F. I. 1943. Larvae of British beetles IV. Various small families. Entomol. Mo. Mag. 79: 259-270.

Werner, F. G. 1964. A revision of the North American species of Anthicus s. str. (Coleoptera: Anthicidae). Misc. Publ. Entomol. Soc. Amer. 4: 193-242.

Wickham, H. F. 1894. On the larvae and pupae of Hololepta and Pyrochroa. Amer. Naturalist 28: 816-820, 1 pl.

Wood, S. L. 1952. Observations on the homologies of the copulatory apparatus in male Coleoptera. Ann. Entomol. Soc. Amer. 45: 613-617.

Young, D. K. and R. L. Fischer. 1972. The pupation of Calopteron terminale (Say) (Coleoptera: Lycidae). Coleopt. Bull. 26: 17-18.