Bulletin of the Museum of Comparative Zoology at Harvard College.

Cambridge, Mass. :The Museum,
http://www.biodiversitylibrary.org/bibliography/2803

This page intentionally left blank.

Page Unavailable

Page Unavailable

Page Unavailable

which feed in both larval and adult stages on the mycelia and fruiting bodies of wood-rotting fungi, such as Polyporaceae. At present, the family includes about 40 genera and 550 species, but the generic concepts badly need revision and at least 400 more species remain to be described. The following paper consists of a short, general section on the taxonomy of the group and a more detailed account of the 12 genera and 84 species known to occur or likely to occur within the confines of the continental United States and Canada. Throughout the text, this area will be referred to as North America, even though Mexico has been excluded. The keys and discussions presented should permit the identification of the vast majority of ciid species encountered north of the Mexican border, but there are probably a number of undescribed forms yet to be found in southern Florida, along the Gulf Coast of Texas, and in the mountains of the Southwest.

Although the scope of this work is limited geographically, the concepts presented are derived from an examination of large numbers of specimens from various parts of the world. The generic treatment is relatively conservative, and with the exception of a few obvious synonymies (*Cis-Macrocis*, *Hadraule-Maphoca*, *Malacocis-Brachycis*), no drastic changes have been made in the classification currently used in the United States. The recognition of Casey's *Orthocis* and *Plesiocis* and Dury's *Dolichocis* and *Strigocis*, however, is contrary to the concepts of European workers. In Lohse's work (1967), *Orthocis* and *Strigocis* would be included in *Cis* and *Sulcacis*, respectively, while species of *Dolichocis* and *Plesiocis* would be placed in *Ennearthron*.

Brief sections are included on the geographic distribution and host preferences of North American Ciidae, but these topics (particularly the latter) will be covered in more detail in a future publication (Lawrence, in preparation).

ACKNOWLEDGMENTS

I am indebted to the following individuals and institutions for making their collections available to me: Academy of Natural Sciences, Philadelphia, Pa. (H. J. Grant); American Museum of Natural History, New York, N. Y. (J. Rozen, P. Vaurie, L. Herman); Bernice P. Bishop Museum, Honolulu, Hawaii (J. L. Gressitt, G. A. Samuelson); Brigham Young University, Provo, Utah (V. M. Tanner, S. L. Wood); British Museum (Natural History), London, England (J. Balfour-Browne, R. Pope, C. von Hayek); Bureau of Entomology, California State Department of Agriculture, Sacramento, Calif. (M. Wasbauer); Burke Memorial Museum, University of Washington, Seattle, Wash. (M. H. Hatch); California Academy of Sciences, San Francisco, Calif. (E. S. Ross, H. B. Leech); California Insect Survey, University of California, Berkeley, Calif. (J. Powell, P. D. Hurd); Carnegie Museum, Pittsburgh, Pa. (E. Wallace); Cincinnati Museum of Natural History, Cincinnati, Ohio (C. Oehler); J. F. Cornell, Boone, N. C.; Cornell University, Ithaca, N. Y. (W. L. Brown, H. Dietrich); Entomology Research Institute, Canada Department of Agriculture, Ottawa, Canada (W. J. Brown, E. C. Becker); Field Museum of Natural History, Chicago, Ill. (R. L. Wenzel, H. S. Dybas); Hope Department of Entomology, Oxford University, Oxford, England (E. Taylor, M. Graham); H. F. Howden, Ottawa, Canada; Illinois Natural History Survey, Urbana, Ill. (H. H. Ross, L. K. Gloyd); Institute Royale des Sciences de Belgique, Brussels, Belgium (R. Damoiseau); V. M. Kirk, Brookings, S. D.; Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (H. Reichardt, U. Martins); Muséum d'Histoire Naturelle, Geneva, Switzerland (C. Besuchet); Muséum National d'Histoire Naturelle, Paris, France (A. M. Villiers); Museum of Comparative Zoology, Cambridge, Mass. (P. J. Darlington, Jr.); Museum Zoologicum Universitatis, Helsinki, Finland (M. Meinander); Natur-

historische Museums Wien, Vienna, Austria (F. Janczik); G. H. Nelson, Kansas City, Mo.; Oregon State University, Corvallis, Ore. (J. D. Lattin); F. Plaumann, Nova Teutonia, Santa Catarina, Brazil; Purdue University, Lafayette, Ind. (R. H. Arnett, L. Chandler); San Diego Natural History Museum, San Diego, Calif. (C. F. Harbison); J. Schuh, Klamath Falls, Ore.; Snow Entomological Museum, University of Kansas, Lawrence, Kans. (G. W. Byers); W. R. Suter, Kenosha, Wis.; United States National Museum, Smithsonian Institution, Washington, D. C. (J. M. Kingsolver, P. J. Spangler, T. J. Spilman, O. L. Cartwright, D. M. Anderson); Universitets Zoologiske Museum, Copenhagen, Denmark (S. G. Larsson); University of Alberta, Edmonton, Alberta (G. E. Ball, D. Whitehead); University of Arizona, Tucson, Ariz. (F. G. Werner); University of British Columbia, Vancouver, B. C. (G. G. E. Scudder); University of California, Davis, Calif. (A. T. McClay, R. O. Schuster); University of Wisconsin, Madison, Wisc. (R. D. Shenefelt, J. K. Ackerman); Utah State University, Logan, Utah (G. Knowlton).

Thanks are extended to the following specialists for their continued cooperation in the identification of fungus specimens and for advice pertaining to the systematics of the Basidiomycetes: L. Bonar, O. Fidalgo, R. L. Gilbertson, P. Lentz, J. Lowe, O. K. Miller, M. Nobles, R. Singer, J. A. Stevenson, I. Taveres.

Thanks are also due to the following individuals who have made a special effort to collect Ciidae and their host fungi: R. Andrews, J. T. Doyen, R. C. Graves, D. H. Janzen, A. Laska, H. B. Leech, E. Lindquist, M. Lundgren, C. W. and L. O'Brien, C. Parsons, S. B. and J. Peck, J. Powell, J. R. Powers, A. G. Raske, W. Shear.

I am grateful to R. A. Crowson, H. V. Daly, H. S. Dybas, R. C. Graves, H. B. Leech, E. G. Linsley, G. Lohse, C. D. MacNeill, E. Mayr, J. Powell, O. W. Richards, R. F. Smith, K. Southern (Paviour-Smith), R. L. Usinger, and P. Wygodzinsky for their help and advice during portions of this study, and to P. J. Darlington, Jr., for the critical reading of this manuscript.

I am indebted to R. Archbold, M. Cazier, and the American Museum of Natural History for allowing me to use the facilities of the Archbold Biological Station, Lake Placid, Florida, and the Southwest Research Station, Portal, Arizona, and to C. R. Benjamin and the U. S. Department of Agriculture for permitting me to examine the National Fungus Collections at Beltsville, Maryland. Thanks are also due to E. O. Wilson and Mr. and Mrs. R. Niedhauk for their hospitality during my stay in the Florida Keys.

I also wish to thank J. Campbell, M. Catron, K. Davis, S. Duncan, K. Heise, S. Loth, W. Peairs, and K. Pearson for technical assistance. I am especially gratefully to Mrs. Penelope Lasnik for the difficult and often thankless job of seeing this manuscript through to publication.

Part of this research was conducted with the aid of a National Science Foundation Grant (GB-4743), National Science Foundation Summer Fellowships, a Woodrow Wilson Fellowship, and grants-in-aid from the University of California Committee on Research and the Society of the Sigma Xi.

METHODS AND TERMINOLOGY

Taxonomic Characters

Color is of limited diagnostic value in the family, except when large samples are available for comparison, and it has been used to distinguish only a few forms with obvious elytral markings. When color is given in descriptions, simple English words are used and Latin terms are avoided. Vestiture has been used extensively in this work, especially at the species level, since it usually is subject to little geographic variation (except in *Cis creberrimus*, p. 452). The vestiture is said to be single if it consists of one type of element (bristles, hairs) and dual if there are two distinct types (bristles and hairs, erect and inclined

bristles, Figs. 29 and 30). The individual elements vary from short, fine hairs or short, stout scales to long, recurved hairs or long, erect bristles. In certain genera (*Ceracis, Octotemnus*) and species groups (*Cis tricornis* group, *Cis pacificus* group) the vestiture remains fairly constant, whereas in others (*Cis nitidus* group, *Cis taurus* group) it is subject to considerable variation, even among closely related species. The lengths of individual elements are usually compared to the basal width of the scutellum.

Head characters are used primarily for males (see below). The vertex is defined as the entire area between the eyes from the frontoclypeal ridge to the concealed occiput. In most ciids, the area in the vicinity of the frontoclypeal or epistomal suture forms a ridge extending from eye to eye (Fig. 3); this is called the frontoclypeal ridge and is composed of both frons and clypeus.

The antennae may be 8-, 9-, or 10-segmented, with a 3-segmented club, although the first club segment is reduced in *Hadraule blaisdelli.* The number of segments is diagnostic at various levels and their relative lengths may be of value at the specific level (ratio of III to IV is used in descriptions). The antennal club segments in the Ciidae are characterized by having at least four large, sensilla-bearing processes, here called *sensillifers* (Figs. 1 and 2). These structures, which have been referred to as "sensory pores" (Casey, 1898; Scott, 1926) or "ampoules à trichoïdes" (Lesne, 1935), appear to be homologous to the hygroreceptors of *Tribolium* (Roth and Willis, 1951a, 1951b) and the "organe sensoriel" of *Typhlophloeus* and *Hypophloeus* (= *Corticeus*) (Jeannel and Paulian, 1945). I have seen similar structures in various tenebrionids (Gnathidiini, Diaperini, Ulomini, Strongyliini), *Myrmechixenus* (Colydiidae), and *Cryptophilus* (Languriidae). These organs may be useful at the generic level but are here restricted to the family diagnosis. Maxillary palps may also prove useful, but they are not used extensively in the present treatment.

The pronotum varies considerably in relative size and shape, with rounded to subparallel sides. The lateral margins may be very narrow to broad and explanate (Figs. 24 and 22), and in some species there is a raised lip at the edge (Figs. 18 and 43). The edge itself may be smooth (Fig. 43) or crenulate (Fig. 44). The anterior angles (where the dorsal and lateral edges meet) may be rounded (Fig. 15) or produced and angulate (Figs. 14, 18, and 22). The pronotal disc varies in surface sculpture and punctation. The surface is smooth and shiny or granulate and dull, and the punctures vary in both diameter and density. The average diameter is compared to either an eye facet or the base of the scutellum, and as an index of density the spaces between punctures are expressed in terms of puncture diameters.

The elytra also vary in relative size and shape, with parallel to rounded sides and blunt to subacute apices. In *Orthocis* and *Strigocis,* the elytral suture bears an inflexed apical margin (Fig. 38). Elytral punctation may be single (punctures relatively uniform in size and depth and all bearing bristles or hairs) or dual (punctures falling into two classes differing in size and depth, with only one bearing bristles or hairs). The punctures vary in distribution from confused to seriate, and also in coarseness and density.

The prosternum has been used extensively, especially at the generic level. The subfamilies Ciinae and Orophiinae are distinguished mainly by the structure of the prosternum and procoxae (*see* generic key p. 436), and the genera of Ciinae are usually distinguished on the basis of prosternal characters. The portion of the prosternum in front of the coxae may be long (Fig. 28) to very short and striplike (Figs. 25 and 27), while the intercoxal process may be broad (Fig. 26) or laminate (Fig. 24), and parallel-sided (Fig. 23) or tapering behind (Fig. 27). In the Orophiinae, the inter

coxal process is very short (Fig. 25) and the procoxae extend well behind and below it (Fig. 16). The anterior part of the prosternum also varies in cross section, being concave or biconcave (Figs. 9–10) and on a different level than the intercoxal process (Fig. 15), or flat to carinate (Figs. 11–13) and on the same level (Fig. 14). The procoxae are almost always open behind (Figs. 22–25; 27–28), but in members of the *Cis vitulus* group the postcoxal bridges meet the intercoxal process to form a posterior closure (Fig. 26). In all Ciidae, the procoxae are open internally.

Tibiae have been used extensively in this group, and the apex of the protibia is particularly diagnostic. The outer apical angle may be narrowly rounded (Fig. 45), dentate (Fig. 50), or expanded and bearing several stout spines (Fig. 58). In addition, the outer edge of the protibia may be spinose (Fig. 60) or serrate (Fig. 54). Spines may also occur at the inner apex (Fig. 54), but they are found in most species and are of little diagnostic value (these are excluded from most illustrations). Although the protibial apex is a useful character at generic and specific levels, it must be treated with caution in certain groups because of sexual differences.

The metasternum varies in shape and convexity, while the metasternal suture varies in length and may be absent (Fig. 33). The hindwing is relatively simple with reduced anal region and a subcubital fleck; it exhibits little variation within the family, but some exotic ciids may be brachypterous or apterous. Genitalic characters have been studied in the male only and consist of the eighth abdominal sternite and the aedeagus. The latter consists of a small basal piece, a ventral tegmen, and a dorsal median lobe (Figs. 85 and 86). The latter two structures and sternite VIII have been included in most descriptions, but these genitalic characters are rarely used in the keys. The terminology is taken from Sharp and Muir (1912), but Lindroth (1957) should be consulted for alternative names.

Secondary Sexual Characters

In the great majority of ciid species, males have a pubescent, glandular structure in the middle of the first visible abdominal sternite (III), which is here called a *pubescent fovea* or *abdominal fovea*, but which has been variously referred to as a "tubercule velu" (Abeille de Perrin, 1874b), "setigerous fovea" (Casey, 1898), "behaartes Grübchen" (Reitter, 1902a), "setiferous pit" (Miyatake, 1954), "median depression" (Kevan, 1967), "setigerous pore" (Lawrence, 1967b), and "Auszeichnung" (Lohse, 1967). The structure may be simple (Fig. 32), margined, or raised and tuberclelike, and in the Orophiinae it may be covered by a triangular flap (Fig. 31). Similar abdominal structures are found in males of many different beetles, including Erotylidae (Delkeskamp, 1959), *Sphindocis*, *Dermestes*, and *Blaps* (Meixner, 1934). In the Ciidae, it varies in size and shape and is useful mainly at the species level. The greatest diameter or length of the fovea may be compared to the "body" of sternite III or that portion of the sternite behind the intercoxal process. Among the North American ciids, the following species lack the fovea in the male: *Cis congestus*, *C. horridulus*, *C. hystriculus*, *C. huachucae*, *C. subtilis*, and *C. vitulus*.

Pubescent foveae may also occur on the vertex of the head of the male. This is the case in *Dolichocis manitoba*, the *Cis pacificus* group, and the "*Ennearthron*" *filum* group. Median and/or lateral tubercles occur on the male vertex in some species, such as *Cis niedhauki* (Fig. 5) and certain *Xylographus* and *Octotemnus*.

The frontoclypeal area is relatively simple in most Orophiinae, but in the Ciinae the development of a frontoclypeal ridge provides a good taxonomic character for species and species groups. This ridge may bear two teeth or tubercles (Fig. 40), two triangular plates (Fig. 39), two long horns (Fig. 42), a median horn (Fig. 6), four teeth (Fig. 4), or a raised, trisinuate

plate (Fig. 3). The anterior edge of the pronotum is also modified in some species, forming a median process (Fig. 41) or two horns (Fig. 7). There are many different types of frontoclypeal and pronotal ornaments, and a particular type is often characteristic of a species group. The major difficulty in using these characters is that they tend to vary allometrically, so that those of larger males may differ greatly from those of smaller ones and the latter may be similar to those of females or small males of related species.

Modifications of the mandibles occur only in the Orophiinae and in no North American species. *Xylographus* males may have a tooth on the left mandible, while in certain Old World *Octotemnus* both mandibles are enlarged.

Measurements and Ratios

Pronotal length (PL) is measured along the midline and in males includes horns or laminae. Pronotal width (PW) is the greatest width. Elytral length (EL) is taken just to one side of the midline and from the base of the scutellum to the elytral apex. Elytral width (EW) is the greatest combined width of both elytra. Greatest depth (GD) is taken through the elytra and metasternum. The total length (TL) is the sum of PL and EL and does not include the head; it is given in millimeters. For one sample of each species described, the range, mean, and standard error of the mean are given for TL and for the following ratios: TL/EW, PL/PW, EL/EW, EL/PL, and GD/EW. In the descriptions, these ratios are given for the holotype and allotype and in the keys they are used only when there is little or no overlap between alternatives. They have proven very useful in distinguishing between species and even higher groups of Ciidae, because of the large amount of variation in general body form occurring in the family. Other ratios included in descriptions are: antennal segment III/IV; prosternal intercoxal process width/procoxal cavity width; length/width of metasternum; length of metasternal suture/median length of metasternum (including its anterior process); and, length of abdominal fovea/median length of sternite III (body only, excluding its anterior process).

Observations and Drawings

Observations were made of dried, fluid-preserved, and slide-mounted material with the aid of a Leitz stereoscopic microscope (12.5× and 18× oculars, 1×, 2×, 4×, 8×, and 12× objectives) and a Bausch and Lomb compound microscope (10× oculars, 100× and 440× objectives). Measurements were made with an ocular linear micrometer, and drawings were made with the aid of ocular grids in the eyepieces of both microscopes. Initial drawings were transferred from graph paper to white board and inked with a series of rapidograph pens. In most of the drawings, no attempt has been made to show relief, and stippling or solid shading has been used to set off specific areas (coxal cowling, abdominal fovea, eyes) or to indicate pigmentation (aedeagus, sternite VIII). Dotted lines have been used to indicate a sharp bend in a surface (raised frontoclypeal ridge, lateral pronotal margin) or a hidden outline (protibial apex, sensillifers, overlapping abdominal sternites).

Synonymies and Descriptions

Synonymies have been reduced to include only author, date, and page, but complete references are cited in the terminal bibliography. The species synonymies are relatively complete, but generic synonymies include only major works. Complete descriptions are given for new species only; for previously described forms and for all genera a short diagnosis is included in the discussion. The species description is usually based on the holotype and is followed by a brief indication of differences in the

allotype. The male genitalia figured are not those of the holotype but have been dissected from one of the male paratypes. The protibiae illustrated have also been removed from paratypes.

Variation

Each species description is followed by a section presenting the range of observed variation in size, form, color, vestiture, and secondary sexual characters. One sample of each sex is treated statistically in the manner described above. Geographic variation is not treated in depth in the present paper, although there are several groups that obviously require further study at this level (*Cis americanus*, page 444; *Cis creberrimus*, page 452; *Orthocis punctatus*, page 486).

Label Data and Collections

Because of the large numbers of specimens examined, complete label data are given only for the type series. In all other cases, localities are listed (alphabetically by states and provinces), collecting dates are excluded, and host data is summarized. Maps are also included for the majority of North American species. The summarization of host data is discussed on page 435. Sources of material (institutions and private collections) are also listed only for types. The following abbreviations are used in the text to refer to locations of types and paratypes: BMNH, British Museum (Natural History); BRUS, Institute Royale des Sciences de Belgique; CAS, California Academy of Sciences; CIN, Cincinnati Museum of Natural History; FMNH, Field Museum of Natural History; GEN, Muséum d'Histoire Naturelle, Geneva; JFC, J. F. Cornell Collection; JFL, J. F. Lawrence Collection; MCZ, Museum of Comparative Zoology; MNHN, Muséum National d'Histoire Naturelle, Paris; MZUH, Museum Zoologicum Universitatis Helsinki; PURD, Purdue University; UAZ, University of Arizona; USNM, United States National Museum; UW, University of Washington; UWS, University of Wisconsin.

SYSTEMATICS OF THE FAMILY CIIDAE

Historical Review

The earliest recognized name in the Ciidae is Scopoli's *Dermestes boleti*, but the genus *Cis* was not described by Latreille until 1796 and the family Ciidae (Cisidae) was proposed by Leach in 1819. The first world monograph of the family was that of Mellié (1848), which included 106 species in eight generic groups, and no other world study has been attempted since. Contributions made within the next eighty years consisted mainly of European faunal works (Thomson, 1863; Abeille de Perrin, 1874b; Kiesenwetter, 1877; Reitter, 1902a) and exotic faunal surveys resulting from foreign expeditions (Gorham, 1883, 1886; Scott, 1926). The Junk catalogue for the family (Dalla Torre, 1911) included 19 genera and 233 species. Outside of North America, most of the work on the family in the last forty years has concerned the Japanese fauna (Chujo, Miyatake, Nakane, Nobuchi) and the Pacific fauna (Blair and Zimmerman). In addition, Pic described almost 100 species from all over the world, and recently European workers, such as Lohse (1964–1969), have renewed interest in the Palaearctic Ciidae.

Although Mellié's monograph included several North American species and Mannerheim described a few from expeditions to Russian America, LeConte and Horn almost ignored the group, and the first major treatment in this country was that of Casey (1898), which included 8 genera and 44 species. Kraus (1908) and Blatchley (1910) added a few more forms, and in 1914 Dury published his North American synopsis that was meant to serve as a supplement to the earlier paper by Casey. Very little has been published since on the North American fauna, with the exception of Hatch's coverage in "Beetles of the Pacific Northwest" (1962) and my recent papers (Lawrence, 1965, 1967a, 1967b).

Family Limits

The composition of the family has varied over the years, and several forms have been removed to other groups. Two genera that are obviously not allied to the Ciidae are *Hendecatomus* Mellié and *Rhipidandrus* LeConte. The former was included in the family by most authors until Lesne (1934, 1935) presented considerable evidence for its removal to the Bostrichidae. The true relationships of *Hendecatomus* had been recognized much earlier, however, by Jacquelin du Val (1861) and LeConte (1861), and the latter had proposed the tribe Hendecatomini within the Bostrichidae. The genus *Rhipidandrus* was placed in the Ciidae by LeConte and Horn (1883), although it was originally described as a tenebrionid (LeConte, 1862) and has been treated as such by most workers (*see* Barber, 1913). In spite of the reduced tarsi (4–4–4) and pectinate antennae, there is little doubt that the group belongs in the Tenebrionidae and is probably related to the *Eledona* Latreille.

The genus *Pterogenius* Candeze is not as easily dispensed with. It was included in the family Ciidae until Crowson (1955) transferred it to a new family (Pterogeniidae) along with *Histanocerus* Motschulsky (= *Labidocera* Gebien). These two genera belong among the primitive Heteromera as defined by Crowson (1955, 1960, 1966, 1967) and are thus more or less closely related to the Ciidae; they differ from all ciid genera, however, in a number of characters, including the following: 1) antennae 11-segmented, filiform or gradually enlarged apically, without sensillifers; 2) maxillary palps securiform; 3) tarsal formula 5–5–4; 4) procoxal cavities closed internally; 5) mesotrochantins visible; 6) abdominal sternites III and IV connate; 7) anal region of hindwing with four veins, the anterior one running through the subcubital fleck, and a wedge cell. It is unlikely that this family represents the sister group of the Ciidae, but it must be taken into consideration in any study of the primitive heteromerous Coleoptera (Crowson, 1966).

Another genus doubtfully included in the Ciidae is *Sphindocis* Fall (1917), described on the basis of a single species, S. *denticollis*, from coastal California. The beetle has been collected at various localities from Alameda County to northern Mendocino County and is usually found breeding in the fruiting bodies of *Trametes sepium* growing on dead and fallen branches of Madrone (*Arbutus Menziesii*). The adult of *Sphindocis* resembles a large *Orthocis* and exhibits the following similarities to members of the Ciidae: 1) procoxae without lateral extensions, trochantin hidden; 2) procoxal cavities open internally and posteriorly; 3) mesepimera reaching mesocoxal cavities; 4) hindwing with subcubital fleck; 5) abdominal sternite III in male with pubescent fovea; 6) tarsal formula 4–4–4 in both sexes; 7) aedeagus of inverted heteromeroid type. The *Sphindocis* larva is similar to a ciid larva in general form (see below), and the mouthparts do not differ from those of a ciid larva in any significant manner. Tergite IX is modified to form a sclerotized, concave disc, similar to that found in *Cis melliei* Coquerel (1849) and in the tenebrionid *Meracantha contracta* (Beauvois) (Hyslop, 1915). A number of these adult and larval features may be found in other Cucujoidea, however, and the differences presented in Table 1 argue for the exclusion of the genus from the Ciidae. Crowson (*in litt.*) has suggested that *Sphindocis* may represent the sister group of the Ciidae proper and that both groups might be included in one family. I think it is just as likely that the former is allied to the Tetratomidae or Prostomidae (see below) and I prefer to exclude it in the present treatment.

Characterization of the Family Ciidae

The following description will serve to distinguish members of this family from

TABLE 1. DIFFERENCES BETWEEN *SPHINDOCIS* AND THE CIIDAE

Characters	Sphindocis	Ciidae
Antenna	no sensillifers 11-segmented	8- to 10-segmented with sensillifers
Maxilla	with 2 well-developed lobes	with reduced lacinia
Mesotrochantin	visible	not visible
Metendosternite	With median stalk	without median stalk
Anal region of hindwing	with 4 veins and wedge cell; subcubital fleck undivided	with 1 vein; subcubital fleck divided
Abdominal sternites III and IV	connate	free
Trochanters	heteromeroid type	normal type
Tibial spurs	present	absent
Basal piece of aedeagus	large with 2 condyles	small, without condyles
Median lobe of aedeagus	membranous with lateral struts	sclerotized
Larval spiracle	biforous	annular
Larval antenna	3-segmented	2-segmented
Larval sternite IX	with row of asperites	without asperites

all other Coleoptera. A more complete comparative study of adults and larvae will be the subject of a paper in preparation.

With the general characters of the Polyphaga: Cucujoidea.

Adult. Form variable, usually oval to elongate, convex. Size 0.5–6.0 mm.

Head globular, without neck, declined, often strongly so, partly concealed by pronotum. Eye somewhat protuberant, oval, entire, fairly coarsely faceted. Frontoclypeal area with distinct suture, often raised in males to form a ridge. Antennal insertion in fossa formed by genal ridge and eye, concealed from above by frons. Antenna 8- to 10-segmented, with large pedicel and scape and 2- or 3-segmented club, each club segment bearing at least 4 sensillifers at apex. Mandible bidentate, with simple molar area. Maxilla with galea and lacinia reduced, palp 4-segmented with terminal segment subconical, not securiform. Labium with ligula absent, palp 3-segmented.

Pronotum margined laterally and posteriorly, anterior edge usually produced forward. Prosternum variable, long or short, concave to carinate, coxae globose or transverse, sometimes projecting, contiguous to broadly separated, without internalized lateral extensions, trochantin hidden. Procoxal cavities open internally, narrowly open or closed posteriorly.

Elytra not striate, humeri tuberculate, epipleurae very narrow, extending almost

to apex. Scutellum small and subtriangular. Wing venation reduced, with 1 anal vein (or none); subcubital fleck present, divided.

Mesosternum short, coxae globose and narrowly separated, coxal cavities not closed outwardly by sterna, trochantins hidden. Metasternum subquadrate, with or without median suture, coxae narrow, transverse, subcontiguous. Metendosternite consisting of a pair of diverging arms with anterior tendons near apices.

Tarsal formula in both sexes 4–4–4 (occasionally 3–3–3). Tarsi simple, first 3 segments small and subequal, terminal segment elongate, claws simple. Trochanters oblique, normal type (completely separating coxa from femur). Tibiae without apical spurs, outer edge of protibia often expanded and modified at apex.

Abdominal segments all freely articulated, first segment without coxal lines, often with a median pubescent fovea in male. Aedeagus of inverted heteromeroid type, with small basal piece, ventral tegmen, and dorsal median lobe.

Larva. Orthosomatic, without lateral extensions, lightly and evenly sclerotized except for head, thoracic tergite I, and abdominal tergite IX (occasionally VIII). Head with Y-shaped epicranial suture, 5 ocelli or less, and short gula. Antenna 2-segmented, second segment bearing a long, ventral, sensory appendage near base and a long seta at apex. Mandible bidentate, with or without "retinaculum," with or without molar area. Maxilla with obliquely obtuse mala and a small, dorsal, subapical lobelike lacinia. Spiracles small, annular. Two setae on claw. Tergite IX variously armed but usually bearing 2 "urogomphi"; sternite IX without asperites. Segment X pygopodlike.

Phylogenetic Relationships

The placement of the Ciidae within the order Coleoptera has a complex history, and the group has been associated at various times with the Bostrichoidea, Cleroidea, Clavicornia, and Heteromera. In the 19th Century, the family was commonly placed with the Bostrichidae and their allies (Teredilia, Xylophages, Bostrichoidea) primarily on the basis of the cylindrical form, declined head, expanded and often spinose tibiae, and other features associated with the boring habit. Casey (1890) considered the group to comprise a subfamily of the Cryptophagidae, which was used in a very broad sense to include the Mycetophagidae, Sphindidae, and Biphyllidae as well.

Forbes (1926) united the Ciidae with the Lathridiidae, Corylophidae, and Murmidiidae (= Cerylonidae) on the basis of wing venation and folding, and he derived this group of families from the Endomychidae and Colydiidae partly on the basis of the "double chitinization" in the anal region of the wing. This anal chitinization refers to the subcubital fleck of Crowson (1955), which is found in a number of cucujiform families and which may be divided by the first anal vein and remains divided even after the vein has been lost. A divided subcubital fleck occurs in several families, including the Endomychidae, Lathridiidae, Biphyllidae, Byturidae, Colydiidae, Pterogeniidae, and Ciidae. An undivided fleck occurs in the Mycetophagidae, Tetratomidae, *Sphindocis*, Salpingidae, and several other groups (Bernet-Kempers, 1923; Crowson, 1955; Forbes, 1926; Miyatake, 1960; Wilson, 1930). A further study of this character (whose function is at present unknown) may shed some light on relationships among the Cucujoidea.

Böving and Craighead (1930, 1931) included the Ciidae in the Cleroidea on the basis of larval characters, such as the lack of a mandibular mola (actually present in some Ciidae) and the reduction of the maxillary articulating area (also occurring in some cucujoids), while Jeannel and Paulian (1944) related the family to the Colydiidae, Byturidae, Boridae, and several other families on the basis of male genitalia.

Crowson (1955) presented convincing evidence for excluding the Ciidae from the Bostrichoidea and Cleroidea but expressed doubt as to the affinities of the group within the Cucujoidea. In later works (1960, 1966, 1967), Crowson placed the Ciidae within the section Heteromera and indicated possible relationships to several of the more primitive families, such as the Biphyllidae, Byturidae, Mycetophagidae, Pterogeniidae, Tetratomidae, Prostomidae, and Colydiidae.

I agree basically with Crowson's view that the Ciidae are primitive members of the Heteromera, but the affinities of the group to other heteromerous families are not at all clear, and the possibility still exists that they have been derived independently from some clavicorn stock, such as the Languriidae. The prothoracic structure resembles that of the Mycetophagidae, Tetratomidae, and *Sphindocis*, in that the coxae are not internalized (lacking lateral extensions) and the cavities are open internally and posteriorly. Other primitive heteromeran characters include the free abdominal sternites, nonheteromeroid trochanters, and annular larval spiracles. Specialized features, such as the reduction of antennal segments, maxillary lacinia, tarsi, and anal region of hindwing, and the loss of tibial spurs and the median stalk of the metendosternite all may be correlated with size decrease. The pygopodlike 10th abdominal segment in the larva occurs in both the Clavicornia and Heteromera and may be associated with the habit of boring into fungi.

As mentioned above, the Ciidae, *Sphindocis*, and the Pterogeniidae are similar in several respects. In all three, the procoxae are not internalized, the aedeagus is of the inverted heteromeroid type, and the larval mouthparts are similar, the maxilla, for instance, possessing a distinct laciniar lobe. In *Sphindocis*, however, the 9th larval ventrite bears a row of asperites, the antennae are 11-segmented without sensillifers on the club, the trochanters are heteromeroid, and the subcubital fleck is not divided; in the Pterogeniidae, the procoxal cavities are internally closed, the antennae are filiform, the tarsal formula is 5–5–4, and the maxillary palps are strongly securiform; while in both of the latter groups, the larval spiracles are biforous, the first two abdominal sternites are connate, tibial spurs are present, and the mesotrochantins are visible. *Sphindocis* appears to be more closely related to the Tetratomidae and Mycetophagidae, while the Pterogeniidae may have affinities with the Neotropical genus *Ischyomius* or perhaps to the byturid-biphyllid group.

Other primitive heteromerous families with which the Ciidae might be associated are the Byturidae, Biphyllidae, Prostomidae, Colydiidae, and perhaps the Tenebrionidae and their close allies. It is also possible that the Heteromera, as it is now constituted, does not represent a monophyletic group, in which case certain of the more primitive forms might be derived independently from different clavicorn ancestors. The wing venation in the ciids is similar to that of certain cerylonoid groups, such as the Lathridiidae and Endomychidae, while antennal sensillifers are found in the languriid genus *Cryptophilus* and the overall adult structure in the Ciidae is closely approached in another languriid genus *Setariola*. Similar wing venation (with divided subcubital fleck) may also be found in the heteromerous Colydiidae, however, and antennal sensillifers occur in *Myrmechixenus* (Colydiidae?) and *Szekessya* (Prostomidae?), as well as in a variety of true Tenebrionidae.

The position of the family Ciidae must remain in doubt for the present, until a thorough phylogenetic study of the primitive Heteromera is completed. The phylogenetic relationships within the family Ciidae are also unclear and will not be discussed in detail here. The basic division into subfamilies appears to be sound, and the prothoracic differences used in the

TABLE 2. DISTRIBUTIONAL PATTERNS OF FAUNAL AFFINITIES OF NORTH AMERICAN CIIDAE.

Ciid species	NW	NE	SE	SW	Faunal affinities
CIS					
acritus	x			xx	Neotropical?
americanus	xx	x	x		Palaearctic?
angustus	xx				Palaearctic
biarmatus	xx				Palaearctic
castlei		x	xx		Neotropical
cayensis			xx		Neotropical (1)
congestus		x	xx		Neotropical
cornelli			xx		Neotropical
cornutus		x	xx		Neotropical
creberrimus		x	xx	x	Neotropical
crinitus			xx		Neotropical (1)
discolor				xx	Neotropical (2)
dunedinensis			xx		Neotropical (1)
duplex				xx	Neotropical (2)
ephippiatus	xx	x			Palaearctic
festivulus		xx			Palaearctic
floridae			xx		Neotropical (1)
fuscipes	x	x	x		Palaearctic
hirsutus			xx		Neotropical (1)
horridulus	x	xx	x	x	Palaearctic
huachucae			x	xx	Neotropical
hystriculus	xx				Palaearctic
krausi			xx		Neotropical (1)
laminatus		(xx)			Palaearctic
levettei	x	xx	x		Palaearctic
maritimus	xx	x			Palaearctic
megastictus	xx				Palaearctic
miles		x	xx		Neotropical
niedhauki			xx		Neotropical (1)
pistoria	x	xx			Palaearctic
quadridentatus		x	xx		Oriental?
robiniophilus		xx			Palaearctic
rotundulus			xx		Neotropical (1)
stereophilus		x	xx		Neotropical
striolatus	x	xx	x		Palaearctic
subfuscus			xx		Neotropical
subtilis		x	xx		Neotropical?
tetracentrum				xx	Neotropical
tridentatus	xx				Palaearctic?
tristis		x	xx		Neotropical?
ursulinus		x	xx		Neotropical (1)
versicolor	x			xx	Neotropical
vitulus	xx			x	Neotropical
ENNEARTHRON					
aurisquamosum		x	xx		Oriental?
spenceri	(xx)				Palaearctic
DOLICHOCIS					
indistinctus	xx	x		x	Palaearctic
manitoba	xx	x			——
ORTHOCIS					
huesanus			xx		Neotropical
longulus		x	xx		Neotropical
pulcher			xx		Neotropical (1)

TABLE 2. (Continued)

Ciid species	NW	NE	SE	SW	Faunal affinities
ORTHOCIS (Continued)					
punctatus	x	xx	x	x	Palaearctic
transversatus			xx		Neotropical (1)
STRIGOCIS					
bilimeki				(xx)	Neotropical (2)
opacicollis		x	xx		Neotropical (2)
opalescens		x	xx		Neotropical (2)
HADRAULE					
blaisdelli	x	x		xx	——
elongatula		(xx)			Palaearctic
explanata		xx			Palaearctic
PLESIOCIS					
cribrum	xx	x		x	——
CERACIS					
californicus	x	x		xx	Neotropical
curtus		x	xx		Neotropical (1)
dixiensis	x			xx	Neotropical
magister			xx		Neotropical
minutissimus		x	xx		——
minutus			xx		Neotropical (1)
monocerus			xx		Neotropical
multipunctatus			xx		Neotropical (1)
nigropunctatus			xx		Neotropical
obrieni				xx	Neotropical
pecki		x	xx		Neotropical
powelli				xx	Neotropical (2)
pullulus			xx		Neotropical (1)
punctulatus		x	xx		Neotropical (1)
quadricornis			xx		Neotropical
sallei		x	xx		——
schaefferi			xx		Neotropical
similis				(xx)	Neotropical
singularis		x	xx		Neotropical
thoracicornis		x	xx		——
SULCACIS					
curtulus	xx	x	x	x	Palaearctic
lengi		x	xx		——
MALACOCIS					
brevicollis		x	xx		Neotropical
RHOPALODONTUS					
americanus		xx			Palaearctic
OCTOTEMNUS					
laevis	x	xx	x		Palaearctic

key (p. 436) are correlated with a number of other characters. The Orophiinae contains several distinct genera, while the much larger Ciinae requires considerable revision. It is hoped that an improved generic classification, based on larval and adult characters, will result from a study now in progress.

TABLE 3. COMPARISON OF FAUNAL SECTORS.

	NW	NE	SE	SW	NW
Total species	26	45	53	20	26
Indigenous species	15	10	44	13	15
Endemic species	6	6	21	7	6
Shared species	16	29	5	11	
S. C.	61.5	64.4	25.0	55.0	

Family Name

The spelling of the family name has been a subject of controversy for many years. The family was originally named Cisidae by Leach (1819), and Wollaston (1854) used Cissidae. Gistel (1856) appears to be the first to use Cioidae, and this spelling was used by most German authors (Kiesenwetter, 1877; Reitter, 1902a) until recently. Ciidae was first used by Marseul (1887) and has been adopted by a number of recent workers. The type genus *Cis* is derived from the Greek masculine noun *kis, kios*, meaning a worm which bores into wood. The genitive stem is *ki-*, so that the correct family name should be Ciidae. There is no doubt that Ciidae is the correct spelling, but Grensted (1940, 1947) has suggested that this name be replaced by one that is more euphonious and more clearly linked to the genus name *Cis*. Among recent authors, Arnett (1962), Crowson (1955), and Lohse (1967) have all used Cisidae, while I have continued to use Ciidae, as have Miyatake (1954) and other Japanese workers. This is a relatively unimportant matter and is included here only to clarify the inconsistent spellings found in the literature.

THE NORTH AMERICAN CIIDAE

The family Ciidae in North America includes 12 genera and 84 species, 16 of which are here described as new. The majority of species fall into the two genera *Cis* (43) and *Ceracis* (20), while most of the genera are represented by one or two species only.

Origin and Distribution

As would be expected the major affinities of the North American ciids are with the Neotropical and Palaearctic faunas. One or two species may be related to Oriental forms, but there is no evidence for Ethiopian or Australian affinities. A general faunistic analysis of the North American species is presented in Tables 2 and 3. The continent has been divided into four sectors, as shown in Figure 87, and in Table 2 the occurrence of a ciid species within a sector is indicated by an "x," while an "xx" is used for the sector in which the species is assumed to be indigenous (or at least most common and widespread relative to the remainder of the area considered). Doubtful occurrences or possible introductions are indicated by "(xx)." Finally, the last column gives the zoogeographic region in which the closest relatives of the species occur. The number (1) after Neotropical indicates West Indies, while the number (2) stands for the Mexican Plateau. Table 3 gives the total species, indigenous species, and endemic species for each sector and an expression of faunal similarity between each adjacent sector, using Simpson's Coefficient (Simpson, 1947; S. C. = $100C/n_1$, where C is the number of species common to the two faunas and n_1 the number of species in the smaller fauna). This is a very coarse analysis, since relatively broad and arbitrary sectors have been chosen, but it will serve to emphasize some of the major features of ciid distribution in North America.

A more relevant type of distributional study is one which takes into consideration geographical origins and phylogenetic affinities, such as that of Linsley (1958) on the Cerambycidae. Since the Ciidae are

associated with woody plants, as are the cerambycids, it would be useful to compare Linsley's faunal elements with those based on the Ciidae. The North American ciids are most easily grouped into three major faunas, one of which may be further divided into three subfaunas. These are discussed below.

Northern fauna. This includes 26 species which occur, for the most part, in the northern forests and mountainous regions of North America, and are usually allied to forms from northern Eurasia.

Cis americanus	*Cis robiniophilus*
Cis angustus	*Cis striolatus*
Cis biarmatus	*Cis tridentatus*
Cis ephippiatus	*Enn. spenceri*
Cis festivulus	*Dol. indistinctus*
Cis fuscipes	*Dol. manitoba*
Cis horridulus	*Orth. punctatus*
Cis hystriculus	*Hadr. elongatula*
Cis laminatus	*Hadr. explanata*
Cis levettei	*Ples. cribrum*
Cis maritimus	*Sulc. curtulus*
Cis megastictus	*Rhop. americanus*
Cis pistoria	*Oct. laevis*

Some of these species are equally common in the Northeast and Northwest (*O. laevis*, Fig. 109), others may be common in the western forests but rare in the Northeast (*P. cribrum*, Fig. 89), and still others are restricted to the Northwest Coast (*C. biarmatus*, Fig. 102). Some forms occur in association with hardwoods (*S. curtulus*, *C. fuscipes*, *O. laevis*, and *C. pistoria*), and others are found on conifers (*C. biarmatus*, *P. cribrum*, and *C. hystriculus*), but the majority may be found on either. Most of the species comprising this fauna would form part of the modern Holarctic element of Linsley and are related to or even synonymous with northern Palaearctic forms. The following species pairs (Nearctic-Palaearctic) are very closely allied and some may be conspecific: *Cis horridulus-C. tomentosus* Mellié; *Cis hystriculus-C. punctulatus* Gyllenhal; *Cis levettei-C. glabratus* Mellié; *Cis pistoria-C. micans* (Fabricius); *Cis striolatus-C. striatulus* Mellié; *Dolichocis indistinctus-D. laricinus* (Mellié); *Orthocis punctatus-O. alni* (Gyllenhal); *Sulcacis curtulus-S. bidentulus* (Rosenhauer); *Rhopalodontus americanus-R. strandi* Lohse; *Octotemnus laevis-O. glabriculus* (Gyllenhal). Three of these northern species (*Cis laminatus*, *Ennearthron spenceri*, and *Hadraule elongatula*) may represent recent introductions. Two species, *Cis festivulus* and *C. robiniophilus*, also have Palaearctic counterparts —*C. festivus* (Panzer) and *C. castaneus* Mellié, respectively—but are more southern in distribution and may represent an older element which Linsley called the Alleghenian. In Western North America, there are several coastal forms (*Cis angustus*, *C. biarmatus*, *C. ephippiatus*, *C. maritimus*, *C. megastictus*, and *C. tridentatus*) which do not have Palaearctic near relatives, but which belong to Holarctic species groups. These may be part of the Vancouveran of Linsley, in that their Old World affinities are not as close. Finally the two species *Dolichocis manitoba* and *Plesiocis cribrum* appear to be the most isolated forms with no obviously related species in the Old World or in the Neotropical Region.

Southwestern fauna. This group includes 15 species (one of which is also mentioned in the next section), which would form part of the Sonoran and Californian faunas of Linsley. Their ranges extend from northern California through the Southwest into Mexico.

Cis acritus	*Cis vitulus*
Cis creberrimus	*Str. bilimeki*
Cis discolor	*Hadr. blaisdelli*
Cis duplex	*Cer. californicus*
Cis huachucae	*Cer. dixiensis*
Cis tetracentrum	*Cer. obrieni*
Cis versicolor	*Cer. powelli*
	Cer. similis

Only four of the above species occur in central and northern California, while the

remainder are restricted to the Southwest. *Cis vitulus* is practically restricted to California, occurs in mesic and humid habitats, and is most closely related to *Cis congestus* of the Southeast and to several Neotropical species; this is the only species that I would consider part of Linsley's Californian subfauna. *Cis versicolor*, *Hadraule blaisdelli*, and *Ceracis californicus* extend north along the Pacific Coast, but are also common in the Southwest at low and intermediate elevations. *Cis acritus*, *C. creberrimus*, *C. discolor*, *C. duplex*, and *Ceracis powelli* are usually found in coniferous forests at higher elevations, while *Cis tetracentrum* occurs in mountain canyons, along with *Cis versicolor*, *Ceracis californicus*, and *Ceracis dixiensis*. The last three species also inhabit the arid lowlands, as do *Ceracis obrieni* and probably *Ceracis similis*.

Southeastern fauna. This includes the great majority of North American Ciidae occurring east of the 100th Meridian and corresponds, for the most part, to Linsley's Neotropical Fauna. It may be subdivided into three groups: 1) the main group of species ranging from New England and the Great Lakes south to Florida and Texas, 2) the Antillean group occurring mainly in Florida and adjacent states, and 3) the Mexican group extending into southern Texas and along the Gulf Coast to Louisiana. These will be discussed separately below.

1) Main group (24 species).

Cis castlei	*Enn. aurisquamosum*
Cis congestus	*Orth. longulus*
Cis cornelli	*Str. opacicollis*
Cis cornutus	*Str. opalescens*
Cis creberrimus	*Cer. minutissimus*
Cis miles	*Cer. pecki*
Cis quadridentatus	*Cer. punctulatus*
Cis rotundulus	*Cer. sallei*
Cis stereophilus	*Cer. singularis*
Cis subtilis	*Cer. thoracicornis*
Cis tristis	*Sulc. lengi*
Cis ursulinus	*Mal. brevicollis*

Most of the species in this group have Neotropical affinities and the ranges of many extend into northern Mexico. Those with continuous distributions into Mexico (usually somewhat broken up in the more arid regions) are probably more modern Neotropical elements, while those with more restricted southeastern distributions may represent older Alleghenian forms. *Cis congestus* (Fig. 105), with its counterpart *C. vitulus* in California, is probably one of the latter, while *Ennearthron aurisquamosum* represents an Alleghenian species with Old World affinities, its closest relative occurring in southwestern China. *Cis quadridentatus* is a rather widespread form and its relationships are obscure; it may be related to an Oriental group of species. *Cis rotundulus* and *C. ursulinus* belong to a West Indian species group, but they appear to have evolved on the mainland and are more widespread than the Antillean forms discussed below (Figs. 89 and 92).

2) Antillean group (16 species).

Cis cayensis	*Orth. pulcher*
Cis crinitus	*Orth. transversatus*
Cis dunedinensis	*Cer. curtus*
Cis floridae	*Cer. magister*
Cis hirsutus	*Cer. minutus*
Cis krausi	*Cer. monocerus*
Cis niedhauki	*Cer. multipunctatus*
Orth. huesanus	*Cer. pullulus*

Most of the species in this group occur only in southern Florida and the majority are also found in the Greater Antilles. *Cis krausi* and *Orthocis transversatus* also occur in Texas and might be included in the next group, but both have close relatives in the West Indies.

3) Mexican group (4 species). *Cis subfuscus*, *Ceracis nigropunctatus*, *Ceracis quadricornis*, and *Ceracis schaefferi* are Neotropical species that occur in Texas and Mexico but are not found in the West Indies. There are probably several more undescribed forms that extend into southern

Texas, but the fauna of that region is not well known at present.

Host Preference

The subject of host preference or specificity in the North American Ciidae has been discussed briefly in a previous paper (Lawrence, 1967b) and will be covered in detail in a future publication (Lawrence, in press).

More than 100 species of fungi have been recorded as ciid hosts in North America, and the great majority of these belong to the basidiomycete family Polyporaceae. In the following text, all host records are listed for each ciid species. For each fungus, the total number of records and the number of "breeding" records (in parentheses) are given. A particular record is considered to be a breeding record if it consists of any one of the following: 1) ten or more fully pigmented adults, 2) two or more fully pigmented adults, 3) one teneral and two or more tenerals only, or 4) one or more larvae and/or pupae. Species of fungi are listed according to the number of records, so that preferred hosts are first. An example is as follows: *Polyporus anceps* [6(5)]; *Fomes officinalis* [2(2)]; *Fomes pinicola* [2(2)]; *Ganoderma oregonense* [1(1)]. The classification of fungi used in the presentation of host data is a rather conservative one, following Lowe (1957, 1966), Lowe and Gilbertson (1961a, 1961b), and Overholts (1953).

Patterns of host preference have been demonstrated for British Ciidae (Paviour-Smith, 1960, 1969) and for North American *Ceracis* (Lawrence, 1967b). The following is a preliminary grouping of 58 North American ciids into the four host preference groups discussed in the *Ceracis* paper. A detailed analysis of host data will be presented at a later date (Lawrence, in preparation).

Polyporus versicolor group. Fungi with thin, whitish, coriaceous fruiting bodies and trimitic hyphal system (*Polyporus versicolor, P. hirsutus, Lenzites betulina, Trametes hispida,* etc.).

Cis congestus	*Str. bilimeki*
Cis cornutus	*Str. opacicollis*
Cis fuscipes	*Str. opalescens*
Cis miles	*Cer. dixiensis*
Cis pistoria	*Cer. minutus*
Cis subfuscus	*Cer. quadricornis*
Cis tetracentrum	*Cer. monocerus*
Cis tristis	*Sulc. curtulus*
Cis versicolor	*Sulc. lengi*
Cis vitulus	*Oct. laevis*

Polyporus pargamenus group. Fungi similar to the above but with brownish or purple pore surface (*Polyporus abietinus, P. pargamenus, P. sector, Daedalea unicolor*).

Cis acritus	*Cis subtilis*
Cis horridulus	*Cer. minutissimus*
Cis hystriculus	*Cer. powelli*
Cis striolatus	*Cer. thoracicornis*

Polyporus gilvus group. Fungi with woody or fibrous fruiting bodies, brownish in color and turning black in potassium hydroxide, dimitic or monomitic hyphal system (*Polyporus gilvus, P. licnoides, Fomes igniarius, F. robiniae,* etc.).

Cis cayensis	*Cer. pecki*
Cis maritimus	*Cer. pullulus*
Cis niedhauki	*Cer. punctulatus*
Cer. magister	*Cer. singularis*
Cer. obrieni	*Mal. brevicollis*

Ganoderma applanatum group. Diverse fungi with dark or light tissues and dimitic or trimitic hyphal systems (*Ganoderma applanatum, G. lucidum, Fomes fomentarius, F. pinicola, Polyporus betulinus, P. adustus, P. hydnoides,* etc.).

Cis americanus	*Dol. indistinctus*
Cis angustus	*Dol. manitoba*
Cis biarmatus	*Cer. californicus*
Cis castlei	*Cer. curtus*
Cis creberrimus	*Cer. multipunctatus*
Cis ephippiatus	*Cer. nigropunctatus*
Cis hirsutus	*Cer. sallei*

Cis levettei	*Cer. schaefferi*
Cis megastictus	*Cer. similis*
Cis tridentatus	*Rhop. americanus*

Some Ciidae are restricted to fungi not included in the above groups. *Plesiocis cribrum*, for instance, is almost always found in the fruiting bodies of *Polyporus volvatus*, while *Cis stereophilus* prefers those of thelephoraceous fungi in the genus *Stereum*. Within the above groups (especially the last) the preferences of individual species vary considerably and some (*Cis americanus*) have a much wider host range than others (*Cis ephippiatus, Ceracis sallei*). Further details on host specificity will be included in species discussions.

Key to the Subfamilies and Genera of North American Ciidae

1. Procoxae subconical, strongly projecting below intercoxal process, which does not extend to middle of coxae (Figs. 16 and 25); metasternal suture absent (Fig. 33); first visible abdominal sternite (III) in male with posteriorly projecting, triangular flap, which partly conceals pubescent fovea (Fig. 31) ..... Orophiinae 2
— Procoxae transverse or globular, not projecting below intercoxal process, which extends beyond middle of coxae (Figs. 17, 22–24, 26–28); metasternal suture present (Fig. 34); first visible abdominal sternite in male simple or foveate, but without triangular flap (Fig. 32) ..... Ciinae 3
2. Outer edges of all tibiae spinose for more than one-third of their lengths (Fig. 60); antennae 8-segmented; body form oval; vestiture consisting of minute hairs, which are not visible under 10× magnification, and a few scattered long, fine hairs; pronotal punctation finer and sparser, the punctures much smaller than those on elytra and separated by 1.5 diameters or more ..... *Octotemnus* (p. 508)
— Outer edges of tibiae with spines at apex only (Fig. 59); antennae 10-segmented; body form cylindrical; vestiture consisting of long, fine hairs; pronotal punctation coarser and denser, the punctures slightly smaller than those on elytra and usually separated by less than 1.0 diameter ..... *Rhopalodontus* (p. 506)
3. Prosternum in front of coxae almost twice as long as intercoxal process (Fig. 28); sides of pronotum subparallel or slightly diverging towards apex (Figs. 20–21, 28); body small, elongate, and extremely flattened, TL usually less than 1.4 mm.; EL/EW greater than 1.60, and GD/EW usually less than 0.65; antennae 9-segmented with a 2- or 3-segmented club; elytral punctation dual and distinctly seriate, micropunctures bearing short, fine hairs or bristles ..... *Hadraule* (p. 491)
— Prosternum in front of coxae not or slightly longer than intercoxal process; without other characters in combination 4
4. Outer apical angle of protibia expanded, rounded, and bearing several spines (Figs. 57–58) 5
— Outer apical angle of protibia not as above, usually produced and dentate (Figs. 49–51, 54–56), blunt and angulate (Figs. 52–53), or narrowly rounded (Figs. 45–47); if expanded and rounded, then not spinose (Fig. 48) 8
5. Prosternum in front of coxae carinate and on same plane as intercoxal process (Figs. 13–14); lateral edges of pronotum visible for their entire lengths from above; anterior pronotal angles slightly produced (Fig. 14); elytral suture with inflexed margin near apex (Fig. 38); antennae 10-segmented ..... *Strigocis* (p. 488)
— Prosternum in front of coxae concave or biconcave and on different plane than intercoxal process (Figs. 9–10, 15); lateral edges of pronotum not visible for their entire lengths from above; anterior pronotal angles rounded or obtusely angulate, not produced (Fig. 15); elytral suture without inflexed margin near apex 6
6. Intercoxal process of prosternum laminate, less than 0.15 × as wide as a procoxal cavity (Fig. 24); vestiture consisting of very short, fine hairs; pronotum of male usually bearing tubercles, horns, or laminae at apex; antennae 8- to 10-segmented ..... *Ceracis* (p. 494)
— Intercoxal process of prosternum not laminate, at least 0.20 × as wide as a procoxal cavity (Fig. 27); vestiture consisting of short, stout bristles; pronotum of male always simple 7
7. Pronotum very short and broad, PL/PW less than 0.73; prosternum in front of coxae only half as long as intercoxal process (Fig. 27); metasternum at midline less than 0.40 × as long as broad; antennae 10-segmented in North American species ..... *Malacocis* (p. 504)
— Pronotum more elongate, PL/PW more than 0.73; prosternum in front of coxae not or only slightly shorter than intercoxal proc-

ess; metasternum at midline more than 0.40 × as long as broad; antennae 9- or 10-segmented ..... *Sulcacis* (p. 502)

8. Outer apical angle of protibia narrowly rounded (Fig. 45); elytral suture with an inflexed margin near apex (Fig. 38); head and pronotum in both sexes without tubercles or horns, male sometimes with densely pubescent area on clypeus (Fig. 37); elytral punctation single and uniform; vestiture consisting of very short, fine hairs; body elongate and parallel-sided, antennae 9- or 10-segmented ..... *Orthocis* (p. 484)

— Outer apical angle of protibia usually produced and dentate or blunt and angulate, if somewhat rounded, then vestiture consisting of short, stout bristles or elytral punctation dual and head of male bearing horns or tubercles; elytral suture without inflexed margin 9

9. Antennae 10-segmented ..... *Cis* (p. 437)

— Antennae 9-segmented 10

10. Outer apical angle of protibia rounded (Fig. 46); body more elongate, EL/EW usually more than 1.50; apex of pronotum simple in both sexes ..... *Dolichocis* (p. 482)

— Outer apical angle of protibia produced and dentate; body shorter and broader, EL/EW usually less than 1.50; apex of pronotum in male produced and emarginate forming 2 horns or tubercles (Figs. 4 and 8) 11

11. Intercoxal process of prosternum less than 0.25 × as wide as a procoxal cavity; metasternal suture less than 0.25 × as long as median length of metasternum; frontoclypeal ridge in male bearing 4 sharp teeth (Fig. 4) ..... *Plesiocis* (p. 493)

— Intercoxal process of prosternum more than 0.25 × as wide as a procoxal cavity; metasternal suture more than 0.25 × as long as median length of metasternum; frontoclypeal ridge in male bearing 2 subtriangular plates with a distinct notch between them (Fig. 8) ..... *Ennearthron* (p. 480)

Subfamily Ciinae

Cisidae Leach, 1819: 206.
Cissidae Wollaston, 1854: 279.
Cioidae Gistel, 1856: 143.
Ciidae Marseul, 1887: 293.

Included genera. All those not placed in the Orophiinae (p. 506). About 30 genera have been described, but a number of these will have to be synonymized and several remain to be described.

Genus *Cis* Latreille

Cis Latreille, 1796: 50; Latreille, 1802: 205; Gyllenhal, 1813: 377; Gyllenhal, 1827: 624; Redtenbacher, 1847: 348; Mellié, 1848: 236; Lacordaire, 1857: 551; Jacquelin du Val, 1861: 237; Thomson, 1863: 183; Abeille de Perrin, 1874b: 19; Kiesenwetter, 1877: 173; LeConte and Horn, 1883: 232; Casey, 1898: 78; Reitter, 1902a: 47; Blatchley, 1910: 897; Dalla Torre, 1911: 5; Leng, 1920: 246; Arnett, 1962: 829. Type species, by subsequent monotypy, *Dermestes boleti* Scopoli, 1763: 17 (Latreille, 1802: 205).

Eridaulus Thomson, 1863: 191; Lawrence, 1965: 282 (complete synonymy); Lawrence, 1967b: 98. Type species, by present designation, *Anobium nitidum* Fabricius, 1792: 238.

Xestocis Casey, 1898: 85; Lawrence, 1965: 282. Type species, by subsequent designation, *Xestocis levettei* Casey, 1898: 85 (Lawrence, 1965: 282).

Macrocis Reitter, 1878c: 34; Gorham, 1883: 219. Type species, by present designation, *Macrocis taurus* Reitter, 1878c: 34. NEW SYNONYMY.

Included species and species groups. This genus contains about 350 named species, which will not be listed here, and numerous undescribed forms as well. Some distantly related forms with 10-segmented antennae have been described as *Cis*, but even when these are eventually removed, the genus will be by far the largest in the family. Within the genus *Cis* there are a number of well-defined subgroups of varying size, the species of which usually have similar body form, male genitalia, secondary sexual characters, larval urogomphi, and food preferences. Several of the more obvious species groups are listed below, with the distribution, a few representative species, and all of the North American members. Of the 24 species groups listed, 6 are entirely exotic and the other 18 contain 34 of the 43 North American *Cis*.

C. bilamellatus group. Oriental-Australian. *C. bilamellatus* Wood, *C. australis* Blackburn, *C. clarki* Blair. North America: none.

C. boleti group. Holarctic. *C. boleti* (Scopoli), *C. rugulosus* Mellié, *C. micans* (Fabricius), *C. villosulus* (Marsham). North America: *C. pistoria* Casey.

C. cayensis group. Neotropical. North America: *C. cayensis*, n. sp., *C. niedhauki*, n. sp.

C. compressicornis group. Australian. *C. compressicornis* Fairmaire, *C. cervus* Blair. North America: none.

C. comptus group. Holarctic. *C. comptus* Gyllenhal, *C. striatulus* Mellié. North America: *C. striolatus* Casey, *C. versicolor* Casey?

C. creberrimus group. Nearctic-Neotropical. North America: *C. creberrimus* Mellié.

C. fagi group. Holarctic. *C. fagi* Waltl, *C. castaneus* Mellié. North America: *C. angustus* Hatch, *C. robiniophilus*, n. sp.

C. festivus group. Holarctic. *C. festivus* (Panzer), *C. pygmaeus* (Marsham), *C. vestitus* Mellié. North America: *C. festivulus*, n. sp.

C. fuscipes group. Holarctic-Oriental. *C. seriatopilosus* Motschulsky, *C. seriatulus* Kiesenwetter, *C. taiwanus* Chujo. North America: *C. fuscipes* Mellié.

C. huachucae group. Nearctic-Neotropical. North America: *C. discolor*, n. sp., *C. huachucae* Dury.

C. krausi group. Neotropical. *C. atromaculatus* Pic, *C. superbus* Kraus. North America: *C. krausi* Dalla Torre.

C. litteratus group. Oriental-Australian. *C. insignis* Scott, *C. litteratus* Fauvel. North America: none.

C. melliei group. Neotropical. *C. melliei* Coquerel. North America: *C. crinitus*, n. sp., *C. hirsutus* Casey, *C. rotundulus*, n. sp., *C. ursulinus* Casey.

C. nitidus group (= *Eridaulus*). Holarctic. *C. jacquemarti* Mellié, *C. lineatocribratus* Mellié, *C. nitidus* (Fabricius). North America: *C. americanus* Mannerheim?, *C. biarmatus* Mannerheim, *C. ephippiatus* Mannerheim, *C. levettei* (Casey), *C. maritimus* (Hatch), *C. megastictus*, n. sp., *C. tridentatus* Mannerheim?

C. pacificus group. Oriental-Australian. *C. agariconae* Zimmerman, *C. marquesanus* Blair, *C. pacificus* Sharp. North America: none.

C. pallidus group. Nearctic-Neotropical. *C. corticinus* Gorham, *C. pallidus* Mellié. North America: *C. tetracentrum* Gorham.

C. pilosus group. Nearctic-Neotropical. *C. pilosus* Gorham. North America: *C. cornutus* Blatchley.

C. punctulatus group. Holarctic. *C. punctulatus* Gyllenhal, *C. tomentosus* Mellié. North America: *C. horridulus* Casey, *C. hystriculus* Casey.

C. setarius group (including *Apterocis*?). Australian (Hawaii). *C. bicolor* Sharp, *C. chloroticus* Sharp, *C. setarius* Sharp, *C. tabidus* Sharp. North America: none.

C. signatus group. Australian (Hawaii). *C. kauaiensis* Perkins, *C. nigrofasciatus* Blackburn, *C. roridus* Sharp, *C. signatus* Sharp. North America: none.

C. subtilis group. Nearctic-Neotropical. North America: *C. acritus*, n. sp., *C. subtilis* Mellié.

C. taurus group (= *Macrocis*). Nearctic-Neotropical. *C. bison* (Reitter), *C. diabolicus* (Reitter), *C. grandicornis* (Pic), *C. setifer* (Gorham), *C. taurus* (Reitter), *C. testaceus* (Pic). North America: *C. cornelli*, n. sp.

C. tricornis group. Nearctic-Neotropical. *C. delicatulus* (Jacquelin du Val), *C. tricornis* (Gorham). North America: *C. miles* (Casey).

C. vitulus group. Nearctic-Neotropical. *C. bubalus* Reitter, *C. bisbidens* Gorham, *C. fasciatus* Gorham, *C. granarius* Mellié. North America: *C. congestus* Casey, *C. vitulus* Mannerheim.

Members of this genus may be distinguished from other North American Ciidae by the 10-segmented antennae, rounded or angulate to dentate protibial apex without spines at the outer angle, flat to carinate prosternum without a laminate intercoxal process, angulate or produced anterior pronotal angles, simple elytral suture, and sexual modifications almost always present on the head and/or pronotum of the male. Species of *Strigocis*, *Sulcacis*, *Malacocis*, and *Ceracis* may have 10-segmented antennae, but always have spinose protibial

apices. Species of *Strigocis* and *Orthocis* have an inflexed margin at the apex of the elytral suture, and members of the latter group never have horns or tubercles on the head or pronotum of the male. Species of *Dolichocis*, *Ennearthron*, and *Plesiocis* resemble *Cis* in several respects and have rounded or dentate protibial apices, but the antennae are always 9-segmented.

In an earlier paper (Lawrence, 1965), I treated Thomson's *Eridaulus* as a full genus, characterized by the carinate prosternum, oval body form, dual elytral punctation, and triangular plates on the head of the male. Further study led me to abandon this concept (Lawrence, 1967b: 98) and to place the included species in at least two different species groups (*Cis nitidus* group and *C. pacificus* group). *Macrocis* Gorham is another genus whose species are characterized by having 10-segmented antennae, carinate prosternum, dual elytral punctation, and two plates on the head of the male. In this case, however, the body is very short and stout, and the frontoclypeal plates are produced to form long, narrow horns. I can see little reason for maintaining a separate genus for this group, although it contains a large number of Neotropical species. The prosternal structure is not uncommon in the genus *Cis*, and the long, lateral horns on the head of the male may be found in members of the *C. compressicornis* group and the *C. melliei* group.

Key to the North American Species of *Cis*

1. Vestiture of elytra distinctly dual, consisting of 2 classes of hairs or bristles, which differ in length, thickness, color, form, or angle of inclination (Figs. 29–30) 2
— Vestiture of elytra not dual, the hairs or bristles varying slightly in length, but not falling into 2 distinct classes 8
2. Vestiture of elytra consisting of short, erect bristles, which are seriate, and very fine, inclined hairs, which are not visible under 10× magnification; head of male with 2 tubercles on vertex (Fig. 5) ..... *C. cayensis* (*see* 22; p. 448)
— Both classes of hairs or bristles easily visible under 10× magnification 3
3. Body shorter and broader, EL/EW usually less than 1.50 mm; if slightly more, then male with 2 subtriangular frontoclypeal plates; lateral margins of pronotum visible for their entire lengths from above, the anterior angles produced forward 4
— Body longer and narrower, EL/EW more than 1.50 mm; male with 4 frontoclypeal teeth or tubercles; lateral margins of pronotum not visible for their entire lengths from above, the anterior angles not produced 7
4. Erect bristles only slightly longer than inclined ones; abdominal fovea in male absent or located on posterior part of sternite III 5
— Erect bristles at least 1.50 × as long as inclined bristles or hairs; abdominal fovea in male located in center of sternite III 6
5. Size smaller, TL usually less than 1.75 mm; elytral punctation subseriate; male with 2 subtriangular, frontoclypeal plates and an abdominal fovea ..... *C. floridae* (*see* 36; p. 460)
— Size larger, TL usually more than 1.75 mm; elytral punctation confused; male with 4 frontoclypeal teeth and no abdominal fovea ..... *C. huachucae* (*see* 36; p. 462)
6. Vestiture consisting of longer and shorter, fine, yellow bristles, which are subseriate on the elytra; EL/EW less than 1.33; fully pigmented adult black ..... *C. cornutus* (p. 451)
— Vestiture consisting of longer, stiff and erect, dark bristles and shorter, inclined, pale hairs, which are uniformly distributed on elytra (Fig. 29); EL/EW more than 1.33; fully pigmented adult reddish brown ..... *C. crinitus* (p. 453)
7. Body flattened, GD/EW usually less than 0.73; male with abdominal fovea ..... *C. creberrimus* (*see* 31, 46; p. 452)
— Body subcylindrical, GD/EW usually more than 0.73; male without abdominal fovea ..... *C. horridulus* (p. 462)
8. Elytral punctation dual, consisting of larger, shallow megapunctures and smaller, deeper micropunctures, which bear bristles or hairs 9
— Elytral punctation single, the punctures fairly uniform in size and all or most of them bearing hairs or bristles 29
9. Vestiture consisting of fine hairs 10
— Vestiture consisting of short, stout bristles 17
10. Elytral hairs longer, more than 0.20 × as long as scutellar base and visible under 10× magnification, decumbent 11

— Elytral hairs very short, less than 0.15 × as long as scutellar base and not visible under 10× magnification, erect or inclined 12

11. Pronotal punctation finer and sparser, punctures subequal to eye facets and separated by 1.0 to 1.5 diameters; body usually smaller, narrower, and bicolored, brownish with black pronotum and transverse elytral macula ..... *C. ephippiatus* (p. 458)

— Pronotal punctation coarser and denser, punctures larger than eye facets and separated by 0.33 to 0.66 diameter; body usually larger, broader, and more uniformly pigmented, brownish ..... *C. biarmatus* (p. 446)

12. Body more elongate, EL/EW more than 1.40; prosternum in front of coxae slightly tumid but not carinate (Figs. 11–12) 13

— Body shorter and broader, EL/EW less than 1.40; prosternum in front of coxae carinate (Fig. 13) 14

13. Elytral punctation distinctly seriate; sides of pronotum subparallel; pronotal punctation coarser and denser, the punctures usually separated by less than 0.50 diameter; head of the male with 2 widely spaced, frontoclypeal teeth ..... *C. dunedinensis* (p. 457)

— Elytral punctation not seriate; sides of pronotum weakly rounded; pronotal punctation finer and sparser, the punctures usually separated by more than 0.50 diameter; head of male with 4 frontoclypeal teeth (the outer 2 sometimes obsolete) and 2 horns on the vertex (Fig. 5) ..... *C. niedhauki* (p. 467)

14. Pronotal punctures about as large as elytral megapunctures and usually separated by more than 0.75 diameter; TL usually less than 1.40 mm; male with 2 distant, lateral horns on pronotal apex and a single, median, forked horn on frontoclypeal ridge (Fig. 6) ..... *C. miles* (p. 467)

— Pronotal punctures, if separated by more than 0.75 diameter, much smaller than elytral megapunctures; TL usually more than 1.40 mm; pronotal apex in male simple or bituberculate and frontoclypeal ridge bearing 2 triangular plates (Fig. 39) 15

15. Outer edge of protibia irregularly notched or serrate for part of its length (Fig. 54); pronotal punctation finer and sparser, punctures smaller than eye facets and separated by more than 1 diameter; lateral edges of pronotum smooth; elytral punctation not distinctly seriate ..... *C. levettei* (p. 464)

— Outer edge of protibia simple; pronotal punctation coarser and denser, punctures usually larger than eye facets and separated by less than 1 diameter; lateral edges of pronotum coarsely crenulate; elytral punctation distinctly seriate 16

16. Anterior angles of pronotum broadly rounded; pronotal punctures very dense, separated by 0.33 diameter or less, interspaces smooth; elytral megapunctures 4 × as large as micropunctures; abdominal fovea in male circular ..... *C. megastictus* (p. 465)

— Anterior angles of pronotum subacute; pronotal punctures not as dense, separated by 0.50 to 0.66 diameter, interspaces granulate; elytral megapunctures less than 4 × as large as micropunctures; abdominal fovea in male longitudinally oval ..... *C. maritimus* (p. 465)

17. Elytra short and broad, EL/EW less than 1.28, apices broadly rounded; elytral punctation distinctly seriate; prosternum strongly carinate; TL less than 1.75 mm; frontoclypeal ridge in male with 2 long and narrow, lateral horns (Fig. 42) ..... *C. cornelli* (p. 450)

— Elytra longer and narrower, EL/EW more than 1.28, or if slightly less, apices narrowly rounded; male never with long, narrow horns; without other characters in combination 18

18. Anterior angles of pronotum distinctly produced forward and broadly rounded (Fig. 43); pronotum shorter and broader, PL/PW usually less than 0.80, the disc impressed anteriorly in male; lateral margins of pronotum broader, easily visible for their entire lengths from above; prosternum tumid but not carinate; size larger, TL usually more than 2.00 mm 19

— Anterior angles of pronotum not or barely produced forward and angulate; pronotum longer and narrower, PL/PW usually more than 0.80, the disc not impressed anteriorly in male; lateral margins of pronotum narrower or prosternum carinate; size smaller, TL usually less than 2.00 mm 20

19. Elytral punctation seriate; elytral bristles longer and narrower, more than 0.25 × as long as scutellar base and more than 3 × as long as wide; lateral edges of pronotum weakly and finely crenulate; pronotal and elytral discs fairly even ..... *C. fuscipes* (p. 460)

— Elytral punctation confused; elytral bristles shorter and broader, less than 0.20 × as long as scutellar base and less than 3 × as long as wide; lateral edges of pronotum strongly and coarsely crenulate; pronotal

and elytral discs irregularly impressed ..... *C. pistoria* (p. 469)

20. Prosternum distinctly carinate; elytra shorter and somewhat ovate, EL/EW usually less than 1.42; apex of pronotum in male produced and emarginate, forming a subtriangular process or two approximate tubercles 21
— Prosternum flat or slightly tumid, not carinate; elytra more elongate and parallel-sided, EL/EW usually more than 1.42; apex of pronotum in male simple 22
21. Elytral punctation obscurely dual, megapunctures barely larger than micropunctures ..... *C. tridentatus* (p. 477)
— Elytral punctation distinctly dual, megapunctures 1.50 to 3.0 × as large as micropunctures ..... *C. americanus* (p. 444)
22. Elytral punctation distinctly seriate 23
— Elytral punctation not distinctly seriate 27
23. Outer apical angle of protibia not produced, rounded, or obtusely angulate; lateral margins of pronotum broader, visible for their entire lengths from above; fully pigmented adults bicolored, with pronotum reddish and elytra black or red and black 24
— Outer apical angle of protibia at least slightly produced, usually forming a distinct tooth; lateral margins of pronotum narrower, not or barely visible for their entire lengths from above; fully pigmented adults uniformly brownish or black in color or with pronotum darker than elytra 25
24. Body larger and more elongate, TL usually more than 1.75 mm and EL/EW usually more than 1.45; elytral punctation finer and sparser; frontoclypeal ridge in male simple ..... *C. versicolor* (p. 478)
— Body smaller and broader, TL usually less than 1.75 mm and EL/EW usually less than 1.45; elytral punctation coarser and denser; frontoclypeal ridge in male with 2 weak tubercles ..... *C. subfuscus* (p. 476)
25. Elytral vestiture dual, consisting of short, stout bristles and very fine hairs, which are not visible under 10× magnification; TL usually less than 1.40 mm; head of male with 4 frontoclypeal teeth and 2 tubercles on vertex ..... *C. cayensis* (*see* 2; p. 448)
— Elytral vestiture not dual; TL usually more than 1.40 mm; male without tubercles on vertex 26
26. Pronotal punctation sparser, punctures usually separated by more than 0.50 diameter, interspaces coarsely granulate and dull; elytral bristles yellowish; abdominal fovea in male about 0.20 × as long as body of sternite III ..... *C. striolatus* (p. 475)
— Pronotal punctation denser, punctures usually separated by less than 0.50 diameter, interspaces finely granulate and shiny; elytral bristles colorless; abdominal fovea in male more than 0.25 × as long as body of sternite III ..... *C. tristis* (p. 477)
27. Body more elongate, EL/EW more than 1.60; elytra yellowish with black maculae ..... *C. krausi* (p. 463)
— Body less elongate, EL/EW less than 1.60; elytra uniformly brownish or black 28
28. Frontoclypeal ridge in male simple; abdominal fovea in male present; southwestern U. S. ..... *C. acritus* (p. 443)
— Frontoclypeal ridge in male with 2 tubercles; abdominal fovea absent; eastern U. S. ..... *C. subtilis* (p. 476)
29. Vestiture consisting of very short, fine hairs, which are not or barely visible under 10× magnification; outer apical angle of protibia blunt and rounded; body elongate, EL/EW more than 1.50; elytral suture with an inflexed margin near apex (Fig. 38); head and pronotum in male simple ..... *Orthocis* (p. 484)
— Vestiture consisting of long hairs or short, stout bristles 30
30. Vestiture of long, fine hairs 31
— Vestiture of shorter, stout bristles 34
31. Body flattened and elongate, EL/EW more than 1.50; frontoclypeal ridge in male with 4 tubercles ..... *C. creberrimus* (*see* 7, 46; p. 452)
— Body not flattened, shorter and broader, EL/EW less than 1.50; frontoclypeal ridge in male with 2 narrow, lateral horns (Fig. 41) 32
32. Prosternum in front of coxae carinate; metasternum short and broad, the length at midline less than 0.40 × the width; sides of elytra strongly rounded, the apices acute ..... *C. rotundulus* (p. 471)
— Prosternum in front of coxae strongly tumid, but not carinate; metasternum more elongate, the length at midline more than 0.40 × the width; sides of elytra weakly rounded or subparallel, the apices blunt 33
33. Lateral edges of pronotum strongly crenulate; size smaller, TL usually less than 1.60 mm; fully pigmented adults usually reddish in color; abdominal fovea in male less than 0.20 × as long as body of sternite III ..... *C. ursulinus* (p. 478)
— Lateral edges of pronotum not or weakly crenulate; size larger, TL usually greater than 1.60 mm; fully pigmented adults usually blackish in color; abdominal fovea in male more than 0.20 × as long as body of sternite III ..... *C. hirsutus* (p. 461)
34. Lateral margins of pronotum broader, usually visible for their entire lengths from

above; anterior angles of pronotum distinctly produced and rounded 35
— Lateral edges of pronotum narrower, usually not visible for their entire lengths from above; anterior angles of pronotum not or barely produced and subacute 41
35. Vestiture indistinctly dual, the bristles differing in length and angle of inclination 36
— Vestiture single 37
36. Elytral punctation subseriate; size smaller, TL usually less than 1.75 mm; male with 2 subtriangular frontoclypeal plates; abdominal fovea present ..... *C. floridae* (*see* 5; p. 460)
— Elytral punctuation confused; size larger, TL usually more than 1.75 mm; male with 4 frontoclypeal teeth; abdominal fovea absent ..... *C. huachucae* (*see* 5; p. 462)
37. Prosternum in front of coxae carinate; size smaller, TL less than 2.20 mm; male with 2 pronotal horns, 4 frontoclypeal teeth, and a pubescent fovea ..... *C. quadridentatus* (p. 469)
— Prosternum in front of coxae flat to strongly tumid, but not carinate; size larger, TL more than 2.20 mm, or if slightly less, male without above combination of characters 38
38. Lateral margins of pronotum without raised lip, edges strongly crenulate (Fig. 44); body more elongate, EL/EW more than 1.50; elytra with a transverse impression at anterior fourth; apex of pronotum in male weakly emarginate, but never with horns ..... *C. discolor* (p. 455)
— Lateral margins of pronotum with a narrow, raised lip, edges not or barely crenulate (Fig. 43); body shorter and broader, EL/EW less than 1.50; elytra without transverse impression; apex of pronotum in male with 2 triangular horns 39
39. Pronotal punctures only slightly smaller than elytral punctures; elytral bristles longer and finer, more than 6 × as long as wide, acute at apex; frontoclypeal ridge in male with 2 triangular plates; male with abdominal fovea; elytra in female more than 1.90 × as long as pronotum ..... *C. tetracentrum* (p. 476)
— Pronotal punctures much smaller than elytral punctures; elytral bristles shorter and stouter, less than 6 × as long as wide, blunt at apex; frontoclypeal ridge in male elevated and trisinuate, so that 4 teeth are formed (Fig. 3); male without abdominal fovea; elytra in female less than 1.90 × as long as pronotum 40
40. Pronotal punctation coarser and denser, the punctures usually separated by less than 0.75 diameter, interspaces smooth and shiny; antennal segment III less than 1.50 × as long as IV; body somewhat smaller, shorter and stouter, TL usually less than 2.45 mm; EL/EW usually less than 1.31, and TL/EW in female usually less than 2.06; southeastern U. S. ..... *C. congestus* (p. 449)
— Pronotal punctation finer and sparser, the punctures usually separated by more than 0.75 diameter, the interspaces granulate and dull; antennal segment III more than 1.50 × as long as IV; body somewhat larger and more elongate, TL usually more than 2.45 mm, EL/EW usually more than 1.31, and TL/EW in female usually more than 2.06; California and northern Arizona ..... *C. vitulus* (p. 479)
41. Body shorter and broader, EL/EW less than 1.40, or if slightly more, apex of pronotum in male with 2 triangular horns; elytral punctation confused 42
— Body more elongate, EL/EW more than 1.40, or if slightly less, elytral bristles subseriate; apex of pronotum in male simple, emarginate, or with 2 small tubercles 44
42. Base of scutellum less than 0.10 × as wide as pronotum; body somewhat shorter and broader, EL/EW usually less than 1.30; prosternum in front of coxae slightly tumid but not carinate; apex of pronotum in male simple, frontoclypeal ridge elevated and weakly trisinuate ..... *C. laminatus* (p. 464)
— Base of scutellum more than 0.10 × as wide as pronotum; body somewhat more elongate, EL/EW usually more than 1.30; prosternum in front of coxae weakly carinate; apex of pronotum and frontoclypeal ridge in male each bearing 2 triangular plates or horns (Fig. 7) 43
43. Lateral edges of pronotum distinctly crenulate; pronotal punctation coarser and denser, the punctures usually separated by less than 0.75 diameter; pronotal surface granulate and dull; TL usually more than 1.40 mm ..... *C. duplex* (p. 457)
— Lateral edges of pronotum not crenulate; pronotal punctation finer and sparser, the punctures usually separated by more than 0.75 diameter; pronotal surface smooth and shiny; TL usually less than 1.40 mm ..... *C. castlei* (p. 447)
44. Elytral bristles shorter and broader, usually less than 2.5 × as long as wide, subseriate, blunt at apex; elytra usually bicolored, darker anteriorly than posteriorly ..... *C. stereophilus* (p. 472)
— Elytral bristles longer and narrower, usually more than 2.5 × as long as wide, confused or acute at apex; elytra concolorous 45

45. Outer apical angle of protibia rounded (Fig. 47); elytral bristles varying in length, blunt, and yellowish ..... *C. festivulus* (p. 459)
— Outer apical angle of protibia produced, dentate or angulate; elytral bristles more uniform in length and acute or colorless 46
46. Body somewhat flattened, GD/EW usually less than 0.73; lateral edges of pronotum not or barely crenulate; elytral bristles subseriate and acute at apex ..... *C. creberrimus* (*see* 7, 31; p. 452)
— Body not flattened, GD/EW usually more than 0.73; lateral edges of pronotum distinctly crenulate; elytral bristles confused and blunt at apex 47
47. Elytral bristles shorter and broader, usually less than 3.5 × as long as wide; elytral punctation finer and sparser, the punctures usually less than 0.30 × as wide as scutellar base and separated by 0.50 diameter or more ..... *C. robiniophilus* (p. 470)
— Elytral bristles longer and narrower, usually more than 3.5 × as long as wide; elytral punctation coarser and denser, the punctures usually more than 0.30 × as wide as scutellar base and separated by 0.33 diameter or less 48
48. Elytral bristles colorless; apex of pronotum in male usually bituberculate; male without abdominal fovea ..... *C. hystriculus* (p. 463)
— Elytral bristles bright yellow in color; apex of pronotum in male simple; male with pubescent fovea on abdominal sternite III ..... *C. angustus* (p. 446)

Cis acritus NEW SPECIES

Holotype. ♂, ARIZONA: Rustler Park, 8 mi. W Portal, Cochise Co., Aug. 3, 1961, Lot 892 J. F. Lawrence, ex *Polyporus abietinus* on conifer [CAS]. Allotype, ♀, same data, [JFL].

Male. Length 1.67 mm. Body 2.23 × as long as broad, slightly convex. Head and pronotum reddish orange, elytra dark yellowish brown. Vestiture consisting of short, stout, blunt, colorless bristles. Vertex flattened with a slight median impression; frontoclypeal ridge simple. Antennal segment III 1.40 × as long as IV. Pronotum 0.85 × as long as broad, widest at middle; anterior edge moderately rounded, simple; sides weakly rounded, the margins narrow and distinctly crenulate, not visible for their entire lengths from above; anterior angles not produced forward, almost right; disc weakly convex, even; surface distinctly granulate, slightly shiny; punctures 0.20 × as large as scutellar base and separated by 0.25 to 0.75 diameter. Elytra 1.50 × as long as broad and 2.04 × as long as pronotum; sides subparallel, apices blunt; punctation dual and confused; megapunctures somewhat coarser and denser than those on pronotum, shallow and nude; each micropuncture bearing a stout, blunt, colorless bristle, which is about 0.33 × as long as scutellar base. Prosternum slightly tumid; intercoxal process 0.30 × as wide as a procoxal cavity, parallel-sided. Protibial apex slightly produced, outer apical angle almost right (Fig. 52). Metasternum 0.54 × as long as wide; suture 0.40 × as long as median length of sternum. Abdominal sternite III bearing a median, oval, pubescent fovea, which is almost 2.0 × as long as wide, 0.30 × as long as body of sternite, distinctly margined, and located anterad of center. Sternite VIII as in Figure 63. Aedeagus as in Figures 73 and 80.

Female. Length 1.75 mm. Body 2.33 × as long as broad. Vertex and frontoclypeal ridge as in male. Pronotum 0.85 × as long as broad; anterior edge as in male. Elytra 1.57 × as long as broad and 2.04 × as long as pronotum. Protibial apex as in male. Sternite III without pubescent fovea.

Variation. Pronotum yellowish to dark reddish brown, usually reddish orange or reddish brown. Elytra yellowish to brownish black, usually brownish. Pronotum usually lighter in color than elytra. Size and dimensions vary as follows in a mixed series of seven males and nine females from California, Arizona, and New Mexico:

TL mm: ♂ 1.55–1.80 (1.70 ± 0.031), ♀ 1.47–1.82 (1.66 ± 0.040);
TL/EW: ♂ 2.20–2.38 (2.27 ± 0.022), ♀ 2.18–2.44 (2.33 ± 0.030);
PL/PW: ♂ 0.82–0.88 (0.85 ± 0.007), ♀ 0.79–0.95 (0.88 ± 0.017);
EL/EW: ♂ 1.47–1.61 (1.53 ± 0.017), ♀ 1.48–1.67 (1.58 ± 0.021);

EL/PL: ♂ 1.96–2.13 (2.05 ± 0.024),
♀ 2.00–2.14 (2.09 ± 0.017);
GD/EW: ♂ 0.73–0.81 (0.76 ± 0.010),
♀ 0.73–0.81 (0.77 ± 0.009).

Paratypes. ARIZONA: 1, East Turkey Creek, 6 mi. W Portal, Cochise Co., July 24, 1963, Lot 1240 JFL (A. Raske, coll.), ex *Polyporus abietinus* [JFL]; 4, Hitchcock Hwy. Mi. 27, VI–22–1957 [MCZ, UAZ]; 2, Madera Canyon, Santa Rita Mts., Santa Cruz Co., Jan. 30, 1964, Lot 1285 JFL, ex *Polyporus abietinus* [JFL]; 1, 6 mi. SW Portal, Cochise Co., Aug. 2, 1961, Lot 879 JFL, ex *Polyporus abietinus* [JFL]; 3, Rustler Park, 8 mi. W Portal, Cochise Co., Aug. 3, 1961, Lot 892 JFL, ex *Polyporus abietinus* [JFL]; 1, Southwest Research Station, 5 mi. SW Portal, Cochise Co., Aug. 1, 1961, Lot 882 JFL, ex *Polyporus abietinus* [JFL]. CALIFORNIA: 1, 1 mi. SE Alta Sierra, Kern Co., July 5, 1962, Lot 1043 JFL, ex *Polyporus abietinus* [JFL]; 1, 3 mi. E Shaver Lake, Fresno Co., Sept. 1, 1960, Lot 685 JFL, ex *Polyporus abietinus* [JFL]. NEW MEXICO: 2, Las Vegas H[ot] S[prings], 5.8, Barber & Schwarz Coll. [USNM]; 1, same locality, 9.8, Barber & Schwarz Coll. [USNM]; 1, same locality, 3.8, Barber & Schwarz Coll. [USNM].

Distribution. Montane regions of southern California, Arizona, and New Mexico (Fig. 106).

Host fungi. Polyporus abietinus [7(1)].

Discussion. This species may be distinguished from most other North American *Cis* by the elongate body form, dual and confused elytral punctation, and vestiture of short, blunt, colorless bristles. It differs from *C. subtilis* in having a pubescent fovea on abdominal sternite III of the male and the frontoclypeal ridge simple in both sexes. The pronotum in *C. acritus* is usually more reddish in color and more coarsely punctate than in *C. subtilis*. Of those species occurring within the range of *C. acritus*, *C. versicolor* and *C. striolatus* have similar body form, dual elytral punctation, and short bristles; in both of these, however, the elytral punctation is distinctly seriate. *C. discolor* has similar pale, blunt bristles, but the size is usually larger, the punctation is single, the pronotal margins are broader, and the protibial apex is distinctly dentate (Fig. 56). Smaller specimens of *C. fuscipes* may be confused with *C. acritus*, but they differ in the broader body form and the produced and rounded anterior pronotal angles (Fig. 23).

The ranges of *C. acritus* and *C. subtilis* are allopatric and the two species are closely related, even sharing the unique type of aedeagus (Figs. 73 and 80). They are considered to be distinct species in this treatment mainly because of the lack of an abdominal fovea in the male of the eastern form. The two species do not appear to belong to any Palaearctic group and their closest relatives are to be sought among the diverse and little known Neotropical fauna.

Cis acritus is found in association with conifers at intermediate and high elevations in the mountains of the Southwest. It has been collected only on *Polyporus abietinus*, where it occurs with *Cis hystriculus* in California and with *C. horridulus* and *Ceracis powelli* in Arizona.

The name *acritus* is derived from the Greek *akritos*, meaning confused, disorderly, mixed (referring to the confused elytral punctation).

Cis americanus Mannerheim

Cis americanus Mannerheim, 1852: 360; Pielou and Verma, 1968: 1184 (dist., biol.). Type locality: "Insulae Sitkhae." Lectotype, ♂, Mannerheim Coll., MZUH.

Xestocis insolens Casey, 1898: 86. Type locality: "Pennsylvania." Holotype, ♂, Casey Coll., USNM. NEW SYNONYMY.

Cis frosti Dury, 1917: 9; Brown, 1929: 153 (dist.); Frost, 1930: 41 (biol.). Type locality: "Orono, Maine." Holotype, ♂, Dury Coll., CIN (type lost). NEW SYNONYMY.

Cis serricollis Dury, 1917: 9; Weiss and West, 1921a: 61 (dist., biol.). Type locality: "Linn Co., Oregon." Syntypes, ♀♀, Dury Coll., CIN. NEW SYNONYMY.

Xestocis minor Hatch, 1962: 232. Type locality:

"Wheatland [Yamhill Co.], Ore." Holotype, ♂, Hatch Coll., UW. NEW SYNONYMY.

Xestocis oweni Hatch, 1962: 232. Type locality: "Seattle, Wash." Holotype, ♂, Hatch Coll., UW. NEW SYNONYMY.

Xestocis strigulosus Hatch, 1962: 231. Type locality: "Seattle, Wash." Holotype, ♂, Hatch Coll., UW. NEW SYNONYMY.

Cis hatchi, NEW NAME for *Xestocis nitidus* Hatch, 1962 (not *Anobium nitidum* Fabricius, 1792). NEW SYNONYMY.

Xestocis nitidus Hatch, 1962: 232. Type locality: "Wheatland [Yamhill Co.], Ore." Holotype, ♂, Hatch Coll., UW.

Distribution. Widespread across the northern part of North America from Alaska to Nova Scotia, south in California to Monterey County on the coast and Fresno County in the Sierra Nevada, in the Rocky Mountains south to northern Utah and Colorado, and in the Appalachian chain as far south as western North Carolina (Fig. 93). Marginal records: ALASKA: Kenai. BRITISH COLUMBIA: Terrace. ALBERTA: Cypress Hills. WISCONSIN: Bayfield Co. QUEBEC: Duparquet. MAINE: Orono, Washington Co. NEW BRUNSWICK: NE of Ludlow. NOVA SCOTIA: Portaupique. NORTH CAROLINA: Highlands, Macon Co. SOUTH DAKOTA: Hill City, Custer Co. COLORADO: Steamboat Springs, Routt Co. UTAH: Provo, Utah Co. NEVADA: 8 mi. SE Lamoille, Elko Co. CALIFORNIA: Huntington Lake, Fresno Co.; Big Sur, Monterey Co.

Host fungi. Polyporus adustus [7(5)]; *Polyporus betulinus* [7(4)]; *Stereum hirsutum* [6(4)]; *Fomes pinicola* [5(2)]; *Polyporus versicolor* [5(1)]; *Fomes annosus* [4(1)]; *Poria versipora* [3(2)]; *Steccherinum ochraceum* [3(2)]; *Pleurotus ostreatus* [3(1)]; *Polyporus sulphureus* [3(1)]; *Ganoderma tsugae* [3(1)]; *Polyporus abietinus* [3]; *Trametes mollis* [2(2)]; *Ganoderma applanatum* [2(1)]; *Polyporus resinosus* [1(1)]; *Polyporus hirsutus* [1(1)]; *Polyporus pargamenus* [1(1)]; *Polyporus squamosus* [1(1)]; *Polyporus tulipiferae* [1]; *Poria nigrescens* [1]; *Fomes fomentarius* [1]; *Polyporus biformis* [1]; *Phlebia merismoides* [1].

Discussion. This species is characterized by the relatively short and stout body form, strongly carinate prosternum, dual and confused or indistinctly seriate elytral punctation, and vestiture of short bristles. Several other sympatric forms resemble *C. americanus* in general body form, carinate prosternum, dual punctation, and secondary sexual characters (Fig. 39); of these, *C. levettei*, *C. megastictus*, and *C. maritimus* are clothed with very short, fine hairs, while *C. biarmatus* and *C. ephippiatus* have longer, decumbent, fine hairs. *Cis castlei* and *C. duplex* are similar in body form and vestiture, but both differ from *C. americanus* by having the prosternum only weakly carinate and the elytral punctation single. *Cis tridentatus* is very closely related to *C. americanus* and the two are often difficult to separate; in the latter the elytral punctation is more distinctly dual, the megapunctures being 1.5 to 3.0 × as large as the micropunctures.

This is an extremely variable, widespread, and polyphagous species, and it may represent a species complex. Mannerheim (1852) first described it on the basis of material from Sitka, Alaska, but the name was forgotten and Casey (1898) gave the name *Xestocis insolens* to specimens from Pennsylvania. Dury (1917) described *Cis frosti* from Maine and *C. serricollis* from Oregon; the types of both of these, as well as that of *insolens*, fall within the range of variation observed in western populations of *C. americanus*. In 1962, Hatch attempted to unravel this complex in the Pacific Northwest and described four more species, which I have synonymized above. One of these, *C. oweni*, may represent a distinct species (*see* below).

Cis americanus occurs across the northern part of the continent and is particularly common in the Pacific Northwest. Here two forms can be recognized that may prove to be different species. In the first, the surface of the pronotum and elytra are

relatively shiny, the lateral pronotal margins are usually broader, the elytral megapunctures are usually larger than the pronotal punctures, separated by 1 to 3 diameters, and almost as numerous as the micropunctures, so that the vestiture is sparser, the elytral bristles are longer, about 0.50 × as long as the scutellar base, and the size is usually smaller; this form is similar to the typical *C. americanus* occurring in the Northeast. In the second form, the pronotum and elytra are relatively dull, the lateral pronotal margins usually narrower, the elytral megapunctures smaller, separated by 2 to 5 diameters and much less numerous than micropunctures, so that the vestiture is denser, the elytral bristles are only about 0.33 × as long as the scutellar base, and the size is usually larger; this corresponds to Hatch's *oweni.* In California, the first form is found on several fungi, including *Stereum hirsutum, Steccherinum ochraceum,* and *Polyporus sulphureus,* while the second is found most often on *Polyporus adustus* and *Fomes pinicola.* The differences between the two forms are slight and intermediates may be found. The two have been collected at the same localities on several occasions and may represent sympatric sibling species. *Cis tridentatus* occurs in the same general area and is difficult to distinguish from the two forms described above; it is treated here as a distinct species because the differences, however slight, appear to be consistent. A thorough analysis of this group in the Pacific Northwest would require more field study.

This species and its sibling, *C. tridentatus,* are most closely related to members of the *Cis nitidus* group, from which they differ in the vestiture and in the form of the aedeagus (Fig. 75; cf. Fig. 74).

Cis angustus Hatch

Cis angustus Hatch, 1962: 230. Type locality: "Stanley, B. C." Holotype, ♀, CAS.

Distribution. Mountains of the Pacific Coast, from south-central British Columbia to the southern Sierra Nevada (Fig. 94). Marginal records: BRITISH COLUMBIA: Stanley. WASHINGTON: Paradise Park, 6000′, Mt. Rainier, Pierce Co. CALIFORNIA: 7 mi. N Mineral, 6000′, Tehama Co.; Huntington Lake, Fresno Co.

Host fungi. Fomes pinicola [2(2)]; *Fomes annosus* [1]; *Fomes officinalis* [1].

Discussion. This species is characterized by the long and narrow, somewhat cylindrical, body form; single, coarse, and confused elytral punctation; weakly dentate or angulate protibial apex (Fig. 52); and moderately long and fine, yellowish bristles. *Cis creberrimus* differs in being flattened and in having much finer and denser elytral punctation. *C. festivulus* has shorter and stouter, yellowish bristles, which are uneven in length, and a rounded protibial apex (Fig. 47). *C. robiniophilus* and *C. hystriculus* are both quite similar, but the former has shorter and stouter bristles and finer elytral punctures, while the latter has colorless bristles and no abdominal fovea in the male.

Cis angustus appears to be most closely related to *C. robiniophilus* from the eastern United States and *C. fagi* Waltl and *C. castaneus* Mellié from the Palaearctic region. The species has been collected only on the Pacific Coast, but further field work may reveal a broader distribution. It appears to be restricted to coniferous forests at higher elevations and may be considered part of the Holarctic faunal element. It has been found on three related species of *Fomes.*

Cis biarmatus Mannerheim

Cis biarmatus Mannerheim, 1852: 360. Type locality: " . . . Insulae Sitkhae." Lectotype, ♂, Mannerheim Coll., MZUH.

Xestocis biarmata (Mannerheim), —Casey, 1898: 86 (dist.); Fall, 1926: 200 (dist.); Hatch, 1962: 233, pl. 48, fig. 4, 4a (dist.).

Eridaulus biarmatus (Mannerheim), —Lawrence, 1965: 281.

Cis bicarinatus LeConte, 1867: 58. Incorrect subsequent spelling.

Distribution. Pacific Coast of North America, from southern Alaska to Marin Co., California (Fig. 102). Marginal records: ALASKA: Sitka; BRITISH COLUMBIA: Peachland; WASHINGTON: Carbon R., Mt. Rainier, Pierce Co.; OREGON: Sandy, Clackamus Co.; CALIFORNIA: 2 mi. SW Inverness, Marin Co.

Host fungi. Fomes pinicola [10(6)].

Discussion. Cis biarmatus may be distinguished by the short and stout body form, distinctly carinate prosternum, dual and confused elytral punctation, and vestiture of moderately long, decumbent hairs. *Cis americanus, C. tridentatus, C. megastictus, C. maritimus,* and *C. levettei* all differ in vestiture, having either short, fine hairs or short, stout bristles. In the closely related *C. ephippiatus,* the body is somewhat smaller and less uniformly pigmented, the pronotal punctation is finer and sparser, the elytral punctation is more distinctly dual and subseriate, and the anterior edge of the pronotum in the male is less strongly produced forward.

This species is relatively restricted in its distribution, occurring only along the Pacific Coast. Throughout its entire range it is sympatric with *C. ephippiatus,* but the range of the latter extends across the northern part of the continent to the Atlantic Coast. *Cis biarmatus* has been taken almost exclusively in *Fomes pinicola* growing on conifers in the coastal forests, while its sibling, *C. ephippiatus,* is most commonly collected in *Ganoderma applanatum* on hardwoods, at least on the Pacific Coast (*see* further discussion under *Cis ephippiatus,* p. 458). Other Ciidae usually collected in association with *C. biarmatus* are *Cis tridentatus, Dolichocis indistinctus* and *D. manitoba.*

Cis castlei (Dury), NEW COMBINATION

Xestocis castlei Dury, 1917: 17. Type locality: "Cincinnati, Ohio." Holotype, ♂, Dury Coll., CIN.

Distribution. Eastern North America, from extreme southern Ontario and Pennsylvania south to central Florida, west to Iowa, and south through eastern Mexico to Costa Rica (Fig. 97). Marginal records: ONTARIO: Tilbury, Essex Co.; PENNSYLVANIA: Chestnut Hill, Philadelphia Co.; FLORIDA: Highlands Hammock, 6 mi. W Sebring, Highlands Co.; LOUISIANA: 5 mi. S Livingston, Livingston Co.; MISSISSIPPI: 5 mi. N Ackerman, Choctaw Co.; IOWA: Maquoketa Caves State Park, Jackson Co.; SAN LUIS POTOSÍ: Huichihuayan; VERACRUZ: El Fortin; COSTA RICA: San José.

Host fungi. Polyporus adustus [9(4)]; *Polyporus pargamenus* [5]; *Polyporus hydnoides* [2]; *Stereum ostrea* [2]; *Polyporus mutabilis* [1(1)]; *Polyporus vinosus* [1(1)]; *Trametes corrugata* [1(1)]; *Ganoderma applanatum* [1]; *Lentinus crinitus* [1]; *Polyporus lignosus* [1]; *Polyporus zonalis* [1]; *Poria latemarginata* [1]; *Trametes plebeja* [1].

Discussion. This species differs from most North American *Cis* by the small size (TL usually less than 1.4 mm), short and broad body form, weakly carinate prosternum, single and confused elytral punctation, vestiture of short, stout bristles, pronotum with narrow lateral margins that are not crenulate, and uniquely curved, subtriangular, frontoclypeal plates in the male (Fig. 7). *Cis duplex* differs in being larger (TL rarely less than 1.4 mm) and in having the pronotum dull with coarser and denser punctation and smooth lateral edges. *C. laminatus* is much larger, with a relatively smaller scutellum, slightly tumid prosternum, and simple pronotal apex in the male. *Cis vitulus, C. congestus,* and *C. quadridentatus* differ in having the anterior pronotal angles distinctly produced forward, the lateral pronotal margins visible from above, and the frontoclypeal ridge quadridentate in the male; in addition, the first two species are much larger in size.

Cis castlei occurs throughout the eastern United States and extends into tropical Mexico and Central America. It does not

appear to be closely related to any other North American species. It has been found in a number of fungi, but *Polyporus adustus* may be the preferred host.

Cis cayensis NEW SPECIES

Holotype. ♂, FLORIDA: Big Pine Key, Monroe Co., June 4, 1968, Lot 2612 J. F. Lawrence, ex *Polyporus porrectus* ? [MCZ No. 31684]. Allotype, ♀, same data [MCZ].

Male. Length 1.27 mm. Body 2.12 × as long as broad, moderately convex. Head and pronotum blackish brown, elytra yellowish brown. Vestiture dual, consisting of moderately short, stout, blunt, yellowish bristles, and very short, fine, recurved, pale hairs. Vertex with deep, circular, median impression and two sharp, lateral tubercles; frontoclypeal ridge bearing two rounded tubercles on each side, the mesal two separated by 2.33 basal widths. Antennal segment III 2.00 × as long as IV. Pronotum 0.78 × as long as broad, widest at posterior third; anterior edge weakly rounded, slightly flattened at midline; sides moderately rounded, the margins narrow and distinctly crenulate, not visible for their entire lengths from above; anterior angles not produced forward, obtuse; disc moderately convex, even; surface coarsely granulate and dull; punctures shallow, shiny, 0.25 × as large as scutellar base, and separated by 0.50 to 1.25 diameters. Elytra 1.37 × as long as broad and 1.83 × as long as pronotum; sides weakly rounded, apices blunt; punctation dual and subseriate; megapunctures finer and denser than those on pronotum, sometimes confluent within a row, shallow and nude; micropunctures bearing either a fine, recurved, pale hair, which is about 0.25 × as long as scutellar base, or a stout, erect, blunt, yellowish bristle, which is 0.60 × as long as scutellar base. Prosternum moderately tumid and subcarinate; intercoxal process 0.45 × as wide as a procoxal cavity, parallel-sided. Protibia with outer apical angle expanded and rounded (Fig. 48). Metasternum 0.56 × as long as wide; suture 0.30 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.23 × as long as body of sternite, indistinctly margined, and located slightly anterad of center.

Female. Length 1.32 mm. Body 2.17 × as body of sternite, indistinctly margined, frontoclypeal ridge simple. Pronotum 0.77 × as long as broad; anterior edge moderately rounded. Elytra 1.46 × as long as broad and 2.06 × as long as pronotum. Protibia as in male. Sternite III without pubescent fovea.

Variation. Pronotum yellowish orange to black, usually blackish brown. Elytra yellowish to dark brown, usually yellowish brown. Tubercles on vertex and frontoclypeal ridge in male vary somewhat in size and shape. Size and dimensions vary as follows in a series of 25 males and 24 females from Big Pine Key, Florida (Lots 2612 and 2613):

TL mm: ♂ 1.02–1.37 (1.19 ± 0.019),
♀ 1.05–1.35 (1.19 ± 0.018);
TL/EW: ♂ 2.05–2.25 (2.17 ± 0.010),
♀ 2.12–2.29 (2.19 ± 0.009);
PL/PW: ♂ 0.75–0.85 (0.80 ± 0.005),
♀ 0.75–0.85 (0.80 ± 0.005);
EL/EW: ♂ 1.35–1.50 (1.42 ± 0.008),
♀ 1.41–1.52 (1.46 ± 0.007);
EL/PL: ♂ 1.71–2.00 (1.89 ± 0.013),
♀ 1.82–2.14 (2.01 ± 0.015);
GD/EW: ♂ 0.75–0.81 (0.77 ± 0.004),
♀ 0.75–0.84 (0.79 ± 0.005).

Total size range in material examined: 0.90–1.40 mm.

Paratypes. CUBA: 2, Buenos Aires, Trinidad Mts., VI. '39, Parsons [MCZ]. FLORIDA: Monroe Co.: 1, Big Pine Key, June 4, 1968, Lot 2611 JFL, ex *Polyporus porrectus* ? [JFL]; 29, same locality and date, Lot 2612 JFL, ex *Polyporus porrectus* ? [FMNH, JFL, MCZ, USNM]; 23, same locality and date, Lot 2613 JFL, ex *Polyporus porrectus* ? [JFL, MCZ]; 8, same locality and date, Lot 2615 JFL, ex *Polyporus hydnoides* [JFL]; 6, same locality and date, Lot 2616 JFL, ex *Polyporus*

hydnoides [JFL]; 4, Key Largo, N end, Feb. 10, 1968, Lot 2550 JFL (S. B. Peck, coll.), ex *Polyporus corrosus* [JFL]; 6, Lignum Vitae Key, May 28, 1968, Lot 2577 JFL, ex *Fomes robiniae* [JFL, MCZ]; 1, same locality and date, Lot 2580 JFL, ex *Polyporus hydnoides* [JFL]; 1, same locality, June 1, 1968, Lot 2596 JFL, ex *Stereum papyrinum* [JFL]; 3, same locality and date, Lot 2600 JFL, ex *Fomes robiniae* [JFL]; 2, same locality and date, Lot 2601 JFL, ex *Fomes robiniae* [JFL]; 1, same locality, June 5, 1968, Lot 2622 JFL, ex *Fomes robiniae* [JFL]; 2, same locality and date, Lot 2623 JFL, ex *Fomes robiniae* [JFL]; 3, Marathon, Mar. 15, 1968 (S. B. Peck, coll.), berlese sample B-111, litter and soil in scrub forest [MCZ]; 5, Pennekamp State Park, Key Largo, June 28, 1965, Lot 1525 JFL, ex *Polyporus porrectus* ? [JFL]; 13, same locality and date, Lot 1526 JFL, ex *Polyporus porrectus* ? [JFL, MCZ]; 2, same locality, May 29, 1968, Lot 2584 JFL, ex *Polyporus porrectus* ? [JFL].

Distribution. Florida Keys and Cuba.

Host fungi. Polyporus porrectus ? [6(4)]; *Fomes robiniae* [5]; *Polyporus hydnoides* [3(2)]; *Polyporus corrosus* [1(1)]; *Stereum papyrinum* [1].

Discussion. This species is unique among the North American Ciidae in the type of elytral vestiture, expanded and rounded protibial apex, and tubercles on the vertex of the male. The elytra bear short, erect, seriate bristles, alternating with very short and fine, inclined hairs, but the latter are not visible under lower magnifications, so that the vestiture may appear single. The expanded and rounded protibial apex and the male armature are both found in *Cis niedhauki*, but that species differs in being subglabrous, the vestiture consisting of only short, fine hairs. In general body form and seriate elytral bristles, *C. cayensis* resembles *C. striolatus* and *C. tristis*, but it differs from both in the smaller size, protibial apex, and head of the male.

This is a West Indian species and probably occurs throughout the Greater Antilles. It appears to prefer melanic conks, as does the closely related *Cis niedhauki*.

The name *cayensis* is derived from the Spanish *cayo*, meaning reef or small island (key).

Cis congestus Casey

Cis congesta Casey, 1898: 82. Type locality: "Louisiana." Holotype, ♀, Casey Coll., USNM.
Cis lodingi Dury, 1917: 6; Blatchley, 1923: 19 (dist.). Type locality: "Mobile, Ala." Syntypes, ♀♀, Dury Coll., CIN. NEW SYNONYMY.

Distribution. Southeastern United States, from Maryland south to northern Florida and west to southern Illinois and eastern Texas (Fig. 105). Marginal records: MARYLAND: Baltimore, Baltimore Co.; FLORIDA: Ormond, Volusia Co.; TEXAS: San Felipe, Austin Co.; ILLINOIS: Fountain Bluff, Jackson Co.

Host fungi. Polyporus hirsutus [3(2)]; *Polyporus pinisitus* [1].

Discussion. This species may be distinguished from most North American *Cis* by the very short and stout body form, single and confused elytral punctation, strongly tumid prosternum, distinctly produced anterior pronotal angles (Fig. 26), and vestiture of short bristles. In addition, the male has a trisinuate frontoclypeal ridge (Fig. 3), two stout horns on the pronotum, and no pubescent fovea on the abdomen. It differs from the closely related *C. vitulus* by having coarser and denser pronotal punctation, shiny pronotal surface, and a shorter and stouter body form. *Cis laminatus* has a similar build and a trisinuate frontoclypeal ridge in the male, but in that species the lateral pronotal margins are narrower, distinctly crenulate, and lack a raised lip. *Cis huachucae* is also similar and lacks the abdominal fovea in the male, but the vestiture is dual, consisting of longer and shorter bristles. In *Cis quadridentatus*, the prosternum is carinate, the size is smaller, and the anterior pronotal angles are not as strongly produced forward.

Cis congestus is restricted to the south-

eastern United States, while *C. vitulus* is found on the Pacific Coast. The two species belong to a group consisting primarily of Neotropical forms, such as *Cis bubalus* Reitter, *C. fasciatus* Gorham, *C. bisbidens* Gorham, *C. granarius* Mellié, and *C. grossus* Mellié. The few host records indicate that *Cis congestus*, like the other members of this group, prefers the whitish conks of *Polyporus hirsutus* and its relatives.

This species may be parthenogenetic, like *Cis fuscipes*, which is discussed below (p. 460) and in another paper (Lawrence, 1967a). Of all of the collections examined so far, only two contained males. In a series of 50 specimens from Mobile, Alabama, no males were found, 3 males were seen in a series of 29 specimens from Tennessee, and a single male turned up in a series of 20 specimens from North Carolina. A total of 4 males were found in the total sample of 136 specimens. Further collecting and laboratory rearing will be required to verify the possible existence of parthenogenesis.

Cis cornelli NEW SPECIES
Figure 42

Holotype. ♂, NORTH CAROLINA: Atlantic Beach, Carteret Co., May 19, 1966, Lot 1890 J. F. Lawrence (Carl Parsons, coll.), ex *Polyporus sector* on dead hardwood [MCZ No. 31685]. Allotype, ♀, same data [MCZ].

Male. Length 1.52 mm. Body 1.74 × as long as broad, strongly convex. Head and pronotum dark reddish brown, elytra dark yellowish brown. Vestiture of moderately short, fine, blunt, yellowish bristles. Vertex with a broad, shallow, median impression; frontoclypeal ridge bearing 2 lateral horns, which are about 4.0 × as long as wide at base, 0.86 × as long as pronotum, and separated by 1.5 basal widths, with mesal edges slightly and lateral edges strongly converging. Antennal segment III 1.70 × as long as IV. Pronotum 0.68 × as long as broad, widest at posterior third; anterior edge weakly rounded, flattened at middle; sides weakly rounded, the margins broad and very weakly crenulate, easily visible for their entire lengths from above; anterior angles distinctly produced forward, rounded; disc strongly convex, even; surface finely granulate and shiny; punctures 0.33 × as large as scutellar base and separated by 0.50 to 0.75 diameter. Elytra 1.14 × as long as broad and 1.90 × as long as pronotum; sides moderately rounded, apices blunt; punctation dual and seriate; megapunctures about as coarse as those on pronotum, very dense and almost confluent within rows, shallow and nude; micropunctures located mainly between rows, each bearing a moderately fine, blunt, yellowish bristle, which is 0.67 × as long as scutellar base. Prosternum strongly tumid and carinate; intercoxal process 0.40 × as wide as a procoxal cavity, parallel-sided. Protibia with outer apical angle produced and dentate (Fig. 50). Metasternum 0.38 × as long as wide; suture 0.35 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.27 × as long as body of sternite, indistinctly margined, and located anterad of center. Sternite VIII as in Figure 67. Aedeagus as in Figures 76 and 79.

Female. Length 1.57 mm. Body 1.80 × as long as broad. Vertex flattened; frontoclypeal ridge simple. Pronotum 0.69 × as long as broad; anterior edge strongly rounded. Elytra 1.17 × as long as broad and 1.86 × as long as pronotum. Protibia as in male. Sternite III without pubescent fovea.

Variation. Pronotum yellowish orange to blackish brown, usually reddish brown. Elytra yellowish to blackish brown, usually dark yellowish brown. Frontoclypeal horns in smaller males shorter and subtriangular, as little as 0.25 × as long as pronotum; in larger specimens the horns are longer and narrower and may be as much as 0.90 × as long as pronotum. Size and dimensions

vary as follows in a mixed series of 23 males and 25 females:

TL mm: ♂ 1.32–1.55 (1.49 ± 0.011), ♀ 1.45–1.72 (1.58 ± 0.013);
TL/EW: ♂ 1.71–1.88 (1.79 ± 0.011), ♀ 1.75–1.89 (1.80 ± 0.007);
PL/PW: ♂ 0.64–0.72 (0.68 ± 0.004), ♀ 0.64–0.71 (0.67 ± 0.003);
EL/EW: ♂ 1.12–1.25 (1.18 ± 0.008), ♀ 1.14–1.26 (1.19 ± 0.006);
EL/PL: ♂ 1.77–2.12 (1.93 ± 0.016), ♀ 1.82–2.00 (1.93 ± 0.012);
GD/EW: ♂ 0.75–0.88 (0.80 ± 0.006), ♀ 0.76–0.84 (0.80 ± 0.004).

Paratypes. FLORIDA: 5, 5 mi. W Gainesville, Alachua Co., Nov. 29, 1963, H. S. Dybas, No. 63–86 (S. B. Peck, coll.), live oak litter [FMNH, JFL]. NORTH CAROLINA: 12, Atlantic Beach, Carteret Co., May 19, 1966, Lot 1890 JFL (Carl Parsons, coll.), ex *Polyporus sector* [JFL, MCZ, USNM]; 4, Randolf Co., XII–18–63, J. F. Cornell [JFC, JFL]. SOUTH CAROLINA: 35, Yemassee, Beaufort Co., XII–28–63 (J. F. Cornell, coll.), berlese from litter under log in palmetto-cypress bog [JFC, FMNH, JFL, USNM].

Distribution. North and South Carolina and Florida.

Host fungi. Polyporus sector [1(1)].

Discussion. This species is characterized by the very short and broad body form (EL/EW less than 1.25), strongly carinate prosternum, protibial apex with a stout tooth and several spines, dual and seriate elytral punctation, vestiture of short, fine bristles, and male with a simple pronotal apex and two long and narrow, lateral horns on the clypeus. In *Cis fuscipes*, the elytra are longer and narrower, the prosternum is not carinate, and the frontoclypeal horns are absent in the male.

Cis cornelli is the only North American member of a Neotropical species group formerly included in the genus *Macrocis* (*see* p. 439). It resembles the South American species *Cis testaceus* (Pic), *C. grandicornis* (Pic), and *C. testaceimembris* (Pic), but the first two are larger (TL more than 2 mm) and the last two have broader, blunt, frontoclypeal horns in the male. *C. setifer* (Gorham), known from Mexico and Central America, is much smaller (less than 1.3 mm) with shorter and stouter, colorless bristles.

The species is probably distributed throughout the Southern Coastal Plain. It has been named after Dr. J. F. Cornell, who collected the first series.

Cis cornutus Blatchley

Cis cornutus Blatchley, 1910: 898, fig. 353. Type locality: "Grand Chain, Posey Co." [Indiana]. Holotype, ♂, Blatchley Coll., PURD.
Cis hirsuta Casey, — Weiss and West, 1920: 8 (biol., dist.). Misidentification.

Distribution. Eastern United States, from New York south to northern Florida and west to Illinois and Arkansas. Marginal records: NEW YORK: West Point, Orange Co.; FLORIDA: Jacksonville, Duval Co.; ARKANSAS: Washington Co.; ILLINOIS: Fountain Bluff, Jackson Co.

Host fungi. Polyporus versicolor [4(3)]; *Polyporus subectus* [1(1)].

Discussion. Cis cornutus may be distinguished by the dual vestiture, consisting of longer and shorter, yellowish bristles, which are seriate on the elytra, and the short and broad body form with fairly broad lateral pronotal margins. The male bears two subtriangular plates on the frontoclypeal ridge, a single, raised, rounded process on the anterior edge of the pronotum, and a small, pubescent fovea on the abdomen. The elytral bristles are much finer than those in *C. huachucae* and fall into two distinct size classes; in addition, they are yellowish and seriate. In *C. crinitus*, the longer bristles are dark in color, the vestiture is confused, and the elytra are longer and narrower. In *C. fuscipes*, the elytral bristles may be seriate, but they are relatively uniform in length and not as fine, while the elytra are more elongate and the male armature is different.

Cis cornutus is most closely related to

Cis pilosus Gorham, described from Guatemala and occurring also in Costa Rica and Mexico. In *C. pilosus* the vestiture is longer and finer, the male fovea is absent, and the aedeagus is slightly different.

Cis creberrimus Mellié

Cis creberrimus Mellié, 1848: 357, pl. 12, fig. 5; Gorham, 1883: 222 (dist.); Casey, 1898: 80 (dist.); Blatchley, 1910: 897 (dist., biol.); Weiss and West, 1921b: 169 (dist., biol.); Blackman and Stage, 1924: 85 (biol.). Type locality: "Nouvelle Orleans." Lectotype, ♀, Pic Coll. (Chevrolat Coll.), MNHN.

Cis puberulus Mellié, 1848: 358; Gorham, 1883: 222 (dist.). Type locality: "Saint-Thomas." Holotype, ♀, Marseul Coll., MNHN. NEW SYNONYMY.

Cis nubillus Gorham, 1898: 331. Type locality: "St. Vincent: south end." Holotype, ♂, BMNH. NEW SYNONYMY.

Cis nubilus Dalla Torre, 1911: 15. Incorrect subsequent spelling.

Distribution. Eastern North America, from Vermont south to Florida and west to eastern Nebraska, Kansas, and Texas; montane regions of the Southwest; throughout the West Indies; scattered localities in Mexico, Central America, and South America as far south as Santa Catarina, Brazil; Galapagos Islands (Fig. 98). Marginal records: VERMONT: Manchester, Bennington Co. FLORIDA: Paradise Key, Dade Co. NEBRASKA: Central City, Merrick Co. KANSAS: Lawrence, Douglas Co. TEXAS: Kerrville, Kerr Co.; Brownsville, Cameron Co. NEW MEXICO: Albuquerque, Bernalillo Co. ARIZONA: Hitchcock Highway, Mile 25, Santa Catalina Mts., Pima Co.; Rustler Park, 8 mi. W Portal, Cochise Co. CALIFORNIA: 4 mi. E Running Springs, San Bernardino Co.; 1.5 mi. NW Mt. Laguna, San Diego Co. BAHAMAS: Pine Ridge, Grand Bahama Is.; 2 mi. E Conch Shell Hill, Great Inagua Is. CUBA: Pinar del Rio. JAMAICA: Windsor, 10 mi. S Falmouth, Trelawny Par. GRENADA: Mount Gay Est. (leeward side). SINALOA: 22 mi. S Espinol. GUATEMALA: El Reposo, 800′; Zapote. CANAL ZONE: Barro Colorado Is. COLOMBIA: Medellin, Antioquia Prov. VENEZUELA: Yacua, Sucre Prov. BRAZIL: Nova Teutonia, Santa Catarina. GALAPAGOS IS.: 6 mi. N Academy Bay, Santa Cruz Is. This is a composite distribution in that several closely related species are probably involved (*see* discussion below).

Host fungi. Fomes sclerodermeus [6(1)]; *Polyporus adustus* [5(1)]; *Ganoderma lucidum* [4(2)]; *Ganoderma applanatum* [4]; *Polyporus hydnoides* [3(1)]; *Fomes officinalis* [2(2)]; *Poria latemarginata* [2(2)]; *Fomes pinicola* [2(1)]; *Polyporus pargamenus* [2(1)]; *Trametes corrugata* [2(1)]; *Polyporus gilvus* [2]; *Fomes annosus* [1(1)]; *Ganoderma fulvellum* [1(1)]; *Polyporus sanguineus* [1(1)]; *Poria corticola* [1(1)]; *Daedalea elegans* [1]; *Lenzites striata* [1]; *Pleurotus* sp. [1]; *Polyporus anceps* [1]; *Polyporus hirsutus* [1]; *Polyporus sulphureus* [1]; *Polyporus supinus* [1]; *Schizophyllum commune* [1]; *Trametes hispida* [1].

Discussion. The material on which the above distributional summary is based probably represents a complex of species, which are here included under the single name *Cis creberrimus*, until a more thorough analysis is possible. In North America, the species may be distinguished from other ciids by the elongate and flattened form, narrow lateral pronotal margins, dentate protibial apex, flat prosternum, fairly coarse and dense, single, subseriate, elytral punctation, and four rounded tubercles on the frontoclypeal ridge in the male.

The surface of the pronotum is subject to considerable variation. Punctation may be fine and sparse to coarse and dense, while the surface may be granulate and dull to smooth and shiny. In North America, southwestern populations have the pronotum smooth and shiny with coarse and dense punctation, while eastern populations are characterized by having a dull pronotum with finer and sparser punctation.

The vestiture is highly variable in this complex. The elytra may be clothed with relatively short and stout bristles, which are not obviously dual, longer and finer bristles, which are erect and inclined, or long, fine hairs. Long and fine hairs are characteristic of specimens from the Chiricahua Mountains of Arizona, while the short bristles occur in midwestern and eastern populations. The dual vestiture, consisting of erect and inclined, long bristles, occurs in various populations from the Southwest and Southeast. Some specimens with long, fine hairs are known from the Southeast as well.

Using these two character complexes, the North American specimens fall into four geographic segregates: 1) typical *Cis creberrimus* with fine and sparse pronotal punctation, dull surface, and fairly short elytral bristles; 2) Floridian specimens with similar pronotal surface but with dual vestiture of erect and inclined, long bristles; 3) specimens from the mountains of southern California, Arizona, and New Mexico with coarse and dense pronotal punctation, shiny surface, and dual, long vestiture; and 4) Chiricahua Mountain specimens with similar pronotal surface and long, fine hairs. A very few specimens from Ohio, Louisiana, Mississippi, and Florida fall into the last category also.

There is some intergradation between the two eastern forms, and the increase in bristle length in the East may be clinal. The dual nature of the vestiture in southeastern populations is more obvious because of the greater length of the individual elements, and the shorter bristles of "typical" *C. creberrimus* appear to be dual upon closer examination. The situation becomes much more complex if the Mexican and West Indian forms are considered. All types occur south of the United States, but material is not abundant and patterns are difficult to discern. Two different types are rarely found together, but when this does occur it would be difficult to justify lumping the forms together as one species. Both of the described species from the West Indies (*C. puberulus* from St. Thomas and *C. nubillus* from St. Vincent) are similar to populations from the southeastern United States and are the least likely to be specifically distinct.

A preliminary analysis of the male genitalia in this complex revealed a certain amount of variation in the form of the tegmen that may be correlated with differences in vestiture described above. A more detailed analysis must be postponed until more material can be examined.

Cis creberrimus is not an uncommon species in eastern North America, but it is rarely taken in large numbers. It may be found in association with various fungi but it is usually not the dominant species in a fruiting body. It is also commonly encountered under bark. The species or complex is widespread in the New World and is one of the two ciids to occur on the Galapagos Islands, the other being *Ceracis cucullatus* (Mellié), an equally ubiquitous form (*see* Lawrence, 1967b).

Cis crinitus NEW SPECIES

Holotype. ♂, FLORIDA: Lignum Vitae Key, Monroe Co., June 5, 1968, Lot 2624 J. F. Lawrence, ex *Stereum papyrinum* [MCZ No. 31686]. Allotype, ♀, same data [MCZ].

Male. Length 1.72 mm. Body 2.30 × as long as broad, moderately convex. Head and pronotum reddish brown, elytra yellowish brown. Vestiture distinctly dual, consisting of shorter, fine, recurved, yellowish hairs, and longer, stiff, erect, darker bristles (Fig. 29). Vertex flattened; frontoclypeal ridge bearing 2 lateral horns, which are about 2 × as long as wide at base, 0.16 × as long as pronotum, and separated by 3.5 basal widths, with mesal edges subparallel and lateral edges strongly converging. Antennal segment III 1.66 × as long as IV. Pronotum 0.90 × as long as broad, widest at posterior fourth; anterior edge strongly produced and emarginate, forming 2 approximate, sharp, subtriangular horns,

which are 0.14 × as long as pronotum; sides subparallel, the margins broad and weakly crenulate, easily visible for their entire lengths from above; anterior angles distinctly produced forward, subacute; disc moderately convex, even; surface smooth and shiny; punctures 0.30 × as large as scutellar base and separated by 0.25 to 0.50 diameter. Elytra 1.43 × as long as broad and 1.65 × as long as pronotum; sides subparallel, apices blunt; punctation apparently single and confused; punctures about as large as, but sparser than, those on pronotum, each puncture bearing either a fine, recurved, yellowish hair, which is about as long as scutellar base, or a stiff, erect, dark bristle, which is 1.50 × as long as scutellar base, the hairs being more abundant than the bristles. Prosternum slightly tumid; intercoxal process 0.40 × as wide as a procoxal cavity, parallel-sided. Protibia with outer apical angle strongly produced and dentate. Metasternum 0.50 × as long as wide; suture 0.33 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.36 × as long as body of sternite, distinctly margined, and located about in center.

Female. Length 1.77 mm. Body 2.15 × as long as broad. Vertex as in male; frontoclypeal ridge simple. Pronotum 0.77 × as long as broad; anterior edge strongly rounded, simple. Elytra 1.45 × as long as broad and 2.09 × as long as pronotum. Protibial apex only slightly produced, angulate or weakly dentate. Sternite III without a pubescent fovea.

Variation. Pronotum yellowish orange to dark brown, usually reddish brown. Elytra yellowish to dark brown, usually yellowish brown. Frontoclypeal ridge in smaller males bearing 2 short, subtriangular processes; in larger specimens these are represented by longer, narrow horns, which may be 0.20 × as long as pronotum. Anterior edge of pronotum in smaller males barely produced and emarginate, forming 2 small tubercles; pronotal horns in larger specimens may be 0.20 × as long as pronotum. In West Indian specimens, the erect bristles are finer and lighter in color, so that the vestiture is less obviously dual. These insular specimens are almost surely conspecific with those on the mainland, but they have not been included in the paratype series. Size and dimensions vary as follows in a mixed series of 10 males and 16 females from Florida:

TL mm: ♂ 1.52–2.12 (1.81 ± 0.054),
♀ 1.67–2.32 (1.89 ± 0.037);
TL/EW: ♂ 2.16–2.33 (2.26 ± 0.018),
♀ 2.10–2.26 (2.17 ± 0.010);
PL/PW: ♂ 0.79–0.94 (0.88 ± 0.015),
♀ 0.74–0.82 (0.79 ± 0.006);
EL/EW: ♂ 1.38–1.47 (1.43 ± 0.008),
♀ 1.39–1.53 (1.45 ± 0.010);
EL/PL: ♂ 1.61–2.00 (1.72 ± 0.040),
♀ 1.91–2.21 (2.03 ± 0.023);
GD/EW: ♂ 0.72–0.83 (0.77 ± 0.010),
♀ 0.74–0.80 (0.76 ± 0.004).

Paratypes. ALABAMA: 1, Mobile, 3.4 [CIN]. FLORIDA: 1, Big Pine Key, Monroe Co., June 4, 1968, Lot 2605 JFL, ex *Polyporus* sp. [JFL]; 1, same locality and date, Lot 2616 JFL, ex *Polyporus hydnoides* [JFL]; 1, Crawl Key, Monroe Co., June 6, 1968, Lot 2630 JFL, ex *Polyporus fulvocinereus* [JFL]; 1, Dunedin, 12–7–21, W. S. B.[latchley] [PURD]; 1, same locality, 1–8–26, W. S. B. [PURD]; 1, same locality, 3–20–16, W. S. B. [PURD]; 1, same locality, 3–5–20, W. S. B. [PURD]; 2, Grassy Key, Monroe Co., June 28, 1965, Lot 1522 JFL, ex *Polyporus fulvocinereus* [JFL]; 1, Indian River, IV–7–30, J. R. Barass, Florida Fruit Fly Trap Surv. [USNM]; 3, Lignum Vitae Key, Monroe Co., June 5, 1968, Lot 2624 JFL, ex *Stereum papyrinum* [FMNH, JFL]; 1, same locality, June 1, 1968, Lot 2595 JFL, ex *Polyporus fulvocinereus* [JFL]; 1, same locality and date, Lot 2596 JFL, ex *Stereum papyrinum* [JFL]; 1, same locality and date, Lot 2597 JFL, ex *Polyporus hydnoides* [JFL]; 1, Marathon, Monroe Co.; Mar. 10, 1968, Lot 2545 JFL (S. B. Peck, coll.), ex *Ganoderma zonatum*

[JFL]; 1, Punta Gorda, II–7–40, Van Dyke Collection [CAS]; 5, St. Augustine, III–5–1940, Van Dyke Collection [CAS]; 1, Tampa, 5.4, J. L. LeConte Collection [MCZ]. GEORGIA: 1, Tybee Is., VI–23, Coll. by H. A. Wenzel [CIN]. LOUISIANA: 2, Covington, 28, V, Collection H. Soltau [USNM]. NORTH CAROLINA: 1, Longbeach, VI–12–53, G. H. Nelson, Beating *Quercus virginiana* [GHN]. TEXAS: 1, Borden, 18.6 [MCZ].

Additional material. BAHAMAS: 1, 2 mi. E Conch Shell Hill, Great Inagua, Feb., 1967, Lot 2058 JFL (A. Laska, coll.), ex *Polyporus hydnoides* [JFL]. CUBA: 1, Cayamas, 29.5, E. A. Schwarz, Collector [USNM]; 1, same locality, 29.12, E. A. Schwarz [USNM]; 1, same locality, 9.3, E. A. Schwarz [USNM]; 1, same locality, 4.2, E. A. Schwarz [USNM]; 4, same locality, 10.6, E. A. Schwarz [USNM]; 1, same locality, 12.3, E. A. Schwarz [USNM]. JAMAICA: 1, Try, nr. Falmouth, VIII–9–1966, mangrove swamp, A. T. Howden [HH]. PUERTO RICO: 18, Caja de Muertos Is., Dec. 10, 1961, Lot 1660 JFL (H. Heatwole, coll.), ex *Lenzites striata* [JFL].

Distribution. Southeastern United States, from North Carolina to Florida and west to eastern Texas, the Bahamas, and the Greater Antilles (Fig. 96).

Host fungi. Polyporus hydnoides [3(1)]; *Polyporus fulvocinereus* [3(1)]; *Stereum papyrinum* [2(2)]; *Lenzites striata* [1(1)]; *Ganoderma zonatum* [1].

Discussion. Individuals of this species are easily recognized by the unique vestiture of short, recurved hairs and long, erect bristles. In most other species with dual vestiture, there are two classes of bristles, which differ mainly in length and angle of inclination (Fig. 30), but in *C. crinitus* the large bristles are much stouter and darker in color than the short hairs (Fig. 29). In *Cis cayensis* the bristles are short, pale, and seriate, while the hairs are very small and barely visible at lower magnifications. In *C. cornutus* the two types of vestiture are not as distinct (longer, erect and shorter, inclined, yellowish bristles) and are subseriate on the elytra.

Cis crinitus belongs to the *Cis hirsutus* group, but it is the only member with distinctly dual vestiture. In *Cis hirsutus*, *C. rotundulus*, and *C. ursulinus* the vestiture consists of long, recurved, fine hairs. Individuals of *C. crinitus* are usually larger than those of *C. rotundulus* or *C. ursulinus* and smaller and more elongate than those of *C. hirsutus*.

The name *crinitus* is taken directly from the Latin word meaning hairy.

Cis discolor NEW SPECIES

Holotype. ♂, ARIZONA: Rustler Park, 8 mi. W Portal, Cochise Co., Aug. 8, 1961, Lot 922 J. F. Lawrence, ex *Fomes cajanderi* on *Pinus* sp. [CAS]. Allotype, ♀, same locality and date, Lot 918 J. F. Lawrence, ex *Fomes cajanderi* on *Pinus* sp. [CAS].

Male. Length 2.45 mm. Body 2.45 × as long as broad, moderately convex. Head blackish posteriorly, reddish orange anteriorly; pronotum reddish orange, with two broad, longitudinal, black fasciae extending from the posterior edge to the anterior fifth; elytra dark brownish posterolaterally and anteriorly along the suture, reddish orange at apices, each elytron with a vague, median, reddish orange fascia that broadens posteriorly. Vestiture of short, stout, somewhat flattened, colorless bristles. Vertex with a slight median elevation; frontoclypeal ridge bearing two rounded tubercles on each side, the mesal two separated by 1.0 basal width. Antennal segment III 1.80 × as long as IV. Pronotum 0.86 × as long as broad, widest at posterior third; anterior edge strongly rounded, slightly emarginate at midline; sides weakly rounded, the margins broad and weakly crenulate, easily visible for their entire lengths from above (Fig. 44); anterior angles distinctly produced forward, rounded; disc moderately convex, broadly impressed anteriorly; surface finely granulate and shiny; punctures varying considerably in size, 0.10 to 0.25 × as large as scutellar base, and separated by

0.20 to 0.50 diameter. Elytra 1.67 × as long as broad and 2.16 × as long as pronotum; sides subparallel, apices blunt; disc with a distinct transverse impression at anterior fourth; punctation single and confused; punctures more uniform in size and somewhat smaller than the larger of the pronotal punctures, each bearing a stout, somewhat flattened, colorless bristle, which is about 0.33 × as long as scutellar base. Prosternum slightly tumid, intercoxal process 0.43 × as wide as a procoxal cavity, broadened posteriorly. Protibia with outer apical angle produced and dentate (Fig. 56). Metasternum 0.58 × as long as wide; suture 0.26 × as long as median length of sternum. Abdominal sternite III bearing a median, oval, pubescent fovea, which is 1.40 × as long as wide, 0.17 × as long as body of sternite, distinctly margined, and located anterad of center. Sternite VIII as in Figure 62. Aedeagus as in Figures 68 and 81.

Female. Length 2.70 mm. Body 2.35 × as long as broad. Vertex as in male; frontoclypeal ridge simple. Pronotum 0.85 × as long as broad; anterior edge barely emarginate at midline. Elytra 1.61 × as long as broad and 2.04 × as long as pronotum. Protibia as in male. Sternite III without a pubescent fovea.

Variation. Pronotum yellowish orange to reddish brown with variable brownish or blackish markings laterally, usually reddish orange with 2 broad, blackish brown, lateral fasciae. Elytra yellowish to black with variable reddish orange markings, usually reddish orange with vague, dark brownish fasciae along the suture and lateral edges. Specimens from the Chiricahua Mountains are darker in color than those from the Santa Rita Mountains, but the latter sample consists mainly of tenerals from a single lot. The Chiricahua specimens are also significantly larger in size. Male specimens vary slightly in the development of secondary sexual characters; in some males the mesal frontoclypeal tubercles are sharper than the lateral ones. Size and dimensions vary as follows in a series of seven males and four females from Rustler Park (Chiricahua Mts.), Cochise Co., Arizona (Lots 918, 922, and 1294):

TL mm: ♂ 2.45–2.85 (2.61 ± 0.052),
♀ 2.32–2.80 (2.65 ± 0.110);
TL/EW: ♂ 2.40–2.49 (2.44 ± 0.012),
♀ 2.35–2.41 (2.38 ± 0.013);
PL/PW: ♂ 0.81–0.87 (0.85 ± 0.008),
♀ 0.83–0.90 (0.86 ± 0.014);
EL/EW: ♂ 1.64–1.72 (1.66 ± 0.012),
♀ 1.61–1.67 (1.64 ± 0.012);
EL/PL: ♂ 2.08–2.30 (2.14 ± 0.029),
♀ 2.17–2.32 (2.22 ± 0.035);
GD/EW: ♂ 0.74–0.78 (0.76 ± 0.004),
♀ 0.72–0.76 (0.74 ± 0.009).

A second series of 27 males and 19 females from Madera Canyon (Santa Rita Mts.), Santa Cruz Co., Ariz. (Lot 1282) shows the following variation:

TL mm: ♂ 1.80–2.52 (2.19 ± 0.037),
♀ 1.95–2.57 (2.28 ± 0.043);
TL/EW: ♂ 2.27–2.45 (2.38 ± 0.008),
♀ 2.31–2.54 (2.44 ± 0.016);
PL/PW: ♂ 0.82–0.90 (0.87 ± 0.004),
♀ 0.80–0.89 (0.85 ± 0.005);
EL/EW: ♂ 1.50–1.66 (1.59 ± 0.007),
♀ 1.57–1.74 (1.68 ± 0.012);
EL/PL: ♂ 1.85–2.12 (2.01 ± 0.013),
♀ 2.06–2.27 (2.19 ± 0.014);
GD/EW: ♂ 0.68–0.82 (0.75 ± 0.006),
♀ 0.68–0.80 (0.76 ± 0.006).

Total size range in material examined: 1.80–2.85 mm.

Paratypes. ARIZONA: 46, Madera Canyon, Santa Rita Mts., Santa Cruz Co., Jan. 30, 1964, Lot 1282 JFL, ex *Trametes sepium* [CAS, FMNH, JFL, MCZ, UAZ, USNM]; 3, Rustler Park, 8 mi. W Portal, Cochise Co., Aug. 8, 1961, Lot 918 JFL, ex *Fomes cajanderi* [JFL]; 1, same locality and date, Lot 922 JFL, ex *Fomes cajanderi* [JFL]; 5, same locality, Apr. 9, 1964, Lot 1294 JFL (A. Raske, coll.), ex *Fomes cajanderi* [JFL].

Distribution. Montane regions of southern Arizona.

Host fungi. Fomes cajanderi [3(3)]; *Trametes sepium* [1(1)].

Discussion. Individuals of this species are characterized by the large size; elongate body form; coarse and dense punctation, which is single and confused on the elytra; vestiture of flattened, colorless bristles; broad, crenulate, lateral pronotal margins; and, elytra with a transverse impression. The two populations comprising the type series differ both in size and color pattern, but they are almost certainly conspecific. Two other specimens from the Chiricahua Mountains have been excluded from the type series although they may belong to this species. In one the TL is less than the average for the Madera Canyon series and the elytra are yellow with two distinct black spots, while in the other the size is still smaller, the elytra are uniformly brownish, and the body is more elongate than any specimen of *C. discolor* (EL/EW = 1.79). Also in this complex are specimens from northwest of Gómez Farías, Tamaulipas, Mexico, in which the elytra are maculate, and a series from Desierto de los Leones, Mexico D. F., in which the size and color are comparable to that in the Rustler Park population, but the bristles are much flatter, blunt, and wedgelike. It is obvious that further collecting will be necessary to understand this species complex.

Cis discolor is most closely related to *C. huachucae*, described from the Huachuca Mountains and known also from Texas and northern Mexico, but the latter is shorter and broader, with dual vestiture, four sharp tubercles on the frontoclypeal ridge of the male, and no abdominal fovea.

The name *discolor* is derived from the Latin word meaning variegated.

Cis dunedinensis Leng

Cis dunedinensis Leng, 1918: 207, replacement name for *Cis pusillus* Dury, 1917 (not Gorham, 1898).

Cis pusillus Dury, 1917: 10. Type locality: "Dunedin, Fla." Lectotype, ♂, Dury Coll., CIN.

Distribution. Florida and Cuba. Marginal records: FLORIDA: Dunedin, Pinellas Co.; Crescent City, Putnam Co.; Paradise Key, Dade Co.; Biscayne, Dade Co. CUBA: Cayamas.

Host fungi. Unknown.

Discussion. This species may be distinguished by the elongate form, dual and seriate elytral punctation, coarse and dense pronotal punctation, granulate and dull pronotal surface, dentate protibial apex, and vestiture of very short and fine hairs. Individuals of *Cis niedhauki* differ in having confused elytral punctation, finer and sparser pronotal punctation, expanded and rounded protibial apex, and the presence of tubercles on the vertex of the male. Specimens of various *Orthocis* may be confused with *C. dunedinensis*, but the protibial apex is narrowly rounded, the elytral suture is inflexed apically (Fig. 38), the antennae may be 9-segmented, and the frontoclypeal region is simple in the male. All other *Cis* with a vestiture of short, fine hairs have a much shorter and broader body form.

Cis dunedinensis appears to have no close affinities with other North American species, and its relatives are to be sought among the West Indian and Central American faunas.

Cis duplex Casey

Cis duplex Casey, 1898: 82. Type locality: "California." Holotype, ♂, Casey Coll., USNM.

Distribution. Mountains of the southwestern United States and Mexico, from southern California east to north-central New Mexico and south as far as Morelos and the southern tip of Baja California (Fig. 107). Marginal records: CALIFORNIA: 1.5 mi. NW Mt. Laguna, San Diego Co.; ARIZONA: Williams, Coconino Co.; NEW MEXICO: El Porvenir, San Miguel Co.; MORELOS: Cuautla; DURANGO: 37 mi. W El Salto; BAJA CALIFORNIA SUR: La Laguna, Sierra Laguna.

Host fungi. Polyporus anceps [6(5)];

Fomes officinalis [2(2)]; *Fomes pinicola* [2(2)]; *Ganoderma oregonense* [1(1)].

Discussion. This species may be distinguished by the moderately short and broad body form; single and confused elytral punctation; weakly carinate prosternum; narrow, crenulate lateral pronotal margins; coarse and dense pronotal punctation; and vestiture of short, stout bristles. The male bears two subtriangular plates on the frontoclypeal ridge and two more on the anterior edge of the pronotum. *Cis castlei* is similar in most of these characters, but is smaller in size (TL less than 1.4 mm), somewhat shorter and broader, with shinier pronotal surface, finer and sparser pronotal punctation, smooth lateral pronotal margins, and uniquely curved frontoclypeal plates in the male (Fig. 7). The species may be confused with *Plesiocis cribrum*, which is usually larger, with 9-segmented antennae and 4 teeth on the frontoclypeal ridge of the male.

Cis duplex is a distinct species that cannot be placed in any group at this time. It occurs at higher elevations in various mountain chains from southern California and New Mexico to central Mexico. It is associated with fungi on conifers and appears to prefer *Polyporus anceps*. Specimens collected at the southern tip of Baja California are from the Sierra Laguna, where *Pinus cembroides* is abundant, according to Goldman (1916). *C. duplex* has been collected with *Plesiocis cribrum* in southern California and New Mexico and appears to replace the latter in southern Arizona.

Cis ephippiatus Mannerheim

Cis ephippiatus Mannerheim, 1853: 234. Type locality: "... insula Sitkha." Types, Mannerheim Coll., MZUH ? (not located).

Cis ephippium Dalla Torre, 1911: 10. Incorrect subsequent spelling.

Xestocis moznettei Dury, 1917: 16. Type locality: "Corvallis, Oregon." Syntypes, ♂♂ ♀♀, Dury Coll., CIN. NEW SYNONYMY.

Distribution. Western North America, from southern Alaska south in California to Alameda County and the southern Sierra Nevada, and in the Rocky Mountain Region to northern Nevada and Colorado. Also known from Vermont, New Hampshire, and the Gaspé Penninsula of Quebec (Fig. 90). Marginal records: ALASKA: Sitka. BRITISH COLUMBIA: 5 mi. NE Field. WYOMING: Jenny Lake, 6800′, Grand Teton Nat. Park, Teton Co. COLORADO: 28 mi. NW Kremmling, Grand Co. NEVADA: 8 mi. SE Lamoille, Elko Co. CALIFORNIA: Huntington Lake, Fresno Co.; Berkeley, Alameda Co. NEW HAMPSHIRE: 1 mi. W Mt. Lafayette, Grafton Co. VERMONT: Big Equinox Mtn., Bennington Co. QUEBEC: Gaspé Co.

Host fungi. Ganoderma applanatum [10(8)]; *Fomes pinicola* [7(4)]; *Ganoderma brownii* [2(2)]; *Fomes annosus* [1]; *Polyporus betulinus* [1]; *Polyporus resinosus* [1]; *Polyporus sulphureus* [1]; *Poria versipora* [1].

Discussion. This species may be separated from most North American *Cis* by the short, stout body form, dual and confused or subseriate elytral punctation, distinctly carinate prosternum, and vestiture of moderately long, decumbent hairs. It differs from the closely related *C. biarmatus* in the finer and sparser pronotal punctation, smaller size, dark transverse macula on the elytra, and weakly produced pronotal apex in the male. *C. ephippiatus* was described by Mannerheim from Sitka, Alaska, and although the type has not been seen, it is fairly apparent from the description that it is the same species that Dury named *Xestocis moznettei* on the basis of Oregon specimens.

Like *Cis biarmatus*, *C. ephippiatus* is distributed along the Pacific Coast, but the latter also occurs in the Rocky Mountains and in the northeastern part of the continent (Figs. 90 and 102). Where the two species occur together, the former is found in conks of *Fomes pinicola*, while the latter is usually taken in *Ganoderma applanatum*. Outside of the range of *Cis*

biarmatus, however, *C. ephippiatus* commonly inhabits *Fomes pinicola*.

Cis festivulus NEW SPECIES

Holotype. ♂, DISTRICT OF COLUMBIA: Wash[in]gt[o]n, 15.8, Coll. Hubbard & Schwarz [USNM]. Allotype, ♀, MARYLAND: Blad[e]ns-b[ur]g, 13.7, Coll. Hubbard & Schwarz [USNM].

Male. Length 1.62 mm. Body 2.41 × as long as broad, strongly convex. Head and pronotum dark reddish brown. Elytra dark brown. Vestiture of short, stout, blunt, yellowish bristles, which vary in length. Vertex slightly convex; frontoclypeal ridge bearing 2 blunt, setiferous tubercles, which are separated by 1 basal width. Antennal segment III 1.40 × as long as IV. Pronotum 0.84 × as long as broad, widest at posterior third; anterior edge strongly rounded, simple; sides weakly rounded, the margins narrow and weakly crenulate, barely visible for their entire lengths from above; anterior angles not produced forward, almost right; disc strongly convex, even; surface finely granulate to smooth and shiny; punctures 0.22 × as large as scutellar base and separated by 0.33 to 0.50 diameter. Elytra 1.63 × as long as broad and 2.09 × as long as pronotum; sides subparallel, apices blunt; punctuation single and uniform; punctures coarser and denser than those on pronotum, each bearing a stout, blunt, yellowish bristle, which may be from 0.25 to 0.33 × as long as scutellar base. Prosternum slightly tumid; intercoxal process 0.30 × as wide as procoxal cavity, subparallel. Protibial apex narrowly rounded, with slight indication of outer tooth (Fig. 47). Metasternum 0.50 × as long as wide; suture 0.52 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.42 × as long as body of sternite, indistinctly margined, and located anterad of center. Sternite VIII as in Figure 65. Aedeagus as in Figures 72 and 84.

Female. Length 1.52 mm. Body 2.44 × as long as broad. Vertex as in male; frontoclypeal ridge simple. Pronotum 0.87 × as long as broad; anterior edge as in male. Elytra 1.64 × as long as broad and 2.05 × as long as pronotum. Protibia as in male. Sternite III without pubescent fovea.

Variation. Pronotum yellowish orange to dark brown, usually dark reddish brown. Elytra yellowish to dark brown, usually dark brown or yellowish brown. Size and dimensions vary as follows in a mixed series of three males and seven females:

TL mm: ♂ 1.50–1.62 (1.55 ± 0.047), ♀ 1.42–1.87 (1.57 ± 0.058);
TL/EW: ♂ 2.41–2.50 (2.45 ± 0.032), ♀ 2.33–2.44 (2.39 ± 0.015);
PL/PW: ♂ 0.83–0.86 (0.84 ± 0.011), ♀ 0.82–0.87 (0.86 ± 0.007);
EL/EW: ♂ 1.63–1.70 (1.67 ± 0.025), ♀ 1.59–1.65 (1.62 ± 0.009);
EL/PL: ♂ 2.09–2.21 (2.15 ± 0.043), ♀ 2.00–2.17 (2.09 ± 0.027);
GD/EW: ♂ 0.79–0.81 (0.80 ± 0.007), ♀ 0.79–0.84 (0.81 ± 0.008).

Paratype. MARYLAND: 4, Blad[e]ns-b[ur]g, 13.7, Coll. Hubbard & Schwarz [JFL, USNM]; 1, same locality, 20.7, Coll. Hubbard & Schwarz [USNM]; 1, Plummers I[sland], 15.7.07, E. A. Schwarz Collector [USNM]; 2, Sparrows Pt., VII–4–36, J. W. Green [CAS, JFL]. VIRGINIA: 1, Pennington Gap, 30.6 [USNM].

Distribution. Known only from Maryland, Virginia, and the District of Columbia.

Host fungi. Unknown.

Discussion. This species may be distinguished by the long and narrow, cylindrical body form, single and confused elytral punctation, vestiture of short, stout, yellowish bristles varying somewhat in length, and protibial apex narrowly rounded with only a slight indication of an outer tooth. In *Cis stereophilus* the elytral bristles are subseriate and more uniform in length, and the outer apical angle of the protibia is distinctly produced and angulate (Fig. 53). *Cis robiniophilus* differs from *C. festivulus*

in the somewhat finer punctures and distinctly dentate protibial apex (Fig. 49). In *Cis hystriculus* and *C. angustus* the bristles are longer and finer and the protibial apex is dentate or angulate.

Cis festivulus appears to be most closely related to the Palaearctic *Cis festivus* (Panzer) and its allies *C. vestitus* Mellié and *C. pygmaeus* (Marsham).

The name *festivulus* is derived from the Latin *festivus,* meaning joyous or merry, and the Latin diminutive suffix *-ulus* (refering to the similarity to *Cis festivus* and the smaller size).

Cis floridae Dury

Cis floridae Dury, 1917: 9. Type locality: "Key West, Florida." Lectotype, ♂, Dury Coll., CIN.

Distribution. Southern Georgia, Florida, and Cuba. Marginal records: GEORGIA: Savannah, Chatham Co. FLORIDA: Crescent City, Putnam Co.; Lignum Vitae Key, Monroe Co.; Key West, Monroe Co. CUBA: Cayamas.

Host fungi. Polyporus gilvus [1]; *Stereum papyrinum* [2].

Discussion. This species is characterized by the moderately short and broad, parallel-sided body form, coarse and dense punctation that is subseriate on the elytra, slightly tumid prosternum, dentate protibial apex, pronotum with distinct side margins and projecting anterior angles, and vestiture indistinctly dual, consisting of longer and shorter pale yellow bristles. The male bears two frontoclypeal plates, two pronotal horns, and an abdominal fovea that is located at the posterior end of sternite III. *Cis huachucae* and *C. cornutus* have dual vestiture, but both are larger (TL more than 2 mm) and somewhat shorter and broader (with the sides more rounded); in the former species the male lacks an abdominal fovea, while in the latter, the fovea is much smaller and more centrally located than in *C. floridae.* In *Cis crinitus* the form is similar but the vestiture is more distinctly dual and confused. *Cis quadridentatus* and *C. castlei* are also somewhat similar in general form, but the vestiture is single (consisting of short bristles), the prosternum is carinate, the elytral punctation is confused, and the abdominal fovea in the male is relatively smaller and more centrally located; *C. castlei* is also smaller (TL less than 1.4 mm) and the male of *C. quadridentatus* bears four teeth on the frontoclypeal ridge.

This is another West Indian species that does not extend further north than Florida and southern Georgia. It is not obviously related to any other species or group. There are too few records to speculate on host preference.

Cis fuscipes Mellié

Cis fuscipes Mellié, 1848: 271; Lawrence, 1967a: 1–14 (syn., dist., biol.). See Lawrence (1967a) for complete synonymy.

Distribution. Widespread and abundant throughout most of northern and eastern North America, ranging from northern British Columbia, south to Los Angeles County on the Pacific Coast, east across Canada to Nova Scotia, and south throughout eastern and midwestern United States (east of the 100th meridian) to southern Texas and Florida. Also known from Cuba, Madeira, and Hawaii. Marginal records in North America: BRITISH COLUMBIA: Terrace; NORTHWEST TERRITORY: Fort Smith; MANITOBA: Lake Dauphin; QUEBEC: Duparquet; NOVA SCOTIA: Truro; FLORIDA: Dunedin, Pinellas Co.; TEXAS: Brownsville, Cameron Co.; CALIFORNIA: Los Angeles Co. See Lawrence (1967a) for further remarks on distribution.

Host fungi. Polyporus versicolor [91 (48)]; *Polyporus hirsutus* [14(10)]; *Lenzites betulina* [12(3)]; *Polyporus pubescens* [5(1)]; *Polyporus conchifer* [3(2)]; *Ganoderma brownii* [1(1)]; *Polyporus adustus* [1(1)]; *Polyporus squamosus* [1(1)]; *Daedalea ambigua* [1]; *Fomes fraxinophilus* [1]; *Fomes pinicolor* [1]; *Ganoderma applanatum* [1]; *Polyporus subectypus* [1].

Discussion. This species is easily distinguished from other North American forms by the dual and subseriate elytral punctation, vestiture of short, erect bristles, large and stout body form with a shortened pronotum, wide lateral pronotal margins with strongly produced anterior angles, and impressed pronotal disc in the male. Most other species with dual and seriate elytral punctation are smaller, longer, and narrower, with different sexual characters and a relatively longer pronotum. *Cis cornelli* has a very short and broad body form with carinate prosternum and two long lateral horns on the clypeus of the male. *C. cornutus* is somewhat similar to *C. fuscipes* but is shorter and broader with finer, yellowish elytral bristles that fall into two size classes.

The distribution and biology of *Cis fuscipes* have been discussed in an earlier paper (Lawrence, 1967a). This is a very widespread and common species that is usually found in the fruiting bodies of *Polyporus versicolor* and its relatives. It is most closely related to *Cis seriatopilosus* Motschulsky and its allies from Siberia and Japan. Parthenogenesis in *Cis fuscipes* is discussed in detail in the paper cited above.

Cis hirsutus Casey

Cis hirsuta Casey, 1898: 83. Type locality: "Florida (Lake Worth)." Holotype, ♂, Casey Coll., USNM.

Distribution. Florida, the Bahamas, and the Greater Antilles (Fig. 95). Marginal records: FLORIDA: Enterprise, Volusia Co.; BAHAMAS: Matthew Town, Great Inagua Is.; PUERTO RICO: Arecibo; HAITI: Port au Prince; JAMAICA: Kingston; CUBA: Baños de San Vicente, Pinar del Rio.

Host fungi. Polyporus hydnoides [11 (3)]; *Fomes sclerodermeus* [5(1)]; *Ganoderma zonatum* [4(3)]; *Ganoderma* sp. [3(3)]; *Trametes corrugata* [3(2)]; *Polyporus fulvocinereus* [2(1)]; *Polyporus maximus* [2]; *Polyporus pinisitus* [2]; *Ganoderma lucidum* [1(1)]; *Polyporus pargamenus* [1(1)]; *Polyporus sector* [1 (1)]; *Auricularia polytricha* [1]; *Daedalea ambigua* [1]; *Ganoderma applanatum* [1]; *Polyporus iodinus* [1]; *Polyporus rigidus* [1]; *Polyporus supinus* [1].

Discussion. This species is fairly easy to recognize because of the short, broad form and vestiture of long and fine hairs, which are recurved at the apices. The male is characterized by two narrow, lateral horns on the frontoclypeal ridge and two approximate, flattened horns (deeply emarginate median process) on the apex of the pronotum. It is similar in general form and size to *Cis cornutus*, but in that species the vestiture is dual and seriate and consists of stouter bristles that are not recurved at the apices. In *C. crinitus* the vestiture is dual and the elytra are longer and narrower. *Cis hirsutus* differs from *C. rotundulus* in the larger size, more elongate metasternum, blunt elytral apices, and strongly tumid, but not carinate, prosternum. It differs from *C. ursulinus* in being somewhat larger, darker in color, with weakly crenulate lateral pronotal margins and a relatively larger abdominal fovea in the male.

Cis hirsutus belongs to a Neotropical species group that includes *C. crinitus*, *C. rotundulus*, *C. ursulinus*, *C. melliei* Coquerel, and a number of undescribed West Indian forms. The males of all of these species have two narrow, lateral, frontoclypeal horns and a median pronotal process that is usually emarginate (Fig. 41). It is quite possible that *C. hirsutus* is synonymous with *C. hirtellus* Jacquelin du Val (1857), described from Cuba. The type of the latter, however, could not be located, and the description is not sufficient for identification.

The distribution pattern suggests that *Cis hirsutus* evolved in the Greater Antilles and spread onto the mainland in relatively recent times. In Florida, the beetle breeds in several diverse fungi, but the preferred hosts throughout the range are *Polyporus*

hydnoides, *Fomes sclerodermeus*, and *Ganoderma zonatum*.

Cis horridulus Casey

Cis horridula Casey, 1898: 81. Type locality: "Pennsylvania (Westmoreland Co.)." Holotype, ♂, Casey Coll., USNM.

Cis mormonica Casey, 1898: 81. Type locality: "Utah (southwestern)." Holotype, ♂, Casey Coll., USNM. NEW SYNONYMY.

Distribution. Northern and montane regions of North America, except Pacific Coast, ranging from south-central British Columbia to the Atlantic Coast, south in the Rocky Mountain Region as far as the Chiricahua Mountains of southern Arizona, and along the Appalachian chain as far as western North Carolina (Fig. 91). Marginal records: BRITISH COLUMBIA: Trinity Valley; ONTARIO: near Kenora; MAINE: Paris, Oxford Co.; NORTH CAROLINA: Highlands, Macon Co.; NEW MEXICO: El Porvenir, San Miguel Co.; ARIZONA: Rustler Park, 2 mi. W Portal, Cochise Co.; UTAH: southwestern.

Host fungi. Polyporus pargamenus [13 (6)]; *Polyporus abietinus* [9(4)].

Discussion. This species may be distinguished by the long and narrow, subcylindrical body form; distinctly dual vestiture consisting of longer and shorter, erect and suberect, colorless bristles; dentate protibial apex; and, lack of an abdominal fovea in the male. Most other species with similar form have single vestiture, but if the bristles vary somewhat in size, they are much shorter than those of *C. horridulus*.

This is closely related to *Cis hystriculus* and to *Cis punctulatus* and its relatives in Eurasia. The Old World species most closely resembling *C. horridulus* is *C. tomentosus* Mellié, which is known from eastern Europe and the Caucasus region. *Cis horridulus* is distributed throughout most of the northern part of the continent (extending south at higher altitudes) where it breeds in the fruiting bodies of *Polyporus pargamenus* and the related *P. abietinus*. It is replaced on the Pacific Coast by *C. hystriculus* (*see* discussion on p. 463).

Cis huachucae Dury

Cis huachucae Dury, 1917: 8. Type locality: "Huachuca Mountains, Arizona. Miller Canyon." Holotype, ♂, Dury Coll., CIN.

Distribution. Southern Arizona, Texas, and northeastern Mexico. Marginal records: ARIZONA: Miller Canyon, Huachuca Mts., Cochise Co.; TEXAS: San Antonio, Bexar Co.; NUEVO LEÓN: Chipinque Mesa, Monterrey.

Host fungi. Unknown.

Discussion. Individuals of this species are relatively large (more than 2 mm), short and broad, with dual vestiture, consisting of shorter and longer, colorless bristles, pronotum with broad lateral margins and produced anterior angles, and male with two pronotal horns, four frontoclypeal teeth or tubercles, and no fovea on the abdomen. *Cis floridae* has similarly dual vestiture but is smaller and more parallel-sided, with subseriate, yellowish bristles, and with two frontoclypeal plates and an abdominal fovea in the male. In *Cis cornutus*, the elytral bristles are longer, finer, more distinctly dual, and yellowish, while the male possesses an abdominal fovea and subtriangular frontoclypeal plates. *Cis quadridentatus*, *C. vitulus*, and *C. congestus* are all similar with respect to general form and sexual ornaments on the head and pronotum of the male; in the first the size is smaller, the vestiture single, the prosternum carinate, and the abdomen foveate in the male, while in the last two forms the vestiture is single, the prosternum strongly tumid, and the body somewhat stouter and more convex.

Cis huachucae appears to be most closely related to *Cis discolor*, which differs in general form, being more elongate and parallel-sided, with vestiture that is not obviously dual. The frontoclypeal ridge in the male of *C. discolor* bears four rounded tubercles, an abdominal fovea is present

but small, and the aedeagus (Figs. 68 and 81) is similar to that of *C. huachucae*. Both species are part of a complex of undescribed forms from the mountains of Mexico.

Cis hystriculus Casey

Cis hystricula Casey, 1898: 82; Hatch, 1962: 250 (dist.). Type locality: "California (Lake Tahoe)." Holotype, ♂, Casey Coll., USNM.

Distribution. Western British Columbia, Washington, and Oregon, south through the Sierra Nevada and coastal California to the Transverse Ranges in the southern part of the state (Fig. 91). Marginal records: BRITISH COLUMBIA: Terrace; OREGON: Base of Mt. Pitt, Klamath Co.; CALIFORNIA: Ebbett's Pass, 8730′, Alpine Co.; 2 mi. NE Idyllwild, Riverside Co.

Host fungi. Polyporus abietinus [27(16)]; *Poria cinerascens* [1]; *Poria versipora* [1].

Discussion. This species is characterized by the long and narrow, subcylindrical body form; single, coarse and confused elytral punctation; vestiture of short, colorless bristles; distinctly dentate protibia; and, lack of an abdominal fovea in the male. The similar *C. angustus* has yellowish bristles, a blunt and angulate protibial apex, and an abdominal fovea in the male. *Cis horridulus* resembles this species, but differs in having longer elytral bristles that fall into two size classes (dual vestiture).

Cis hystriculus is most closely related to *Cis punctulatus* Gyllenhal from northern and central Europe, and the two may represent a single Holarctic species. The adults of *C. punctulatus* that I have examined are practically indistinguishable from those of the North American species and the larva illustrated by Saalas (1923) has urogomphi similar to those of *C. hystriculus* larvae. In addition, both species breed in the same fungi (*Polyporus abietinus*). The situation becomes more complicated, however, if one considers the other species in the complex, such as *Cis horridulus* in North America, *C. tomentosus* in Europe and probably several more species from Europe and Asia.

Cis hystriculus is restricted to the Pacific Coast. It appears to be distinct from *C. horridulus* throughout most of its range, but a population from Riverside County, California (San Jacinto Mountains), exhibits slightly longer bristles and a more convex body form, approaching the condition of *C. horridulus* specimens from the mountains of southern Arizona. In southern British Columbia, however, the two species occur within 120 miles of one another and remain quite distinct. Larvae and male genitalia of the two are similar and the host fungi are the same, so that it is quite possible that they represent geographic races. If so, a zone of intergradation may be found in British Columbia in the vicinity of the Lillooet and Fraser Rivers.

Cis krausi Dalla Torre

Cis krausi Dalla Torre, 1911: 13; Blatchley, 1928: 68 (dist.). Replacement name for *Cis bimaculatus* Kraus, 1908 (not Sharp, *in* Blackburn and Sharp, 1885; not Germain, 1855).

Cis bimaculatus Kraus, 1908: 76. Type locality: "Victoria, Tex." Holotype, ♀, USNM.

Cis duryi Leng, 1918: 207. Replacement name for *Cis bicolor* Dury, 1917 (not Sharp, 1879). NEW SYNONYMY.

Cis bicolor Dury, 1917: 7. Type locality: "Tybee Island, Ga." Lectotype, ♂, Dury Coll., CIN.

Distribution. Georgia, Florida, and southern Texas. Marginal records: GEORGIA: Tybee Is., Chatham Co. FLORIDA: Dunedin, Pinellas Co.; Coconut Grove (Biscayne), Dade Co.; Key West, Monroe Co. TEXAS: Columbus, Colorado Co.; Victoria, Victoria Co.; Brownsville, Cameron Co.

Host fungi. Unknown.

Discussion. This species is fairly easily distinguished by the very long and narrow body form (EL/EW greater than 1.60), dual and subseriate elytral punctation, pronotum with narrow lateral margins and coarse, dense punctures, yellowish color with black markings, and vestiture of short, colorless bristles. The male bears two setiferous tubercles on the clypeus and an abdominal fovea that is located at the

anterior end of sternite III. Among North American species, *Cis stereophilus* is similar in several respects, but in that species the form is not as elongate, the punctation is not dual, and the elytra, although bicolored, are not maculate. The coloration in *C. krausi* is usually as follows: pronotum yellow with a large blackish patch anterad of center; elytra yellow with an anterior black triangle and two round, posterior, black spots.

This species apparently belongs to a group of West Indian forms, including *Cis superbus* Kraus (Cuba), *C. atromaculatus* Pic (Guadeloupe), and several undescribed. *C. superbus* is smaller than *C. krausi* with coarser and denser pronotal punctation, more prominent frontoclypeal tubercles, and a more centrally located abdominal fovea in the male. *C. atromaculatus* differs mainly in color pattern.

Cis krausi has been collected beneath the bark of a grapefruit tree and has been beaten from oak limbs in Florida.

Cis laminatus Mellié

Cis laminatus Mellié, 1848: 318, pl. 11, fig. 16. Type locality: "Montrieux, près de Toulon" [France]. Lectotype, ♂, Marseul Coll., MNHN.

Distribution. In North America, known only from Albany, New York. In Europe, recorded from France, Italy, Germany, Poland, Czechoslovakia, and Hungary.

Host fungi. Recorded from *Polyporus volvatus.* In Europe the species has been collected in fungi growing on pine and spruce.

Discussion. This species may be distinguished by the short and broad body form; coarse and dense punctation, which is single and confused on the elytra; vestiture of short bristles; relatively small scutellum; slightly tumid prosternum; and, the simple pronotal apex and well-developed, trisinuate, clypeal plate in the male. *Cis vitulus* and *C. congestus* are similar, but both have broader lateral pronotal margins with produced anterior angles, strongly tumid prosternum, and two pronotal horns and no abdominal fovea in the male. *Plesiocis cribrum* resembles this species and also feeds on *Polyporus volvatus*, but the antennae in *P. cribrum* are 9-segmented and the clypeus of the male bears four sharp teeth.

Cis laminatus has been collected only once at Albany, New York, in 1920. It was probably introduced from Europe and may not be established in this country. The species appears to be most closely related to *Cis fissicornis* Mellié, which occurs throughout northern Eurasia.

Cis levettei (Casey), NEW COMBINATION

Xestocis levettei Casey, 1898: 85; Dury, 1917: 17 (dist.); Gibson, 1918: 113 (dist.); Weiss and West, 1920: 8 (dist., biol.); Hatch, 1924: 305 (dist., biol.); Peterson, 1957: 94–95, fig. C5–F, 192–193, fig. C54–G (larva); Hatch, 1962: 233 (dist.). Type locality: "... Indiana ..."? Holotype, ♂, Casey Coll., USNM.

Xestocis levellei Dalla Torre, 1911: 20. Incorrect subsequent spelling.

Eridaulus levettei (Casey),—Lawrence, 1965: 281; Pielou and Matthewman, 1966: 1310 (dist., biol.); Pielou and Verma, 1968: 1184 (dist., biol.).

Distribution. Widespread in North America east of the 100th meridian, from Newfoundland south to Alabama and west to Manitoba, Kansas, and Texas. In the western part of the continent, recorded from Alberta, northwestern Colorado, eastern British Columbia and Washington, and California (Fig. 88). Marginal records: WASHINGTON: Palouse, Whitman Co.; BRITISH COLUMBIA: Trinity Valley; ALBERTA: Edmonton; MANITOBA: Aweme; NEWFOUNDLAND: Bay of Islands; SOUTH CAROLINA: Yemassee, Beaufort Co.; ALABAMA: Mobile, Mobile Co.; KANSAS: Salina, Saline Co.; COLORADO: Steamboat Springs, Routt Co.; CALIFORNIA: (no specific locality). The California specimens, if they are not mislabeled, were probably collected in the northern part of the state or in the Sierra Nevada.

Host fungi. Ganoderma applanatum [67(36)]; *Fomes fomentarius* [17(11)];

Fomes pinicola [16(13)]; *Ganoderma tsugae* [9(4)]; *Fomes connatus* [4(3)]; *Polyporus versicolor* [3]; *Ganoderma lucidum* [2(1)]; *Polyporus betulinus* [2(1)]; *Polyporus pargamenus* [2]; *Polyporus pubescens* [2]; *Stereum ostrea* [2]; *Daedalea confragosa* [1(1)]; *Polyporus resinosus* [1(1)]; *Poria nigrescens* [1(1)]; *Fomes robiniae* [1]; *Lenzites betulina* [1]; *Polyporus adustus* [1]; *Polyporus squamosus* [1]; *Poria vitrea* [1].

Discussion. This species differs from most North American *Cis* by the short and broad body form, distinctly carinate prosternum, dual and confused elytral punctation, vestiture of very short, fine hairs, and by the protibia (Fig. 54), which is irregularly serrate along the outer edge and bears a stout tooth at the apex. *Cis maritimus* and *C. megastictus* are similar in most of the above characters, but the outer edge of the protibia is simple, the pronotal punctation is coarser and denser, the lateral edges of the pronotum are crenulate, and the elytral punctation is seriate.

Cis levettei belongs to the *Cis nitidus* group, which has recently received some attention by European workers (Lohse, 1964; Strand, 1965) and includes the following Palaearctic species: *C. glabratus* Mellié, *C. hanseni* Strand, *C. jacquemarti* Mellié, *C. lineatocribratus* Mellié, and *C. nitidus* (Fabricius). The serrations on the outer edge of the protibia are definitely present in *C. glabratus* and are weakly indicated in *C. jacquemarti.*

This species is fairly common throughout the eastern part of the continent but has been collected only a few times in the Northwest. It breeds in several fungi but appears to prefer *Ganoderma applanatum* and is often found in association with *Ceracis sallei* and the tenebrionid beetle *Bolitotherus cornutus* (Panzer) (Heatwole, 1968; Lawrence, 1967b; and Pace, 1967).

Cis maritimus (Hatch), NEW COMBINATION

Xestocis martimus Hatch, 1962: 233. Type locality: "Ocean Park, Ore." Holotype, ♂, Hatch Coll., UW.

Distribution. Pacific Coast from extreme northwestern California to southwestern British Columbia. Also known from south-central Manitoba (Fig. 88). Marginal records: BRITISH COLUMBIA: Bowser; MANITOBA: Dauphin; OREGON: Blue River, Lane Co.; CALIFORNIA: Crescent City, Del Norte Co.

Host fungi. Polyporus schweinitzii [2(1)]; *Fomes pini* [1(1)].

Discussion. Cis maritimus differs from most other North American *Cis* in the short and broad body form, distinctly carinate prosternum, protibial apex with an outer tooth, dual elytral punctation, and subtriangular frontoclypeal plates in the male. It may be distinguished from related species in the *Cis nitidus* group (*see* p. 438) by the vestiture of very short, fine hairs, the finely granulate and shiny pronotum, which is coarsely and densely punctate, the produced and acute anterior pronotal angles, and the longitudinally oval abdominal fovea in the male. It is most similar to *C. levettei* of eastern North America, but that species has much finer and sparser pronotal punctation, duller pronotal surface, and serrate outer protibial edge.

Except for the single Manitoba record, the species is known only from the narrow coastal strip extending from northwestern California to southern British Columbia. It has been found in two species of fungi having reddish brown fruiting bodies. In all of North America, this is the only ciid species with a northern distribution that breeds in this type of sporophore; other Ciidae inhabiting these fungi are southern species with Neotropical affinities.

Cis megastictus NEW SPECIES
Figure 39

Holotype. ♂, CALIFORNIA: Bucks Lake, Plumas Co., July 26, 1964, Lot 1307 J. F. Lawrence (J. Doyen, coll.), ex *Fomes*

annosus on *Abies concolor* [CAS]. Allotype, ♀, same data [CAS].

Male. Length 1.70 mm. Body 1.94 × as long as broad, strongly convex. Head and pronotum reddish brown, elytra yellowish brown. Vestiture of very short and fine yellowish hairs. Vertex with a slight median impression; frontoclypeal ridge bearing two broad, subtriangular plates, which are separated by 0.80 basal width. Antennal segment III 1.60 × as long as IV. Pronotum 0.75 × as long as broad, widest at posterior two-fifths; anterior edge strongly rounded, barely flattened at middle; sides weakly rounded, the margins broad and weakly crenulate, easily visible for their entire lengths from above; anterior angles distinctly produced forward, rounded; disc strongly convex, with a narrow, median furrow extending from posterior edge to anterior fifth; surface smooth and shiny; punctures 0.25 × as large as scutellar base and separated by 0.20 to 0.25 diameter. Elytra 1.26 × as long as broad and 1.83 × as long as pronotum; sides moderately rounded, apices subacute; punctation dual and seriate; megapunctures much coarser than those on pronotum, very dense and almost confluent within rows, shallow and nude; micropunctures located within and between rows, each bearing a fine, yellowish hair, which is about 0.17 × as long as scutellar base. Prosternum strongly tumid and carinate; intercoxal process 0.38 × as wide as a procoxal cavity, narrowing posteriorly. Protibia with outer apical angle produced and dentate (Fig. 55). Metasternum 0.50 × as long as wide; suture 0.28 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.43 × as long as body of sternite, indistinctly margined, and located about in center. Sternite VIII as in Figure 64. Aedeagus as in Figures 74 and 78.

Female. Length 1.92 mm. Body 2.03 × as long as broad. Vertex slightly convex; frontoclypeal ridge simple. Pronotum 0.77 × as long as broad; anterior edge strongly rounded, simple. Elytra 1.32 × as long as broad and 1.85 × as long as pronotum. Protibia as in male. Sternite III without pubescent fovea.

Variation. Pronotum yellowish orange to dark reddish brown, usually reddish brown. Elytra yellowish to dark brownish, usually yellowish brown. Frontoclypeal plates in smaller males shorter and more rounded. Size and dimensions vary as follows in a mixed series of six males and thirteen females from California:

TL mm: ♂ 1.70–2.07 (1.80 ± 0.057),
♀ 1.72–2.10 (1.94 ± 0.030);
TL/EW: ♂ 1.89–2.06 (1.96 ± 0.028),
♀ 1.97–2.03 (2.00 ± 0.006);
PL/PW: ♂ 0.71–0.81 (0.76 ± 0.014),
♀ 0.76–0.84 (0.80 ± 0.007);
EL/EW: ♂ 1.24–1.36 (1.30 ± 0.018),
♀ 1.26–1.37 (1.29 ± 0.011);
EL/PL: ♂ 1.76–1.92 (1.83 ± 0.021),
♀ 1.69–1.89 (1.78 ± 0.018);
GD/EW: ♂ 0.78–0.82 (0.79 ± 0.007),
♀ 0.79–0.83 (0.81 ± 0.004).

Paratypes. CALIFORNIA: 4, (no specific locality) [MCZ]; 8, Bucks Lake, Plumas Co., July 26, 1964, Lot 1307 JFL (J. Doyen, coll.), ex *Fomes annosus* on *Abies concolor* [CAS, JFL, USNM]; 1, same locality and date, Lot 1305 JFL (J. Doyen, coll.), ex *Polyporus sulphureus* [JFL]; 4, Calaveras [CIN]; 1, Plaskett Meadows, 6200′, Glenn Co., July 3, 1960, Lot 631 JFL, ex *Fomes pinicolor* [JFL].

Distribution. Known only from montane regions in northern California.

Host fungi. Fomes annosus [1(1)]; *Fomes pinicola* [1]; *Polyporus sulphureus* [1].

Discussion. This species is distinguished by the short and broad body form, carinate prosternum, distinctly dual and seriate elytral punctation, vestiture of short, yellowish hairs, broad lateral pronotal margins with produced and rounded anterior angles, coarse and dense pronotal punctation, and dentate protibial apex. *Cis cornelli*, *C.*

americanus, and *C. tridentatus* all differ in the vestiture of short, stout bristles. In *C. levettei*, the pronotal punctation is much finer and sparser, the lateral pronotal margins are narrower, and the outer edge of the protibia is serrate (Fig. 54). In *C. maritimus*, the anterior pronotal angles are acute, the elytral megapunctures are not as large, and the abdominal fovea in the male is oval, rather than circular.

This is another of the localized Pacific species in the *Cis nitidus* group (the others being *C. tridentatus*, *C. biarmatus*, and *C. maritimus*). It occurs at higher elevations in the conifer forests of northern California but is apparently absent from the immediate coast.

The name *megastictus* is derived from the Greek *megas*, meaning large, and the Greek *stiktos*, meaning punctured (referring to the size of the elytral megapunctures).

Cis miles (Casey), NEW COMBINATION

Xestocis miles Casey, 1898: 85; Blatchley, 1928: 68 (dist., biol.); Lawrence, 1967b: 98. Type locality: "Pennsylvania (Westmoreland Co.)." [St. Vincent]. Holotype, ♂, Casey Coll., USNM.

Distribution. Eastern North America, from New York south to central Florida and west to Arkansas and Louisiana. Marginal records: NEW YORK: Pompey, Onondaga Co.; FLORIDA: Highlands Hammock State Park, Highlands Co.; LOUISIANA: (no specific locality); ARKANSAS: Washington Co.

Host fungi. Polyporus versicolor [7(1)]; *Lenzites betulina* [3(2)]; *Polyporus subectypus* [1(1)]; *Polyporus supinus* [1]; *Stereum ostrea* [1].

Discussion. This species is characterized by the small size (TL usually less than 1.4 mm), short and broad body form, carinate prosternum, very fine and sparse punctation, vestiture of very short and fine hairs, and unique male armature consisting of two lateral horns on the pronotal apex and a single, median, forked horn on the frontoclypeal ridge (Fig. 6). *Cis levettei* and *C. maritimus* are both larger, with coarser and denser elytral punctation and different sexual characters.

Cis miles is the only North American member of a Neotropical species group which includes *C. tricornis* Gorham, *C. delicatulus* (Jacquelin du Val), and a number of undescribed forms. This species, like most other members of the group, feeds primarily on *Polyporus versicolor* and its relatives.

Cis niedhauki NEW SPECIES

Holotype. ♂, FLORIDA: Lignum Vitae Key, Monroe Co., May 28, 1968, Lot 2577 J. F. Lawrence, ex *Fomes robiniae* [MCZ No. 31690]. Allotype, ♀, same data [MCZ].

Male. Length 1.30 mm. Body 2.17 × as long as broad, moderately convex. Head reddish brown, pronotum and elytra blackish. Vestiture of very short and fine, pale hairs. Vertex with a deep circular median impression, a sharp conical posteromedian tubercle, and two diverging, anterolateral blunt horns, which are about 2.0 × as long as wide at base, 0.22 × as long as pronotum and separated by 3.5 basal widths; frontoclypeal ridge bearing two tubercles on each side, the lateral two smaller and rounded, the mesal two larger, conical, and separated by 3.0 basal widths (Fig. 5). Antennal segment III 1.70 × as long as IV. Pronotum 0.78 × as long as broad, widest at anterior two-fifths; anterior edge produced and emarginate, forming two small approximate tubercles; sides moderately rounded, the margins narrow and weakly crenulate, not visible for their entire lengths from above; anterior angles not produced forward, almost right; disc moderately convex, slightly impressed anteriorly; surface granulate and slightly shiny; punctures 0.20 × as large as scutellar base and separated by 0.75 to 1.25 diameters. Elytra 1.42 × as long as broad and 1.89 × as long as pronotum; sides weakly rounded, apices blunt; punctation dual and confused; megapunctures coarser and denser than those on pronotum; each micropuncture bearing a very fine,

erect pale hair, which is about 0.10 × as long as scutellar base. Prosternum moderately tumid and subcarinate; intercoxal process 0.37 × as wide as a procoxal cavity, narrowed posteriorly. Protibia with outer apical angle expanded and rounded. Metasternum 0.58 × as long as wide; suture 0.23 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea which is 0.25 × as long as body of sternite, indistinctly margined, and located slightly anterad of center.

Female. Length 1.15 mm. Body 2.09 × as long as broad. Vertex slightly convex; frontoclypeal ridge simple. Pronotum 0.79 × as long as broad; anterior edge moderately rounded. Elytra 1.41 × as long as broad and 2.07 × as long as pronotum. Protibia as in male. Sternite III without a pubescent fovea.

Variation. Pronotum yellowish orange to black, usually dark reddish brown or black. Elytra yellowish to black, usually black, occasionally somewhat reddish posteriorly. Median tubercle of vertex and frontoclypeal tubercles in smaller males obscure or absent and lateral horns short and rounded; in larger males the lateral horns are strongly diverging and may be 0.25 × as long as pronotum. Size and dimensions vary as follows in a series of 25 males and 22 females from Lignum Vitae Key, Monroe Co., Florida (Lots 2547, 2577, 2601, 2622):

TL mm: ♂ 1.00–1.35 (1.15 ± 0.016),
♀ 0.97–1.32 (1.18 ± 0.018);
TL/EW: ♂ 2.09–2.26 (2.17 ± 0.010),
♀ 2.04–2.30 (2.15 ± 0.013);
PL/PW: ♂ 0.75–0.83 (0.79 ± 0.004),
♀ 0.76–0.87 (0.80 ± 0.005);
EL/EW: ♂ 1.35–1.53 (1.42 ± 0.008),
♀ 1.35–1.53 (1.43 ± 0.009);
EL/PL: ♂ 1.81–2.08 (1.90 ± 0.014),
♀ 1.88–2.13 (2.00 ± 0.015);
GD/EW: ♂ 0.71–0.81 (0.77 ± 0.004),
♀ 0.73–0.83 (0.77 ± 0.006).

Paratypes. FLORIDA: 3, Lignum Vitae Key, Monroe Co., Mar. 15, 1968, Lot 2547 JFL (S. B. Peck, coll.), ex *Fomes robiniae* [MCZ]; 19, same locality, May 28, 1968, Lot 2577 JFL, ex *Fomes robiniae* [FMNH, JFL, USNM]; 14, same locality, June 1, 1968, Lot 2601 JFL, ex *Fomes robiniae* [JFL, MCZ]; 9, same locality, June 5, 1968, Lot 2622 JFL, ex *Fomes robiniae* [JFL, MCZ].

Distribution. Known only from Lignum Vitae Key, Florida.

Host fungi. Fomes robiniae [4(2)].

Discussion. This species, like *C. cayensis*, is unique in having the protibial apex expanded and rounded (but not spinose), and the head of the male bearing armature on the vertex as well as on the frontoclypeal ridge. *Cis cayensis* males lack the median tubercle and the lateral tubercles on the vertex are not as long; in addition the vestiture is entirely different. The elongate body form, dual elytral punctation, and vestiture of short, fine hairs distinguish this species from all North American *Cis*, with the exception of *C. dunedinensis*, in which the elytral punctation is seriate, the pronotum more parallel-sided with coarser and denser punctation, and the head of the male with two frontoclypeal teeth only. Smaller specimens of *Orthocis* species may resemble *C. niedhauki*, but they will usually differ in the narrowly rounded protibial apex (Fig. 45), the nature of the elytral apices (Fig. 38), the lack of head ornaments in the male, and often in the smaller size, maculate elytra, and 9-segmented antennae.

Cis niedhauki is most closely related to *C. cayensis*, also known from the Florida Keys. It has been collected only on Lignum Vitae Key but probably occurs in the Greater Antilles. A single specimen from Cayamas, Cuba, may belong to this species, but the pronotum is somewhat shinier with coarser and denser punctation, and the color is reddish. Further specimens must be examined. *Fomes robiniae* is the only known host, but the species may occur on other melanic conks.

The species has been named in honor of

Russell and Charlotte Niedhauk, caretakers of Lignum Vitae Key, to whom I am thankful for their generous hospitality.

Cis pistoria Casey

Cis pistoria Casey, 1898: 79; Gibson, 1915: 137 (dist.); Hatch, 1924: 305 (dist.). Type locality: "Rhode Island (Boston Neck)." Holotype, ♂, Casey Coll., USNM.

Distribution. Northeastern North America from central Alberta to southern Minnesota and southern New England (Fig. 104). Marginal records: ALBERTA: Lake George, near Busby; NORTHWEST TERRITORY: Fort Smith; MANITOBA: Dauphin Lake; QUEBEC: Duparquet; MAINE: Weld, Franklin Co.; RHODE ISLAND: Boston Neck, Newport Co.; MINNESOTA: Cedar Creek Forest, Anoka Co.

Host fungi. Polyporus versicolor [7(4)]; *Polyporus pubescens* [2(2)]; *Polyporus adustus* [1(1)]; *Polyporus hirsutus* [1(1)].

Discussion. Individuals of this species are relatively large (usually more than 2.2 mm) with dual and confused elytral punctation, very short, scalelike bristles and slightly tumid prosternum. Most forms with dual punctation are narrower and more elongate and do not have the broad lateral pronotal margins and somewhat uneven pronotal disc characteristic of this species. In *Cis americanus* and *C. tridentatus*, the size is smaller, the form more oval, the prosternum carinate, and the bristles longer. *Cis fuscipes* and *C. tetracentrum* are comparable in size and general form, but in the former the elytral punctation is subseriate, in the latter it is not dual, and in both the vestiture is longer.

Cis pistoria is the only New World member of a Palaearctic group, which includes *Cis boleti* (Scopoli), *C. rugulosus* Mellié, *C. micans* (Fabricius), *C. hispidus* Gyllenhal, and *C. villosulus* (Marsham). Like most of its Old World relatives, the North American species occurs primarily on *Polyporus versicolor* and its relatives. In the Northeast it is usually found in association with *Cis fuscipes* and *Octotemnus laevis*.

Cis quadridentatus (Dury), NEW COMBINATION

Xestocis quadridentatus Dury, 1917: 17. Type locality: "Framingham, Mass." Syntypes, Dury Coll., CIN.

Cis blatchleyi Dury, 1917: 7. Type locality: "Dunedin, Fla." Lectotype, ♀, Blatchley Coll., PURD. NEW SYNONYMY.

Distribution. Eastern North America from Vermont to Florida and west as far as south-central Texas. Marginal records: VERMONT: Pawlet, Rutland Co.; FLORIDA: Dunedin, Pinellas Co.; TEXAS: San Antonio, Bexar Co.; ILLINOIS: Sayer Bog, Volo, Lake Co.

Host fungi. Unknown.

Discussion. This species may be distinguished by the short and broad body form; carinate prosternum; shiny surface; coarse and dense punctation, which is single and confused on the elytra; vestiture of short bristles; moderately broad, crenulate, lateral pronotal margins; and, male with two pronotal horns, four frontoclypeal teeth, and an abdominal fovea. *Cis vitulus* and *C. congestus* are larger in size (TL usually more than 2.2 mm) with a raised lip on the lateral pronotal margins, the prosternum not carinate, and the male without an abdominal fovea. In *C. castlei* and *C. duplex*, the lateral pronotal margins are narrower, without produced anterior angles, and the clypeus of the male bears two subtriangular plates. *Plesiocis cribrum* is similar with respect to general form, vestiture, punctation, and male armature, but in that species the antennae are 9-segmented and the pronotal margins are much narrower.

This species does not appear to be closely related to any other New World species that I have studied, but it closely resembles *Cis indicus* Pic, *Cis subsquamosus* Scott, and several undescribed forms from the Oriental Region.

Cis quadridentatus has been collected from fungus fruiting bodies and has been

found under bark on several occasions, but it has not yet been associated with a particular fungus species.

Cis robiniophilus NEW SPECIES

Holotype. ♂, OHIO: Preston, Hamilton Co., Lot 1960 JFL (A. P. Morgan, coll.), ex *Polyporus robiniophilus* (herbarium specimen, C. G. Lloyd No. 41039) [USNM]. Allotype, ♀, same data [USNM].

Male. 1.70 mm. Body 2.43 × as long as broad, moderately convex. Head and pronotum reddish brown, elytra yellowish brown. Vestiture of short, stout, blunt, yellowish bristles. Vertex slightly concave; frontoclypeal ridge bearing two blunt setiferous tubercles that are separated by 2.5 basal widths. Antennal segment III 1.50 × as long as IV. Pronotum 0.88 × as long as broad, widest at middle; anterior edge strongly rounded, simple; sides strongly rounded, the margins narrow and distinctly crenulate, not visible for their entire lengths from above; anterior angles not produced forward, almost right; disc moderately convex, even; surface finely granulate and somewhat shiny; punctures 0.17 × as large as scutellar base and separated by 0.50 to 0.75 diameter. Elytra 1.61 × as long as broad and 1.96 × as long as pronotum; sides subparallel, apices blunt; punctation single and uniform; punctures slightly coarser and denser than those on pronotum, each bearing a stout, blunt, yellowish bristle, which is about 0.33 × as long as scutellar base. Prosternum slightly tumid; intercoxal process 0.30 × as wide as a procoxal cavity, parallel-sided. Protibia with outer apical angle strongly produced and dentate (Fig. 49). Metasternum 0.60 × as long as wide; suture 0.39 × as long as median length of sternum. Abdominal sternite III bearing a median, oval, pubescent fovea, which is 1.33 × as long as wide, 0.25 × as long as body of sternite, distinctly margined, and located anterad of center. Sternite VIII as in Figure 61. Aedeagus as in Figures 71 and 83.

Female. Length 1.67 mm. Body 2.48 × as long as broad. Vertex flattened; frontoclypeal ridge simple. Pronotum 0.88 × as long as broad; anterior edge as in male. Elytra 1.67 × as long as broad and 2.04 × as long as pronotum. Protibia with outer apical angle weakly dentate. Sternite III without pubescent fovea.

Variation. Pronotum yellowish orange to dark reddish brown, usually reddish brown. Elytra yellowish to yellowish brown, usually yellowish brown. Apex of pronotum in larger males weakly emarginate at midline. Size and dimensions vary as follows in a series of 13 males and 13 females from Preston, Ohio (Lot 1960 JFL):

TL mm: ♂ 1.50–1.75 (1.64 ± 0.021),
♀ 1.50–2.07 (1.73 ± 0.051);
TL/EW: ♂ 2.37–2.52 (2.45 ± 0.011),
♀ 2.44–2.61 (2.51 ± 0.012);
PL/PW: ♂ 0.84–0.92 (0.88 ± 0.008),
♀ 0.84–0.89 (0.87 ± 0.004);
EL/EW: ♂ 1.59–1.67 (1.62 ± 0.007),
♀ 1.65–1.78 (1.70 ± 0.010);
EL/PL: ♂ 1.91–2.05 (1.97 ± 0.014),
♀ 2.00–2.16 (2.09 ± 0.017);
GD/EW: ♂ 0.73–0.79 (0.76 ± 0.005),
♀ 0.76–0.82 (0.78 ± 0.005).

Total size range in material examined: 1.30–2.10 mm.

Paratypes. KENTUCKY: 3, Crittenden, Grant Co., Aug. 3, 1907, Lot 1962 JFL (C. G. Lloyd, coll.), ex *Polyporus robiniophilus* (herbarium specimen, C. G. Lloyd No. 41030) [JFL]; MARYLAND: 3, Plummers Island, Montgomery Co., April 29, 1905, Lot 1961 JFL (H. S. Barber, coll.), ex *Polyporus robiniophilus* (herbarium specimen, C. G. Lloyd No. 39777) [JFL, USNM]; OHIO: 65, Preston, Hamilton Co., Lot 1960 JFL (A. P. Morgan, coll.), ex *Polyporus robiniophilus* (herbarium specimen, C. G. Lloyd No. 41039 [FMNH, JFL, MCZ, USNM].

Distribution. Known only from Maryland, Kentucky, and Ohio.

Host fungi. Polyporus robiniophilus [3(1)].

Discussion. This species is characterized by the long and narrow body form; vesti-

ture of short, stout bristles; single and confused elytral punctation, which is relatively fine and sparse; narrow, crenulate, lateral pronotal margins; and, distinctly dentate protibial apex. In *Cis festivulus*, the protibial apex is rounded and the elytral bristles are uneven in length. *C. stereophilus* is somewhat shorter and broader with subseriate elytral punctation. In *Cis creberrimus* the body is more flattened and the elytral bristles longer and acute. Individuals of *Cis hystriculus* and *C. angustus* have coarser and denser punctation and longer bristles. In *Dolichocis indistinctus*, the body is long and narrow and the bristles short and stout, but in that species the antennae are 9-segmented and the protibial apex rounded.

Cis robiniophilus is a member of the *Cis fagi* group, which includes the North American *C. angustus* and the Palaearctic *Cis fagi* Waltl and *C. castaneus* Mellié.

The name *robiniophilus* is derived from *Robinia*, the generic name for certain of the locust trees, and the Greek *phileo*, to be fond of (referring to the occurrence of this beetle in fruiting bodies of *Polyporus robiniophilus*).

Cis rotundulus NEW SPECIES
Figure 41

Holotype. ♂, SOUTH CAROLINA: Walterboro, Colleton Co., II–15–64, H. Blocker [MCZ No. 31692]. Allotype, ♀, same data [MCZ].

Male. Length 1.50 mm. Body 1.93 × as long as broad, strongly convex. Head and pronotum dark reddish, elytra black. Vestiture of long, fine, recurved, yellowish hairs. Vertex slightly convex; frontoclypeal ridge bearing 2 lateral horns, which are about 3.0 × as long as wide at base, 0.20 × as long as pronotum, and separated by 4.0 basal widths, with lateral and mesal edges subparallel and apices slightly converging. Antennal segment III 1.60 × as long as IV. Pronotum 0.83 × as long as broad, widest at posterior third; anterior edge strongly produced and emarginate, forming 2 approximate, sharp, subtriangular horns, which are 0.10 × as long as pronotum; sides strongly rounded, the margins narrow and distinctly crenulate, not visible for their entire lengths from above; anterior angles barely produced forward, subacute; disc strongly convex, even; surface smooth and shiny; punctures 0.30 × as large as scutellar base and separated by 0.25 to 0.50 diameter. Elytra 1.16 × as long as broad and 1.50 × as long as pronotum; sides strongly rounded, apices acute; punctation single and confused; punctures coarser than and not as dense as those on pronotum, each puncture bearing a fine, recurved, yellowish hair, which is about 2.0 × as long as scutellar base. Prosternum strongly tumid and carinate; intercoxal process 0.40 × as wide as a procoxal cavity, parallel-sided. Protibia with outer apical angle strongly produced and dentate (Fig. 51). Metasternum 0.35 × as long as wide; suture 0.20 × as long as median length of sternum. Abdominal sternite III bearing a median, raised, circular, pubescent fovea, which is 0.33 × as long as body of sternite, distinctly margined, and located posterad of center.

Female. Length 1.50 mm. Body 1.82 × as long as broad. Vertex as in male; frontoclypeal ridge simple. Pronotum 0.73 × as long as broad; anterior edge strongly rounded, simple. Elytra 1.15 × as long as broad and 1.73 × as long as pronotum. Protibial apex only slightly produced, angulate or weakly dentate. Sternite III without a pubescent fovea.

Variation. Pronotum yellowish orange to dark reddish, usually reddish. Elytra yellowish to black, usually dark brown or black. Frontoclypeal ridge on smaller males bearing 2 short, subtriangular processes; in larger males these are represented by longer, narrow horns, which may be 0.33 × as long as pronotum. Anterior edge of pronotum in small males barely produced and emarginate, forming 2 small tubercles; pronotal horns in larger specimens may be 0.20 × as long as pronotum. Size and di-

mensions vary as follows in a series of 18 males and 14 females from Walterboro, South Carolina:

TL mm: ♂ 1.27–1.77 (1.43 ± 0.028),
♀ 1.12–1.57 (1.37 ± 0.034);
TL/EW: ♂ 1.76–1.97 (1.87 ± 0.013),
♀ 1.78–1.93 (1.84 ± 0.011);
PL/PW: ♂ 0.74–0.91 (0.82 ± 0.011),
♀ 0.73–0.81 (0.78 ± 0.006);
EL/EW: ♂ 0.07–1.20 (1.14 ± 0.007),
♀ 1.12–1.21 (1.17 ± 0.008);
EL/PL: ♂ 1.44–1.75 (1.55 ± 0.021),
♀ 1.67–1.87 (1.77 ± 0.016);
GD/EW: ♂ 0.71–0.79 (0.75 ± 0.005),
♀ 0.70–0.77 (0.74 ± 0.006).

Total size range in material examined: 1.10–1.78 mm.

Paratypes. ALABAMA: 1, Mobile, II–17–12, H. P. Löding [CIN]; 1, same locality, 3–4–12 [CIN]; 3, Oak Grove, 17.6, Collection H. Soltau [USNM]. ARKANSAS: 1, Pine Bluff, 23.11, Collection H. Soltau [USNM]. FLORIDA: 3, Crescent City, Coll. Hubbard & Schwarz [USNM]; 2, Enterprise, May 27 [MCZ]; 2, same locality, 27.5, Hubbard & Schwarz [USNM]; 1, same locality, 28.5, Hubbard & Schwarz [USNM]; 2, 4 mi. SE Lake Placid, Highlands Co., June 25, 1965, Lot 1516 JFL, ex *Polyporus iodinus* [JFL]; 2, St. Nicholas [USNM]. GEORGIA: 1, Savannah, Chatham Co., Apr. 6, 1966, Lot 1810 JFL (H. and A. Howden, coll.), ex *Polyporus gilvus* [JFL]. LOUISIANA: 2, Fontainebleau State Park, St. Tammany Par., June 19, 1965, Lot 1456 JFL, ex *Ganoderma lucidum* [JFL]. MISSISSIPPI: 2, Hancock Co., 23.8, Hubbard & Schwarz [USNM]; 2, "Rose's Bluff," Natchez Trace, Madison Co., 25–III–1959, cortical [USNM]. NORTH CAROLINA: 5, Atlantic Beach, Carteret Co., May 19, 1966, Lot 1885 JFL (Carl Parsons, coll.), ex *Stereum ostrea* [JFL]; 2, Bladen Co., 2–V–1964, Jim F. Cornell [JFC]; 2, Moore Co., VI–1–64, J. F. Cornell [JFC]; 2, Raleigh, 25–IV–1964, Jim F. Cornell [JFC]; 2, same locality, IX–8–64, J. F. Cornell [JFC]; 15, Sampson Co., 2–V–1964, J. F. Cornell [JFC, JFL]; 1, Statesville, Tredell Co., May 25, 1966, Lot 1911 JFL (Carl Parsons, coll.), ex *Ganoderma curtisii* [JFL]; 2, same locality and date, Lot 1912 JFL (Carl Parsons, coll.), ex *Ganoderma curtisii* [JFL]. SOUTH CAROLINA: 30, Walterboro, Colleton Co., II–15–64, H. D. Blocker [FMNH, JFC, JFL, MCZ, USNM].

Distribution. Southeastern United States, from North Carolina to Florida and west to Arkansas and Louisiana (Fig. 89).

Host fungi. Ganoderma curtisii [2]; *Ganoderma lucidum* [1]; *Polyporus gilvus* [1]; *Polyporus iodinus* [1]; *Stereum ostrea* [1].

Discussion. This species resembles *Cis hirsutus* and *C. ursulinus* in the type of vestiture and frontoclypeal horns of the male. It differs from both in the shorter and broader form with narrowed elytral apices, reduced metasternum, and sharply carinate prosternum. In addition, *C. ursulinus* is usually more reddish in color with somewhat finer punctation, and *C. hirsutus* is larger with somewhat denser punctation.

Cis rotundulus is restricted to the southeastern United States and is not known from the West Indies. The narrowed elytral apices and shortened metasternum indicate that the species may be evolving in the direction of flightlessness; the hindwings are slightly reduced with a truncate apex. The distribution pattern suggests that *C. rotundulus*, like *C. ursulinus*, may have evolved on the mainland rather than in the Greater Antilles.

Cis stereophilus NEW SPECIES
Figure 40

Holotype. ♂, NORTH CAROLINA: Atlantic Beach, Carteret Co., May 19, 1966, Lot 1887 J. F. Lawrence (Carl Parsons, coll.), ex *Stereum* sp. on hardwood branch [MCZ No. 31693]. Allotype, ♀, same data [MCZ].

Male. Length 1.42 mm. Body 2.28 × as long as broad, moderately convex. Head and pronotum reddish orange, elytra blackish brown anteriorly, yellowish brown

posteriorly. Vestiture of short, stout, blunt, yellowish bristles. Vertex flattened, with slight median impression; frontoclypeal ridge bearing 2 sharp tubercles that are separated by about 2 basal widths. Antennal segment III 1.70 × as long as IV. Pronotum 0.87 × as long as broad, widest at posterior third; anterior edge strongly rounded, barely emarginate at midline; sides weakly rounded, the margins narrow and distinctly crenulate, not visible for their entire lengths from above; anterior angles barely produced forward, subacute; disc strongly convex, even; surface finely granulate and shiny; punctures 0.50 × as large as scutellar base and separated by 0.20 to 0.33 diameter. Elytra 1.44 × as long as broad and 1.71 × as long as pronotum; sides weakly rounded, apices blunt; punctation single and subseriate; punctures about as large and dense as those on pronotum, each bearing a stout, blunt, yellowish bristle, which is about 0.20 × as long as scutellar base. Prosternum slightly tumid; intercoxal process 0.22 × as wide as a procoxal cavity, narrowing posteriorly. Protibia with outer apical angle slightly produced and weakly dentate (Fig. 53). Metasternum 0.50 × as long as wide; suture 0.30 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.30 × as long as body of sternite, distinctly margined, and located anterad of center. Sternite VIII as in Figure 66. Aedeagus as in Figures 77 and 82.

Female. Length 1.30 mm. Body 2.17 × as long as broad. Vertex as in male; frontoclypeal ridge simple. Pronotum 0.84 × as long as broad; anterior edge strongly rounded, simple. Elytra 1.42 × as long as broad and 1.89 × as long as pronotum. Protibia with outer apical angle slightly produced and angulate. Sternite III without pubescent fovea.

Variation. Pronotum yellowish orange to black, usually reddish orange. Elytra yellowish to black, usually blackish brown anteriorly and yellowish brown posteriorly. Almost all specimens examined were either bicolored with a paler pronotum or tricolored with the elytra yellowish posteriorly; in only one specimen was the coloration uniform. Frontoclypeal tubercles in males vary somewhat in size. Anterior edge of pronotum simple and rounded in smaller males, distinctly emarginate in larger specimens. Size and dimensions vary as follows in a mixed series of 13 males and 21 females from various parts of the Atlantic Coast:

TL mm: ♂ 1.20–1.50 (1.34 ± 0.025),
♀ 1.17–1.57 (1.37 ± 0.026);
TL/EW: ♂ 2.22–2.32 (2.27 ± 0.010),
♀ 2.17–2.42 (2.27 ± 0.014);
PL/PW: ♂ 0.84–0.92 (0.87 ± 0.006),
♀ 0.83–0.95 (0.87 ± 0.006);
EL/EW: ♂ 1.43–1.52 (1.46 ± 0.007),
♀ 1.42–1.58 (1.50 ± 0.010);
EL/PL: ♂ 1.71–2.00 (1.82 ± 0.021),
♀ 1.75–2.06 (1.93 ± 0.016);
GD/EW: ♂ 0.74–0.84 (0.77 ± 0.008),
♀ 0.71–0.81 (0.76 ± 0.006).

Total size range in material examined: 1.05–1.60 mm.

Specimens from northern Mexico differ from those of the eastern United States in being consistently smaller and darker in color and in having less well-developed frontoclypeal tubercles in the male.

Paratypes. DISTRICT OF COLUMBIA: 3, Washington, 24.5, Coll. Hubbard & Schwarz [USNM]. FLORIDA: 2, Torreya State Park, Liberty Co., Apr. 8, 1969, Lot 2712 JFL (S. B. Peck, coll.), ex *Stereum ostrea* [JFL]. MARYLAND: 1, Blad[e]nsb[er]g, 13.7, Coll. Hubbard & Schwarz [USNM]; 1, same locality, 20.7, Coll. Hubbard & Schwarz [USNM]. MASSACHUSETTS: 3, Naushon Is., Elizabeth Islands, May 25, 1965, Lot 1671 JFL (Carl Parsons, coll.), ex *Stereum ostrea* [JFL, MCZ]; 2, Vineyard Haven, Martha's Vineyard, Dukes Co., May 20, 1965, Lot 1684 JFL (Carl Parsons, coll.), ex *Stereum ostrea* [MCZ];

1, Woods Hole, Barnstable Co., June 5, 1966, Lot 1812 JFL, ex *Stereum ostrea* [JFL]; 1, same locality and date, Lot 1813 JFL, ex *Stereum ostrea* [JFL]. NEW JERSEY: 2, Anglesea, 7.3, Coll. Hubbard & Schwarz [USNM]; 3, same locality, 24.7, Liebeck Collection [MCZ]. NORTH CAROLINA: 6, Atlantic Beach, Carteret Co., May 19, 1966, Lot 1887 JFL (Carl Parsons, coll.), ex *Stereum* sp. [JFL, MCZ]; 1, Highlands, Macon Co., June 16, 1962, Lot 146 R. C. Graves, ex *Stereum fasciatum* [= *S. ostrea*] [JFL]; 1, nr. Magnolia, Duplin Co., V–26–64, J. Cornell & P. Mampe [JFC]; 5, Raleigh, IX–27–64, J. F. Cornell, coll. [JFC, JFL]; 1, Thompson River Gorge, Transylvania Co., May 17, 1967, Lot 2498 JFL (Carl Parsons, coll.), ex *Stereum ostrea* [JFL]; 24, same locality, May 19, 1967, Lot 2511 JFL (Carl Parsons, coll.), ex *Stereum ostrea* [CAS, FMNH, JFL, MCZ]; 1, Tryon, 1784c Hopk. U. S., *Quercus*, W. F. Fiske [USNM]. NUEVO LEÓN: Chipinque Mesa, 5400′, Monterrey, June 23, 1969, Lot 3050 JFL (S. & J. Peck, coll.), ex *Stereum* sp. [JFL, MCZ]. PENNSYLVANIA: 1, Wisahick[o]n Cr., 7.24, Liebeck Collection [MCZ]; 1, Ches[t]-n[u]t H[i]ll, VII.31, Liebeck Collection [MCZ].

Distribution. Eastern coast of the United States, from southern Massachusetts to northern Florida, and northeastern Mexico.

Host fungi. Stereum ostrea [10(5)]; *Stereum* sp. [2(2)].

Discussion. This species is characterized by the small size, moderately elongate form, single, subseriate, elytral punctation with very short and broad, blunt bristles, dentate or angulate protibial apex, coarsely and densely punctate pronotum with narrow lateral edges, and the normally light colored pronotum and bicolored elytra. The male has two tubercles on the frontoclypeal ridge. The species resembles *C. krausi* in several respects, but may be distinguished from it by the shorter body form (EL/EW less than 1.60), the single and more regular elytral punctation, and the coloration. *C. subtilis* differs from *C. stereophilus* in having distinctly dual elytral punctation, colorless bristles, finer and sparser pronotal punctation, uniform coloration, and in the absence of a pubescent fovea on the abdomen of the male. *C. festivulus* has a similar body form and blunt yellowish elytral bristles, but the punctation is confused, the bristles uneven, and the protibial apex rounded. *C. robiniophilus* also has similar body form and vestiture, but the pronotal punctation is much finer and sparser and the elytral punctures are uniform. Elytral bristles in *C. hystriculus* and *C. angustus* are not as short and broad and are more sparsely distributed; in addition, the former is much larger in size and lacks an abdominal fovea in the male, and the latter species is characterized by having sparser pronotal punctation.

In collections, individuals have been identified as *C. julichi* Dury, but the type of *julichi* is conspecific with *C. subtilis* Mellié.

This is the only species of North American Ciidae that is restricted to fungi of the genus *Stereum*, particularly *S. ostrea*. Fruiting bodies of this fungus are very thin and become woody with age, yet several insects are able to feed within the tissue. *C. stereophilus* definitely breeds in the fungus, and larvae have been taken on several occasions. It is rather rare in collections, but this is almost certainly due to the peculiar habitat. Specimens are known only from the Atlantic Coast and parts of northeastern Mexico, but it is likely that the species occurs throughout the eastern part of North America.

At the present time this species cannot be placed in any group, although it may be related to *C. krausi* and its relatives. It does not appear to have any relatives in the Palaearctic Region, and may be a northern representative of a Neotropical complex.

The name *stereophilus* is derived from the the basidiomycete genus *Stereum* and the Greek *phileo*, meaning to be fond of

(referring to the preference of these beetles for *Stereum* fruiting bodies).

Cis striolatus Casey

Cis striolata Casey, 1898: 79. Type locality: "Colorado (Salida)." Holotype, ♀, Casey Coll., USNM.

Cis fraterna Casey, 1898: 80. Type locality: "Utah (southwestern)." Holotype, ♂, Casey Coll., USNM. NEW SYNONYMY.

Cis macilenta Casey, 1898: 80. Type locality: "California (Lake Tahoe)." Holotype, ♀, Casey Coll., USNM. NEW SYNONYMY.

Cis versicolor Casey. — Hatch, 1962: 231. Misidentification.

Distribution. Widespread across the northern part of North America from the northern part of the Mackenzie District, Northwest Territory (not on map), to Nova Scotia, south into the Sierra Nevada and Rocky Mountains, in the Midwest as far as Kansas, and on the Atlantic coast as far as northern Florida (Fig. 101). Marginal records: NORTHWEST TERRITORY: Aklavik, Mackenzie District; BRITISH COLUMBIA: Midday Valley, Merritt; QUEBEC: Gaspé; NOVA SCOTIA: Portaupique; VIRGINIA: Mt. Vernon, Fairfax Co.; FLORIDA: Panama City, Bay Co.; KANSAS: Lawrence, Douglas Co.; COLORADO: Salida, Chaffee Co.; UTAH: Southwestern; CALIFORNIA: 21 mi. NE Strawberry, Toulumne Co.

Host fungi. Polyporus abietinus [6(2)]; *Polyporus pargamenus* [4(3)]; *Daedalea unicolor* [1(1)]; *Polyporus hirsutus* [1(1)].

Discussion. Individuals of this species may be distinguished from most other *Cis* by the narrow and elongate, somewhat depressed form, dual and distinctly seriate elytral punctation, vestiture of short, stout bristles, angular or dentate protibial apex, and slightly produced anterior pronotal angles. *Cis fuscipes* is larger and broader, with the anterior pronotal angles distinctly produced and the pronotal disc impressed anteriorly in the male. *C. cayensis* is smaller in size, with dual vestiture (visible only under higher magnification) and two tubercles on the vertex in the male. *C. striolatus* differs from *C. versicolor* in having a darker, duller, and more distinctly granulate pronotum with narrower lateral margins, the frontoclypeal ridge bituberculate in the male, and the abdominal fovea smaller. The species is most similar to *Cis tristis*, from which it differs by having a more sparsely punctate and coarsely granulate pronotum, yellowish elytral bristles, a much smaller abdominal fovea and different male genitalia (Fig. 70, cf. Fig. 69).

Cis striolatus appears to be most closely related to *Cis striatulus* Mellié from the Palaearctic Region and to *C. versicolor* from western North America. It is possible that *C. striatulus* and *C. striolatus* represent a single Holarctic species.

Cis striolatus, *C. fraterna*, and *C. macilenta*, all described by Casey, were based on a single female from Colorado, a pair from southwestern Utah, and a female from Lake Tahoe, California, respectively. Characters used to separate the three (impressions at the apical angles of the pronotum and the nature of the outer apical angle of the protibia) vary considerably within one series. The extent to which the apex of the protibia is produced, thereby forming a tooth, varies between the sexes, and the impressions at the anterior pronotal angles are found only in some larger males, in which the pronotum is laterally expanded.

The distribution pattern is a typically northern one, and the species is often associated with conifer forests. In the southeastern part of its range, *C. striolatus* is sympatric with *C. tristis*. *C. striolatus* normally feeds on the fruiting bodies of *Polyporus abietinus* and the related *P. pargamenus*, whereas *C. tristis* usually occurs on *P. versicolor* and its relatives. In western North America, *C. striolatus* may be sympatric with the related *C. versicolor;* the latter is associated with hardwoods and feeds on fruiting bodies of the *P. versicolor* group, while the former occurs on *P. abietinus* on conifers.

Cis subfuscus Gorham

Cis subfuscus Gorham, 1886: 357. Type locality: "Mexico, Cordova, Veracruz." Holotype, ♀, BMNH.

Distribution. Central Texas south along the eastern coast of Mexico to Veracruz. Marginal records: TEXAS: College Station, Brazos Co.; HIDALGO: 7 mi. SW Jacala; PUEBLA: 29 mi. E Xicotepec; VERACRUZ: Veracruz.

Host fungi. Polyporus hirsutus [2(1)]; *Panellus stypticus* [1(1)]; *Daedalea elegans* [1]. Also recorded from *Polyporus sanguineus.*

Discussion. This species is similar to *C. versicolor,* but the body is shorter and broader, the size is usually smaller, the elytral punctation is coarser and denser, and the male bears two tubercles on the frontoclypeal ridge. It also resembles *Cis pusillus* Gorham, described from the West Indies but occurring also in Brazil.

Cis subtilis Mellié

Cis subtilis Mellié, 1848: 353. Type locality: "Amérique boréale." Holotype, ♂, Marseul Coll., MNHN.

Cis confusus Blatchley, 1910: 899. Type locality: "... Perry ..." [Co., Indiana]. Lectotype, Blatchley Coll., PURD. NEW SYNONYMY.

Cis julichi Dury, 1917: 7. Type locality: "New York City." Holotype, ♂, Dury Coll., CIN. NEW SYNONYMY.

Cis wenzeli Dury, 1917: 8; Weiss and West, 1920: 8 (dist., biol.). Type locality: "Del.-[aware] Co. Penn." Holotype, Dury Coll., CIN. NEW SYNONYMY.

Distribution. Eastern North America, from New Hampshire south to Florida and west to Illinois, Arkansas, and eastern Texas (Fig. 106). Marginal records: NEW HAMPSHIRE: 5 mi. N Wilton, Hillsboro Co.; FLORIDA: 4 mi. NW Copeland, Collier Co.; TEXAS: Houston, Harris Co.; ARKANSAS: (southwest); ILLINOIS: Olive Branch, Alexander Co.

Host fungi. Polyporus pargamenus [33 (11)]; *Polyporus abietinus* [7(1)]; *Polyporus sector* [5(4)]; *Ganoderma applanatum* [1]; *Polyporus adustus* [1]; *Polyporus gilvus* [1]; *Stereum ostrea* [1].

Discussion. This species may be distinguished from other North American *Cis* by the relatively long and narrow body form, dual and confused elytral punctation, and vestiture of short, stout, colorless bristles. It differs from the closely related *C. acritus* by having two frontoclypeal tubercles and no abdominal fovea in the male. Within its range it may be confused with *C. tristis,* which differs in having the elytral punctation seriate. In *Cis stereophilus,* the elytral punctation is single and the bristles yellowish, while in *C. krausi* the elytra are more elongate (EL/EW greater than 1.60) and maculate.

Cis subtilis is fairly common throughout the eastern United States, where it breeds on the fruiting bodies of *Polyporus pargamenus* and its relatives. If one ignores secondary sexual characters, the species is barely distinguishable from the western *C. acritus* (*see* p. 443). The species has no close relatives in Europe and similar forms occur in the West Indies and Mexico.

Cis tetracentrum Gorham

Cis tetracentrum Gorham, 1886: 357. Type locality: "...Northern Sonora." Lectotype, ♂, BMNH.

Cis arizonae Dury, 1917: 5. Type locality: "Madera Canyon, Santa Rita Mountains, Arizona." Holotype, Wenzel Coll.? Paratypes, ♂♀, Dury Coll., CIN. NEW SYNONYMY.

Distribution. Mountains of southern California and Arizona and south through the Mexican highlands as far as central Veracruz (Fig. 94). Marginal records: CALIFORNIA: (no specific locality); ARIZONA: Graham Mt., Graham Co.; VERACRUZ: Orizaba; MEXICO: Toluca; DURANGO: 14 mi. SW El Salto; SONORA: (northern).

Host fungi. Polyporus versicolor [5(4)].

Discussion. This is the largest of the North American Ciidae, individuals averaging 3 mm in length. The form is somewhat elongate, the elytral punctation is moder-

ately coarse, dense, single, and confused, the vestiture consists of relatively long and fine bristles, the lateral pronotal margins are broad with a raised lip and barely crenulate edge, the anterior pronotal angles are produced and rounded, the prosternum is slightly tumid, and the male bears two stout pronotal horns, two subtriangular frontoclypeal plates, and a fairly small abdominal fovea (Fig. 32). In *Cis discolor* the body is more elongate and parallel-sided and the pronotal margins lack the raised lip and are distinctly crenulate. In *Cis vitulus* and *C. congestus* the body is shorter and broader, the bristles shorter and thicker, and the male lacks the abdominal fovea and bears an elevated, trisinuate ridge on the clypeus. In *Cis pistoria* the elytral punctation is dual and the bristles are very short and scalelike.

Cis tetracentrum is closely related to *Cis corticinus* Gorham, from the highlands of Mexico and Guatemala, and the two may not be specifically distinct. Individuals of *C. corticinus* are usually larger than those of *C. tetracentrum*, the elytral punctation is somewhat finer and denser, so that the vestiture is not as sparsely distributed, and the pronotal and clypeal horns in the male are more prominent. These two forms and *Cis pallidus* Mellié, from Brazil and Argentina, may constitute a species group, which, in turn, is related to the *Cis vitulus* complex, via *Cis bisbidens* Gorham.

Cis tridentatus Mannerheim

Cis tridentatus Mannerheim, 1852: 360. Type locality: "Insulae Sitkhae." Syntypes, Mannerheim Coll., MZUH.

Xestocis ednae Hatch, 1962: 232. Type locality: "Seattle, Wash." Holotype, ♂, Hatch Coll., UW. NEW SYNONYMY.

Xestocis reflexus Hatch, 1962: 232. Type locality: "Coupeville (Sunnyside), Wash." Holotype, ♂, Hatch Coll., UW. NEW SYNONYMY.

Distribution. Pacific Coast from southern Alaska, through British Columbia, Washington, and Oregon, to Monterey Co., California. Marginal records: ALASKA: Sitka; BRITISH COLUMBIA: Massett, Queen Charlotte Is.; WASHINGTON: White River, Mt. Rainier, Pierce Co.; CALIFORNIA: Big Sur, Monterey Co.

Host fungi. Fomes pinicola [10(7)]; *Poria cinerascens* [2(1)]; *Ganoderma oregonense* [1(1)]; *Polyporus sulphureus* [1(1)]; *Poria carbonica* [1(1)]; *Trametes sepium* [1(1)]; *Ganoderma applanatum* [1]; *Pleurotus ostreatus* [1]; *Polyporus gilvus* [1].

Discussion. This species is identical with *Cis americanus* in most respects but differs in having the elytral punctation obscurely dual, with the megapunctures barely larger than the micropunctures. *C. tridentatus* appears to be restricted to the immediate coast and no specimens have been taken inland. Throughout the range, it is sympatric with *C. americanus*, but the two have not been taken on the same host in any one area. *Cis tridentatus* is commonly found breeding in the fruiting bodies of *Fomes pinicola*, along with *Cis biarmatus* and *Dolichocis indistinctus*. *Cis americanus* ("*oweni*" type) also frequents *Fomes pinicola* but always at localities some distance from the coast and outside of the range of *C. tridentatus*. Coastal populations of *C. americanus* commonly breed in *Polyporus adustus*, *Stereum hirsutum*, and several other fungi (*see* p. 444).

Cis tristis Mellié

Cis tristis Mellié, 1848: 343. Type locality: "Nouvelle-Orléans." Holotype, ♀, Pic Coll. (Chevrolat Coll.), MNHN.

Cis setulosus Mellié, 1848: 257. Type locality: "Amérique boréale." Holotype, ♂, Melly Coll., GEN. NEW SYNONYMY.

Cis falli Blatchley, 1910: 898; Dury, 1917: 9 (dist.). Type locality: "Marion . . . " [Co., Indiana]. Lectotype, ♂, Blatchley Coll., PURD. NEW SYNONYMY.

Distribution. Eastern North America, from New York and Massachusetts south to Florida and west as far as southeastern Colorado and northeastern Mexico (Fig. 103). Marginal records: WISCONSIN: (no specific locality); MICHIGAN: Saugatuck, Allegan Co.; NEW YORK: (no specific

locality); MASSACHUSETTS: (no specific locality); FLORIDA: Panama City, Bay Co.; LOUISIANA: New Orleans, Orleans Par.; TEXAS: Brownsville, Cameron Co.; NUEVO LEÓN: Chorros de Agua, 13 mi. W Montemorelos; COLORADO: Pueblo, Pueblo Co.; NEBRASKA: Central City, Merrick Co.

Host fungi. Polyporus versicolor [3(3)]; *Lenzites betulina* [2(1)]; *Polyporus hirsutus* [2]; *Polyporus supinus* [2]; *Daedalea ambigua* [1(1)]; *Polyporus maximus* [1 (1)]; *Trametes hispida* [1(1)]; *Pleurotus* sp. [1]; *Polyporus cinnabarinus* [1].

Discussion. This species closely resembles *Cis striolatus* but may be distinguished from that species by the shiny pronotum with denser punctation, colorless elytral bristles, and larger abdominal fovea in the male. *Cis subtilis* is similar to *C. tristis* in the elongate form, dual elytral punctation, and colorless bristles, but the elytral punctation is confused and the abdominal fovea is absent.

The species is not very common, but it occurs throughout eastern North America, mainly south of New England and the Great Lakes, where it is usually found in association with *Polyporus versicolor* and its relatives. Although *Cis tristis* resembles the northern *C. striolatus*, as well as the European species *C. striatulus* Mellié and *C. comptus* Gyllenhal, the male genitalia are different and the true affinities may be with members of the Neotropical fauna.

Cis ursulinus Casey

Cis ursulina Casey, 1898: 83; Blatchley, 1910: 899 (dist.); Blatchley, 1918: 54 (dist.). Type locality: "Alabama." Holotype, ♀, Casey Coll., USNM.

Distribution. Southeastern United States, from North Carolina south to Florida and west to Arkansas and Louisiana (Fig. 92). Marginal records: NORTH CAROLINA: Knott's Island, Currituck Co. FLORIDA: Dunedin, Pinellas Co.; Archibold Biological Station, Highlands Co. LOUISIANA: Audubon State Park, West Feliciana Par. ARKANSAS: Hope, Hampstead Co. INDIANA: Crawford Co.

Host fungi. Ganoderma tsugae [1]; *Polyporus adustus* [1]; *Polyporus gilvus* [1]; *Polyporus sulphureus* [1]; *Polyporus versatilis* [1].

Discussion. This species differs from most North American *Cis* in having a vestiture of long, fine, recurved hairs, as in *C. hirsutus* and *C. rotundulus.* The form is more elongate than that of *C. rotundulus*, which also differs by virtue of the sharply carinate prosternum, narrowed elytral apices, shortened metasternum, and sparser punctation. Individuals of *C. hirsutus* are larger (TL more than 1.6 mm) and darker in color, with coarser punctation, smoother lateral pronotal margins, and a larger abdominal fovea in the male.

Like *C. rotundulus*, this species appears to be restricted to the southeastern United States. No specimens have been seen from the West Indies and the distribution indicates that the species may have evolved on the mainland.

Cis versicolor Casey

Cis versicolor Casey, 1898: 80. Type locality: "California (Calaveras . . . Co.)." Holotype, ♀, Casey Coll., USNM.

Cis dichrous LeConte, 1867: 58; Blaisdell, 1892: 34 (biol.); Weiss and West, 1921b: 169 (dist., biol.). Nomen nudum.

Distribution. Extreme southern Oregon, south throughout most of California, west of the Sierran crest, into Baja California Norte and east through Arizona into New Mexico and western Texas (Fig. 101). Marginal records: OREGON: 3 mi. W Dead Indian Springs, Jackson Co. CALIFORNIA: Dutch Flat, Placer Co.; Ash Mt. R., Sequoia National Park, Tulare Co. ARIZONA: 5 mi. SE Wickenburg, Maricopa Co. NEW MEXICO: San Juan Valley, Taos Co. TEXAS: Boquillas Camp, Big Bend National Monument, Brewster Co. BAJA CALIFORNIA NORTE: 12 mi. SE Maneandero.

Host fungi. Polyporus versicolor [22

(14)]; *Trametes hispida* [7(4)]; *Polyporus hirsutus* [5(2)]; *Lenzites betulina* [2(2)]; *Ganoderma brownii* [1]; *Polyporus cinnabarinus* [1]; *Schizophyllum commune* [1].

Discussion. This species is characterized by the elongate and somewhat depressed form, dual and distinctly seriate elytral punctation, vestiture of short bristles, shiny pronotum with fairly broad lateral margins, rounded or angulate protibial apex, reddish pronotum (in contrast to the dark elytra), and lack of frontoclypeal tubercles in the male. *Cis subfuscus* is somewhat smaller and not as elongate, with coarser and denser elytral punctation and distinct frontoclypeal tubercles in the male. *Cis striolatus* and *C. tristis* are similar, but in both, the outer apical angle of the protibia is more prominent, the lateral pronotal margins are narrower, and the clypeus of the male is tuberculate. *Cis subtilis* and *C. acritus* differ in having confused elytral punctation, while individuals of *C. fuscipes* are larger and broader with distinctly produced and rounded anterior pronotal angles and dentate protibial apices.

Cis versicolor appears to be related on the one hand to *C. striolatus* and *C. striatulus*, of the northern Nearctic and Palaearctic respectively, and on the other to *C. subfuscus* and *C. pusillus* of the Neotropical Region. The distribution is southwestern and the species probably extends into northern Mexico.

The species occurs on fungi of the *Polyporus versicolor* group, which are usually associated with hardwoods rather than conifers. In the wetter areas of central and northern California, it may be found with *C. vitulus*, *C. fuscipes*, *Sulcacis curtulus*, *Ceracis californicus*, and *Octotemnus laevis*, while in drier areas of the state it often occurs alone. In southeastern California and Arizona, *Cis versicolor* occupies two distinct habitats: along streams and river beds in the desert, where it feeds on fruiting bodies of *Trametes hispida* growing on cottonwoods, and in mountain canyons, where it may be found in *Polyporus versicolor* on various hardwoods. It has been collected in association with *Ceracis dixiensis* in the former and with *Cis tetracentrum* in the latter situation.

Cis vitulus Mannerheim

Cis vitulus Mannerheim, 1843: 299; Weiss, 1920b: 133–134 (biol.); Weiss, 1923: 199 (biol.); Weiss and West, 1921a: 61 (dist., biol.); Weiss and West, 1921b: 169 (dist., biol.). Type locality: "California." Types, Mannerheim Coll., MZUH ?

Cis caseyi Dalla Torre, 1911: 8, replacement name for *Cis illustris* Casey, 1898 (not Broun, 1880). NEW SYNONYMY.

Cis illustris Casey, 1898: 81. Type locality: "California (Humboldt Co.)." Holotype, ♀, Casey Coll., USNM.

Distribution. California, from Del Norte Co. to San Diego Co., and north central Arizona (Fig. 105). Marginal records: CALIFORNIA: Patrick Cr., Del Norte Co.; Dutch Flat, Placer Co.; Dorset Camp, Sequoia National Park, Tulare Co.; Palm Springs, Riverside Co.; San Diego, San Diego Co. ARIZONA: Oak Creek Canyon, Coconino Co.

Host fungi. Polyporus versicolor [29 (18)]; *Lenzites betulina* [4(3)]; *Polyporus adustus* [2(1)]; *Schizophyllum commune* [1].

Discussion. Individuals of this species are large and stout with single and uniform elytral punctation, vestiture of moderately short bristles, strongly tumid prosternum, broad lateral pronotal margins with a raised lip, produced and rounded anterior pronotal angles, and male with two pronotal horns, an elevated, trisinuate, frontoclypeal ridge (Fig. 3), and no abdominal fovea. *Cis laminatus* differs in the much narrower pronotal margins, shorter and broader form, coarser and denser pronotal punctation, and simple pronotal apex in the male. In *Cis tetracentrum*, the body is more elongate, the size is usually larger, the bristles are longer and finer, and the male bears two subtriangular frontoclypeal plates and an abdominal fovea. *Cis congestus* is quite similar to *C vitulus* but is

characterized by the smaller size, shorter and broader form, and coarser and denser pronotal punctation

Cis vitulus belongs to a group of species occurring mainly in the New World tropics and including the southeastern *C. congestus* and the Mexican species *C. bubalus* Reitter and *C. fasciatus* Gorham. The species has a relatively restricted range occurring primarily in mesic situations along the California coast and in the foothills of the Sierra Nevada.

Genus *Ennearthron* Mellié

Ennearthron Mellié, 1847: 110; Mellié, 1848: 360; Lacordaire, 1857: 552; Jacquelin du Val, 1861: 238; Thomson, 1863: 190; Abeille de Perrin, 1874b: 80; Reitter, 1902a: 59; Dalla Torre, 1911: 23; Winkler, 1927: 794; Miyatake, 1954: 55; Miyatake, 1959: 27; Lawrence, 1967b: 91–92; Lohse, 1965: 294. Type species, by subsequent designation, *Cis cornutus* Gyllenhal, 1827: 626 (Desmarest, 1860: 261).

Ennearthrum Bach, 1852: 111. Incorrect subsequent spelling.

Plesiocis Casey (in part). — Hatch, 1962: 233.

Included species. Ennearthron amamense Miyatake 1959: 27 [Ryukyu Is.]; *E. aurisquamosum* Lawrence, n. sp. [southeastern U. S., *see* p. 481]; *E. chujoi* Nakane and Nobuchi, 1955: 49 [Japan]; *Cis cornutus* Gyllenhal, 1827: 626 [Eurasia]; *E. ishiharai* Miyatake, 1954: 57 [Japan]; *E. mohrii* Miyatake, 1954: 56 [Japan]; *Plesiocis spenceri* Hatch [northwestern North America, *see* p. 482]. Total: 7 species.

Doubtfully included species. Ennearthron abeillei Caillol, 1914: 160 [southern Europe]; *Cis filum* Abeille de Perrin, 1874a: 53 [southern Europe]; *Ennearthron hayashii* Nobuchi, 1955: 108 [Japan]; *E. mussauense* Chujo, 1966: 529 [Bismark Is.]; *E. ondreji* Roubal, 1919: 63 [southeastern Europe]; *E. palmi* Lohse, 1966: 28 [northern Europe]; *E. poriae* Nakane and Nobuchi, 1955: 49 [Japan]; *Cis pruinosulus* Perris, 1864: 291 [Europe]; *E. pulchellum* Scott, 1926: 36 [Seychelles]; *E. reichei* Abeille de Perrin, 1874b: 89 [Egypt]; *Cis reitteri* Flach, 1882: 249 [Europe]. *See* discussion below.

Excluded species. Ennearthron argentinum Pic, 1916: 19 [Argentina]; *E. brevehirsutum* Pic, 1922: 8 [Cameroons]; *E. biroi* Pic, 1956: 77 [New Guinea]; *E. boettgeri* Reitter, 1880: 181 [New Zealand]; *E. longepilosum* Pic, 1922: 8 [India]; *E. multidentatum* Pic, 1917: 4 [China]; *E. obsoletum* Reitter, 1880: 182 [New Zealand]; *E. sinense* Pic, 1917: 4 [China]; *E. vianai* Pic, 1940: 12 [Argentina]. *See* discussion below.

Almost 60 species have been described in the genus *Ennearthron* on the basis of antennal segmentation (9 segments), and about half of these have already been transferred to other genera, such as *Ceracis, Diphyllocis, Dolichocis, Hadraule, Orthocis, Sulcacis,* and *Wagaicis.* The remainder may be divided into three groups: those definitely included in the genus as narrowly defined here, those doubtfully included for various reasons discussed below, and those excluded and transferred to the genus *Cis.*

The genus *Ennearthron* is used here in a restricted sense to include the seven species listed above and three or four others from India and China that are relatively small in size with a characteristic clypeal notch in the male (Fig. 8). They may be distinguished from *Plesiocis cribrum* by the broader intercoxal process of the prosternum, relatively longer metasternal suture, and the clypeal notch.

The doubtful species include four (*E. abeillei* Caillol, *E. mussauense* Chujo, *E. ondreji* Roubal, and *E. reichei* Abeille de Perrin) that have not been examined and are inadequately described, and seven more that seem to represent four separate lines:

1) *E. pulchellum* Scott. This is a broad and somewhat flattened form with bicolored elytra and vestiture of long, fine hairs. The intercoxal process of the prosternum is broad, the protibial apices are angulate, and there are no sexual orna-

ments on the head or pronotum of the male. It probably should be included in a distinct genus along with *Cis bifasciatus* Reitter from Japan and several undescribed Indo-Pacific species.

2) *E. filum* (Abeille de Perrin), *E. palmi* Lohse, and *E. hayashii* Nobuchi. These three species are all quite small (1.4 mm or less), narrow, and cylindrical, with dentate protibial apices and two small foveae on the head of the male.

3) *E. pruinosulum* (Perris) and *E. poriae* Nakane and Nobuchi. These two may be related to the last group, but they are larger in size and lack the dentate protibiae and pores on the head of the male.

4) *E. reitteri* (Flach). This species is short and broad with dual and indistinctly seriate elytral vestiture, carinate prosternum, broad lateral pronotal margins, and dentate protibial apices. It does not appear to be related to any of the above.

Nine species of *Ennearthron* were included on the basis of wrong antennal counts and should be transferred to the genus *Cis* (at least for the present). *Ennearthron biroi* Pic, *E. boettgeri* Reitter, and *E. obsoletum* Reitter belong to the *Cis pacificus* group (*see* Lawrence, 1967b: 98); *E. sinense* Pic and *E. brevehirsutum* Pic are probably related to *Cis fuscipes* Mellié; *E. vianai* Pic will eventually form part of a new genus; and each of the remaining forms belongs to a different group of *Cis*.

Key to the North American Species of *Ennearthron*

1. Elytral bristles longer, more than 0.33 × as long as scutellar base, subseriate; lateral pronotal margins visible for their entire lengths from above, the anterior angles produced and acute; apex of pronotum in male with 2 weak, approximate horns joined by an impressed ridge; British Columbia ---------- *E. spenceri* (p. 482)

— Elytral bristles shorter, less than 0.33 × as long as scutellar base, confused; lateral pronotal margins not or barely visible for their entire lengths from above, the anterior angles not or barely produced, almost right; apex of pronotum in male with 2 sharp, widely spaced horns; southeastern U. S. ---------- *E. aurisquamosum* (p. 481)

Ennearthron aurisquamosum NEW SPECIES

Holotype. ♂, NORTH CAROLINA: "N. C." "*aurisquamosus* Zimm." LeConte Collection [MCZ No. 31904]. Allotype, ♀, "N. C." [MCZ].

Male. Length 1.72 mm. Body 2.23 × as long as broad, strongly convex. Head and pronotum reddish, elytra dark reddish brown anteriorly, yellowish brown posteriorly. Vestiture of short, stout, blunt, yellowish bristles. Vertex with a deep, transverse impression, preceded by a median elevation; frontoclypeal ridge bearing 2 subtriangular plates with a median notch between them (Fig. 8). Antennal segment III 1.50 × as long as IV. Pronotum 0.87 × as long as broad, widest at posterior third; anterior edge produced and emarginate, forming 2 triangular horns that are separated by 1.75 basal widths; sides weakly rounded, the margins narrow and slightly crenulate, not visible for their entire lengths from above; anterior angles barely produced forward, almost right; disc strongly convex, even; surface finely granulate and shiny; punctures 0.20 × as large as scutellar base and separated by 0.25 to 0.35 diameter. Elytra 1.39 × as long as broad and 1.65 × as long as pronotum; sides weakly rounded, apices blunt; punctation single and confused; punctures slightly larger than and about as dense as those on pronotum, each bearing a stout, blunt, yellowish bristle, which is about 0.33 × as long as scutellar base. Prosternum biconcave; intercoxal process 0.30 × as wide as a procoxal cavity, parallel-sided. Protibia with outer apical angle strongly produced and dentate. Metasternum 0.46 × as long as wide; suture 0.33 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.27 × as long as body of sternite, distinctly margined, and located slightly posterad of center.

Female. Length 1.65 mm. Body 2.20 ×

as long as broad. Vertex with a slight median impression; frontoclypeal ridge simple. Pronotum 0.81 × as long as broad; anterior edge strongly rounded, simple. Elytra 1.47 × as long as broad and 2.00 × as long as pronotum. Protibia with outer apical angle produced and weakly dentate. Sternite III without pubescent fovea.

Variation. Pronotum reddish orange to reddish brown. Elytra yellowish brown to almost black anteriorly, yellowish brown posteriorly, usually somewhat lighter at apices. Size and dimensions vary as follows in type series:

TL mm:	♂ 1.72, 1.82, 1.85, ♀ 1.65, 1.87;
TL/EW:	♂ 2.23, 2.28, 2.31, ♀ 2.20, 2.20;
PL/PW:	♂ 0.87, 0.90, 0.93, ♀ 0.81, 0.81;
EL/EW:	♂ 1.39, 1.44, 1.44, ♀ 1.44, 1.47;
EL/PL:	♂ 1.64, 1.65, 1.70, ♀ 1.88, 2.00;
GD/EW:	♂ 0.81, 0.84, 0.87, ♀ 0.82, 0.83.

Paratypes. KENTUCKY: 1, Mammoth Cave National Park, Edmonson Co., June 13, 1965, Lot 1430 JFL, ex *Polyporus adustus* [JFL]; NORTH CAROLINA: 3, "N. C." [JFL, MCZ].

Distribution. Kentucky and North Carolina.

Host fungi. Polyporus adustus [1].

Discussion. This species may be distinguished from *E. spenceri* by the narrower pronotal margins, shorter, confused elytral bristles, and more widely spaced pronotal horns. It resembles several species of *Cis* in general form and vestiture. *Cis stereophilus* has a more elongate form with subseriate elytral bristles, *C. laminatus* is somewhat larger with shorter and broader elytra, *C. castlei* is much smaller, and *C. duplex* has longer elytral bristles that are more sparsely distributed. The species most closely resembles an undescribed *Ennearthron* collected in *Polyporus volvatus* from western China.

Ennearthron spenceri (Hatch), NEW COMBINATION

Plesiocis spenceri Hatch, 1962: 233. Type locality: "Vancouver, B. C." Holotype, ♂, Hatch Coll., UW.

Distribution. Known only from Vancouver, BRITISH COLUMBIA. Probably introduced from Japan.

Host fungi. Recorded from *Polyporus volvatus.*

Discussion. This species may be distinguished from *E. aurisquamosum* on the basis of vestiture, pronotal margins, and male armature, as indicated in the key. It is also similar to several species of *Cis*, including *C. stereophilus*, *C. floridae*, and *C. duplex.* Both *Cis duplex* and *C. floridae* resemble *E. spenceri* in general form, punctation vestiture, and male armature, but both have 10-segmented antennae and in neither species is the frontoclypeal ridge interrupted in the middle. In addition, the vestiture in *C. floridae* is indistinctly dual and that of *C. duplex* is composed of shorter bristles. *Cis stereophilus* is similar in general form and color, but the bristles are much shorter and the male armature is different. In *Plesiocis cribrum*, the pronotal punctation is coarser and denser, the lateral pronotal margins are narrower, the clypeus of the male is quadridentate, and the prosternum and metasternum differ as indicated in the generic key.

Ennearthron spenceri belongs to a group of species inhabiting eastern Asia and including *E. amamense* Miyatake, *E. ishiharai* Miyatake, and *E. mohrii* Miyatake. Considering its limited distribution, the North American species may well be an introduction. Most of the individuals in the type series were taken from a herbarium specimen of *Polyporus volvatus* (origin not recorded), but at least one of the types in the University of British Columbia collection was taken in Vancouver at a later date than the herbarium series. Further collecting is needed to determine whether or not this species is established in southern British Columbia.

Genus *Dolichocis* Dury

Dolichocis Dury, 1919: 158; Lawrence, 1965: 289 (complete synonymy). Type species, by monotypy, *Dolichocis manitoba* Dury, 1919: 158.

Included species. Dolichocis indistinctus Hatch [northern North America, *see* p. 483]; *Cis laricinus* Mellié, 1848: 355 [Europe]; *Dolichocis manitoba* Dury [northern North America, *see* p. 483]; *Ennearthron yuasai* Chujo, 1941: 85 [Japan]. Total: 4 species.

Dolichocis represents a small aggregate of species with 9-segmented antennae, elongate, cylindrical form, and simple protibial apices. Like *Plesiocis*, it should be included within the genus *Ennearthron* as currently defined, but it is here retained as a distinct group, which has independently undergone antennal reduction. The genus is further discussed in a previous paper (Lawrence, 1965).

Key to the North American Species of *Dolichocis*

1. Pronotal punctation coarser and denser, the punctures more than 0.25 × as large as scutellar base and usually separated by less than 0.33 diameter; elytral punctures distinctly larger than pronotal punctures; elytral bristles 3 to 4 × as long as wide and about 0.33 × as long as scutellar base; vertex of male with median, raised, pubescent fovea; abdominal fovea of male margined and located in center of sternite III ..... *D. manitoba* (p. 483)

— Pronotal punctation finer and sparser, the punctures less than 0.25 × as large as scutellar base and usually separated by more than 0.33 diameter; elytral and pronotal punctures subequal in size; elytral bristles 2 to 3 × as long as wide and about 0.17 × as long as scutellar base; vertex of male simple; abdominal fovea of male not margined and located anterad of center ..... *D. indistinctus* (p. 483)

Dolichocis indistinctus Hatch

Dolichocis indistinctus Hatch, 1962: 234; Lawrence, 1965: 288. Type locality: "Stanley, B. C." Holotype, ♂, CAS.

Distribution. Known from scattered localities throughout the northern and montane parts of the continent, from the northern coast of British Columbia to the Gaspé Peninsula of Quebec and south into the Sierra Nevada, Chiricahua Mountains of southeastern Arizona, and the Green Mountains of Vermont. Marginal records: BRITISH COLUMBIA: Terrace; 36 mi. N Radium; QUEBEC: Mt. Lyall, 1500 ft.; VERMONT: Peru, Bennington Co.; COLORADO: 28 mi. NW Kremmling, Grand Co.; ARIZONA: Rustler Park, 8 mi. W Portal, Cochise Co.; CALIFORNIA: Caspar, Mendocino Co.; 6 mi. NW Fish Camp, Mariposa Co.

Host fungi. Fomes pinicola [6(3)]; *Trametes serialis* [2(2)]; *Fomes officinalis* [1].

Discussion. This species may be distinguished from *D. manitoba* by the finer pronotal punctation, shorter and stouter bristles, and simple vertex in the male. The only species of *Cis* likely to be confused with *D. indistinctus* is *C. robiniophilus*, in which the antennae are 10-segmented, the protibial apex produced and dentate, the bristles somewhat longer, and the surface shinier.

Dolichocis indistinctus is closely related to and probably conspecific with *Cis laricinus* Mellié, which is included in the genus *Ennearthron* by European workers (*see* p. 480). Its range is broadly sympatric with that of *C. manitoba* and it occurs on the same fungi, but *C. indistinctus* appears to be much rarer.

Dolichocis manitoba Dury

Dolichocis manitoba Dury, 1919: 158; Criddle, 1921: 80 (dist.); Weiss and West, 1921a: 61 (dist., biol.); Hatch, 1962: 233, pl. 48, fig. 6, 6a (dist.); Lawrence, 1965: 288; Pielou, 1966: 1235 (dist., biol.); Pielou and Matthewman, 1966: 1310 (dist., biol.); Pielou and Verma, 1968: 1284 (dist., biol.). Type locality: "Aweme, Manitoba." Holotype, ♀, Dury Coll., CIN.

Distribution. Northern and montane regions of North America, from the northern coast of British Columbia to New Brunswick and south to the central California coast, the southern Sierra Nevada, southeastern Utah, and northern Pennsylvania (Fig. 92). Marginal records: BRITISH CO-

LUMBIA: Terrace; ALBERTA: Edmonton; NORTHWEST TERRITORY: Fort Smith; MANITOBA: Victoria Beach; NEW BRUNSWICK: Matapedia; PENNSYLVANIA: Twin Lakes, Pike Co.; WISCONSIN: Minocqua, Oneida Co.; SOUTH DAKOTA: Black Hills, Harney Nat. For., Pennington Co.; COLORADO: 28 mi. N Kremmling, Grant Co.; UTAH: Wickiup Pass, 9000′, Henry Mts., Garfield Co.; CALIFORNIA: Huntington Lake, Fresno Co.; Ben Lomond, Santa Cruz Co.

Host fungi. Fomes pinicola [50(21)]; *Polyporus betulinus* [5(3)]; *Polyporus pargamenus* [4]; *Fomes annosus* [3(2)]; *Daedalea unicolor* [2(1)]; *Fomes officinalis* [1(1)]; *Ganoderma applanatum* [1(1)]; *Polyporus sulphureus* [1(1)]; *Fomes fomentarius* [1]; *Polyporus adustus* [1]; *Polyporus tulipiferae* [1]; *Polyporus volvatus* [1].

Discussion. This species is easily distinguished from *D. indistinctus* by the coarser punctation, longer and finer bristles, and fovea on the head of the male. It may be confused with *Sulcacis curtulus*, which has similar punctation and vestiture, but in that species the form is somewhat less elongate (EL/EW less than 1.50), the antennae are 10-segmented, and the apex of the protibia is expanded, rounded, and spinulose. *Cis hystriculus* and *C. angustus* are also somewhat similar, but the protibial apex is angulate or dentate, the antennae are 10-segmented, and the pronotum is not distinctly narrowed anteriorly.

Dolichocis manitoba is a common inhabitant of *Fomes pinicola* and its relatives in western North America, but in the eastern part of the continent it appears to have a broader host range.

Genus *Orthocis* Casey

Orthocis Casey, 1898: 84; Lawrence, 1965: 288 (complete synonymy). Type species, by subsequent designation, *Orthocis aterrima* Casey, 1898: 84 (= *Cis punctatus* Mellié, 1848: 337) (Lawrence, 1965: 288).

Cis (*Mellieicis*) Lohse, 1964: 122; Lawrence, 1965: 288. Type species, by original designation, *Cis alni* Gyllenhal, 1813: 386.

Cis (*Orthocis*) Casey, — Lohse, 1967: 285.

Included species. Cis abyssinicus Guerin-Meneville, 1847: 325 [Ethiopia]; *Cis aequalis* Blackburn, 1888: 268 [Australia]; *Cis alni* Gyllenhal, 1813: 386 [Eurasia]; *Cis alnoides* Reitter, 1884: 120 [southeastern Europe]; *Ennearthron annulatum* Kraus, 1908: 80 [Cuba]; *Cis apicipennis* Pic, 1916: 5 [Brazil]; *Cis assimilis* Broun, 1880: 347 [New Zealand]; *Cis collenettei* Blair, 1927: 166 [Marquesas]; *Cis coluber* Abeille de Perrin, 1874a: 52 [Europe]; *Cis cylindrus* Gorham, 1886: 358 [Panama]; *Cis discoidalis* Pic, 1922: 1 [Cameroons]; *Cis flavipennis* Pic, 1923: 12 [Indo China]; *Cis guamae* Zimmerman, 1942: 49 [Guam]; *Orthocis huesanus* Kraus, 1908: 77 [Florida, *see* p. 485]; *Cis immaturus* Zimmerman, 1939: 346 [Hawaii]; *Cis insularis* Waterhouse, 1876: 177 [Rodriguez]; *Cis juglandis* Reitter, 1885: 208 [southeastern Europe]; *Cis lacernatus* Reitter, 1908: 121 [eastern Africa]; *Cis leanus* Blackburn, 1907: 285 [Australia]; *Cis linearis* Sahlberg, 1901: 10 [northern Europe]; *Orthocis longula* Dury, 1917: 13 [eastern U. S., *see* p. 486]; *Cis lucasi* Abeille de Perrin, 1874b: 62 [southern Europe, northern Africa]; *Cis m-nigrum* Champion, 1913: 161 [Mexico]; *Cis nigrosplendidus* Nobuchi, 1955: 105 [Japan]; *Cis ornatus* Reitter, 1877: 381 [Japan]; *Cis perrisi* Abeille de Perrin, 1874a: 53 [southern Europe]; *Orthocis platensis* Brèthes, 1922: 302 [Argentina]; *Cis pseudolinearis* Lohse, 1965: 179 [Europe]; *Orthocis pulcher* Kraus, 1908: 78 [Florida, *see* p. 486]; *Cis punctatus* Mellié, 1848: 337 [North America, *see* p. 486]; *Cis schizophylli* Nakane and Nobuchi, 1955: 47 [Japan]; *Cis sublacernatus* Scott, 1926: 24 [Seychelles]; *Cis subornatus* Wollaston, 1861: 140 [southern Africa]; *Cis testaceofasciatus* Pic, 1922: 2 [Guadeloupe]; *Ennearthron transversatum* Kraus, 1908: 79 [southeastern U. S., *see* p. 488]; *Cis undulatus* Broun, 1880: 347 [New Zea-

land]; *Cis wollastonii* Mellié, 1849: 86 [Madeira]; *Cis zoufali* Reitter, 1902b: 6 [southeastern Europe]. Total: 38 species.

The genus *Orthocis* was discussed at length in an earlier paper (Lawrence, 1965) and arguments were presented for affording the group generic rank. Lohse (1964, 1965, 1967) prefers to consider *Orthocis* as a subgenus of *Cis* and includes within it certain species that I would exclude, namely *Cis festivus* (Panzer), *C. pygmaeus* (Marsham), and *C. vestitus* Mellié. As it is here delimited, the genus consists of 38 described species and at least 30 undescribed forms from various parts of the world.

Members of the genus *Orthocis* are usually distinguished from other ciids by the elongate form, 10-segmented antennae, simple and rounded protibial apices (Fig. 45), vestiture of short and fine hairs, elytral suture with inflexed margin at apex (Fig. 38), single and confused elytral punctation, well-developed and somewhat flattened prosternum with a fairly broad intercoxal process (Fig. 22), and complete absence of horns or tubercles on the head or pronotum of the male. Some species have 9-segmented antennae (*O. annulatus*, *O. pallidus*), while others may be clothed with stouter bristles (*O. abyssinicus*, *O. coluber*, *O. lucasi*), and a few are broader (*O. collenettei*). Lack of male armature is universal in the group, and the few species of *Cis* that have simple protibial apices and resemble *Orthocis* in other ways, are characterized by having teeth or tubercles on the male clypeus. There is another type of secondary sexual character in *Orthocis*, however, that is not found in other groups of ciids. In a number of species, the clypeus of the male is covered with setae or hairs that are longer and denser than those on the surrounding parts of the head (Fig. 37). The inflexed elytral margin also occurs in *Strigocis*, but members of that genus have a carinate prosternum and spinose protibial apices.

Key to the North American Species of *Orthocis*

1. Antennae 9-segmented; elytra bicolored, black or dark brown with median, yellow, transverse band; pronotal punctation coarse and dense, punctures 0.25 × as large as scutellar base and separated by 0.33 diameter or less; lateral pronotal margins narrow, not visible for their entire lengths from above; TL 1.4 mm or less ..... *O. transversatus* (p. 488)
— Antennae 10-segmented; without other characters in combination 2
2. Size smaller, TL less than 1.25 mm; pronotal punctation coarse and sparse, punctures about 0.50 × as large as scutellar base and separated by 0.50 diameter or more; lateral pronotal margins not visible for their entire lengths from above; elytra bicolored, brownish with median, yellow, transverse band ..... *O. pulcher* (p. 486)
— Size larger, TL more than 1.25 mm; pronotal punctation finer or denser; elytra uniformly pigmented or lateral pronotal margins easily visible for their entire lengths from above 3
3. Lateral pronotal margins narrow, not visible for their entire lengths from above, diverging anteriorly and abruptly converging near apex, so that they appear angulate (Fig. 19); body elongate, TL/EW more than 2.65 and EL/EW more than 1.80 ..... *O. longulus* (p. 486)
— Lateral pronotal margins broader, easily visible for their entire lengths from above, weakly rounded or subparallel, not angulate, with raised lip (Fig. 18); body shorter and broader, TL/EW less than 2.65 and EL/EW less than 1.80 4
4. Elytra bicolored, each elytron bearing 2 large, yellow spots, Florida Keys ..... *O. huesanus* (p. 485)
— Elytra uniformly pigmented ..... *O. punctatus* (p. 486)

Orthocis huesanus Kraus

Orthocis huesanus Kraus, 1908: 77, pl. 3, fig. 3; Lawrence, 1965: 283. Type locality: "Key West, Fla." Holotype, ♀, USNM.

Distribution. Known only from Key West, Monroe Co., FLORIDA.

Host fungi. Unknown.

Discussion. This species is quite similar to *O. punctatus* as it is here defined, differing mainly in the slightly flatter body and bicolored elytra. The general form and

coloration are also similar to *O. m-nigrum* (Champion) described from Mexico.

Orthocis longulus Dury

Orthocis longula Dury, 1917: 13; Lawrence, 1965: 283. Type locality: "Pennsylvania . . ." [Linglestown]. Holotype, ♀, Dury Coll., CIN.

Distribution. Known from scattered localities in the southeastern part of North America, from southern Pennsylvania to Florida and west to Kansas and the Gulf Coast of Texas and northeastern Mexico. Localities: PENNSYLVANIA: Linglestown, Dauphin Co. FLORIDA: Gainesville, Alachua Co.; Crescent City, Putnam Co.; Enterprise, Volusia Co.; Lakeland, Polk Co.; Dunedin, Pinellas Co. ALABAMA: Spring Hill, Mobile Co. MISSISSIPPI: Lucedale, George Co. LOUISIANA: Harahan, Orleans Par.; Belle Chasse, Plaquemines Par. KANSAS: (no specific locality). TEXAS: Columbus, Colorado Co.; Victoria, Victoria Co. TAMAULIPAS: Tampico.

Host fungi. Unknown.

Discussion. This species is unique among the North American Ciidae in the very long and narrow body form and the narrow and somewhat angulate lateral pronotal margins. Some specimens of *O. punctatus* have fairly narrow pronotal margins, but these are never angulate and the body is always shorter and broader than that of *O. longulus*. The species is most closely related to *O. cylindrus* (Gorham) from Panama.

Orthocis pulcher Kraus

Orthocis pulcher Kraus, 1908: 78, pl. 3, fig. 4; Lawrence, 1965: 283. Type locality: "Key West, Fla." Holotype, ♀, USNM.

Distribution. Southern Florida. Localities: FLORIDA: Punta Gorda, Charlotte Co.; Coconut Grove, Dade Co.; Key West, Monroe Co.

Host fungi. Unknown.

Discussion. This species is easily distinguished by the small size, elongate body form, narrow lateral pronotal margins, very large pronotal punctures, and bicolored elytra. It is very similar to *O. testaceofasciatus* (Pic) described from Guadeloupe, and the two species may be synonymous.

Orthocis punctatus (Mellié)

Cis punctatus Mellié, 1848: 337. Type locality: "Amérique boréale." Holotype, ♂, Marseul Coll., MNHN.

Orthocis punctata (Mellié), Casey, 1898: 84 (dist.): Cockerell and Fall, 1907: 185 (dist.); Blatchley, 1910: 899 (biol.); Dury, 1917: 13; Brown, 1931: 90 (dist.); Hatch, 1962: 231 (dist., biol.); Lawrence, 1965: 283.

Orthocis aterrima Casey, 1898: 84; Dury, 1917: 13; Lawrence, 1965: 283. Type locality: "California (Alameda Co.)." Holotype, ♂, Casey Coll., USNM. NEW SYNONYMY.

Distribution. Widespread across North America from the edge of the Beaufort Sea (Mackenzie District) to the Island of Newfoundland, south on the Pacific Coast to Santa Barbara, California, through the Rocky Mountains to northeastern New Mexico, into the Black Hills of South Dakota, and through the eastern and midwestern states from New England to Florida and west to Kansas and Texas. Marginal records: NORTHWEST TERRITORY: Reindeer Depot, Mackenzie District. ALBERTA: McMurray. MANITOBA: Winnipeg. ONTARIO: Biscotasing. NEWFOUNDLAND: Harmon Field. FLORIDA: Biscayne, Dade Co. TEXAS: Kerrville, Kerr Co.; Victoria, Victoria Co. KANSAS: Riley Co. SOUTH DAKOTA: Hill City, Custer Co. NEW MEXICO: Las Vegas Hot Springs, San Miquel Co. CALIFORNIA: Santa Barbara, Santa Barbara Co. This is probably a composite distribution, since two or more species may be involved (*see* discussion below).

Host fungi. Auricularia auricula [1(1)]. Collected beneath the bark of various trees, including species of *Pinus*, *Abies*, *Prunus*, *Quercus*, *Ricinus*, and *Fagus*. Also taken by beating branches and in "powdery fungus" and "shelf fungus."

Discussion. Orthocis punctatus, as it is

here delimited, is extremely variable and may represent a complex of two or more related species. It may be distinguished from other North American *Orthocis* by the 10-segmented antennae, uniform elytral coloration, and relatively broad lateral pronotal margins, which are raised at the edge to form a narrow lip (Fig. 18). The actual widths of the pronotal margins vary considerably, but they are never angulate as in *O. longulus* (Fig. 19).

Characters exhibiting the most noticeable variation are: 1) size and density of pronotal punctures, 2) widths of lateral pronotal margins, 3) shape and prominence of anterior pronotal angles, 4) type of pronotal surface sculpture, and 5) relative size of pronotum. A comparative study of the male genitalia has not been made and must await a more complete analysis of the genus *Orthocis*.

The pronotal punctation varies from fine and sparse to fairly coarse and dense. The punctures in some specimens are 0.08 × as large as the scutellar base and separated by more than 1 diameter, while in others they may be as much as 0.25 × as large as the scutellar base and separated by 0.20 diameter. Finer and sparser punctation is characteristic of western and northern populations.

Lateral pronotal margins may be relatively narrow and only barely visible from above or they may be quite broad and explanate. From above they may be rounded and convex, subparallel, or even slightly sinuate at middle. The anterior angles in some specimens are strongly projecting and rounded, while in others they are barely projecting and almost right. Specimens from the southeastern United States and the Gulf Coast of Texas usually have narrower pronotal margins and less prominent anterior angles. In some southern populations, the lateral margins may diverge slightly towards the apex of pronotum. Narrower lateral margins are usually correlated with coarser and denser punctation.

Surface sculpture may be coarsely granulate and dull to smooth and shiny. In specimens with coarser and denser punctation, the interspaces are usually smoother and shiny.

The length of the pronotum relative to that of the elytra exhibits considerable variation. EL/PL varies from 1.80 to 2.60. The larger pronotum is usually found in southern populations.

The total size is also variable in *O. punctatus*, TL ranging from 1.30 to almost 3.00 mm. Larger specimens are usually found in northern and western populations and the smallest individuals are from Florida and Texas.

There is little variation in vestiture, all specimens examined being clothed with very short and fine hairs. The coloration is also fairly uniform throughout the range. It is likely that two species are included among this material and a third may even be found in the southeastern collections. In specimens from the western and northern parts of the continent the size is larger, the pronotum smaller, dull, finely and sparsely punctate, and the lateral pronotal margins are broad and somewhat rounded, with prominent anterior angles. The type specimens of both *O. punctatus* and *O. aterrimus* are of this form. The second form may be found throughout the eastern and midwestern part of the continent and south to Florida and the Gulf Coast. This is more variable but usually has a larger prothorax, with a shiny, coarsely and densely punctate pronotum, narrower, subparallel lateral margins with less prominent anterior angles. Casey's concept of *O. punctatus* would be included here. Since little is known of the biology of either form and since they cannot be consistently distinguished from one another, I prefer to lump them under one name for the present.

Orthocis punctatus is most closely related to the Palaearctic species *O. alni* (Gyllenhal), *O. linearis* (Sahlberg), and *O. pseudolinearis* (Lohse), and the latter two differ

from *O. alni* in much the same way as the two forms above differ from one another (*see* Lohse, 1965, 1967).

Orthocis transversatus (Kraus), NEW COMBINATION

Ennearthron transversatum Kraus, 1908: 79, pl. 3, fig. 7; Lawrence, 1965: 283, 286. Type locality: "Crescent City, Fla." Holotype, ♀, USNM.

?*Ennearthron pallidum* Kraus, 1908: 79, pl. 3, fig. 6; Lawrence, 1965: 283. Type locality: "Haw Creek, Fla." Holotype, ♀, USNM (type lost). NOMEN DUBIUM.

Orthocis pulcher Kraus, — Blatchley, 1923: 19 (dist., biol.); Blatchley, 1928: 68 (dist., biol.). Misidentification.

Distribution. Southeastern United States, from southern Virginia to Florida and west to the Gulf Coast of Texas. Marginal records: VIRGINIA: Virginia Beach, Princess Anne Co.; FLORIDA: Dunedin, Pinellas Co.; TEXAS: Dallas, Dallas Co.; Columbus, Colorado Co.

Host fungi. Unknown. Bred from decaying rattan vines in Virginia. Collected by beating dead branches of *Quercus* and from a dead limb of "red-bay" in Florida.

Discussion. This species may be distinguished from other North American *Orthocis* by the 9-segmented antennae, small size, coarse and dense pronotal punctation, and bicolored elytra. It resembles certain small, bicolored *Cis*, such as *C. krausi*, *C. superbus* Kraus, and *C. atromaculatus* Pic, but in all of these the vestiture consists of stouter bristles rather than fine hairs, the antennae are 10-segmented, and the protibial apices are angulate or dentate. The type of Kraus's *Ennearthron pallidum* was lost and the description is inadequate: thus the name is doubtfully synonymized above and considered a *nomen dubium*. *O. transversatus* is closely related to *O. annulatus* (Kraus) from Cuba, which also has 9-segmented antennae and may not be specifically distinct.

Genus *Strigocis* Dury

Strigocis Dury, 1917: 18; Leng, 1920: 247; Arnett, 1962: 829. Type species, by monotypy, *Strigocis opacicollis* Dury, 1917: 20.

Cis Latreille (in part), — Mellié, 1848: 356; Abeille de Perrin, 1874b: 75; Reitter, 1878c: 33; Gorham, 1883: 222; Reitter, 1902a: 57; Dalla Torre, 1911: 6; Winkler, 1927: 793; Kevan, 1967: 143.

Rhopalodontus Mellié (in part), — Fowler, 1890: 212; Peyerimhoff, 1915: 26; Horion, 1951: 321; Nobuchi, 1960: 39.

Xestocis Casey (in part), — Casey, 1898: 86; Dury, 1914: 18–19; Leng, 1920: 247; Arnett, 1962: 829.

Entypus (*Entypocis*) Lohse (in part), — Lohse, 1964: 121.

Sulcacis (*Entypocis*) Lohse (in part), — Lohse, 1967: 284.

Sulcacis Dury (in part), — Lawrence, 1965: 277.

Included species. Cis bicornis Mellié, 1848: 356 [Europe]; *Cis bilimeki* Reitter [Mexico, *see* p. 490]; *Strigocis opacicollis* Dury [eastern North America, *see* p. 490]; *Xestocis opalescens* Casey [eastern North America, *see* p. 490]; *Rhopalodontus tokunagai* Nobuchi, 1960: 39 [Japan]. Total: 5 species.

In a previous paper (Lawrence, 1965), I included *Cis bicornis* Mellié in the genus *Sulcacis*, although specimens had not been seen at that time. *Rhopalodontus tokunagai* Nobuchi was tentatively placed in the same genus. Having examined specimens of *C. bicornis* and reviewed the description of *R. tokunagai*, I would now place both species in the North American genus *Strigocis*, originally proposed by Dury (1917) for *S. opacicollis*. Members of both genera are characterized by having the protibial apex spinose, but in other respects the groups are quite distinct and probably distantly related. The main differences between *Strigocis* and *Sulcacis* are listed in the table below.

In addition to the species mentioned above, *Strigocis* includes the North American *Xestocis opalescens* Casey, the Mexican *Cis bilimeki* Reitter, and at least three more undescribed forms from Central America. Members of this genus resemble

TABLE 4. DIFFERENCES BETWEEN *STRIGOCIS* AND *SULCACIS*.

Characters	Strigocis	Sulcacis
Vestiture	single confused fine hairs or bristles	dual confused or seriate bristles
Antennae	10-segmented	9- or 10-segmented
Prosternum (in front of coxae)	tumid to carinate and on same level as intercoxal process (Fig. 14)	concave or biconcave and on different level than intercoxal process (Fig. 15)
Intercoxal process of prosternum	parallel-sided	tapering behind
Pronotal hypomera	strigose	not strigose
Anterior angles of pronotum	angulate or produced (Fig. 14)	rounded and not produced (Fig. 15)
Lateral margins of pronotum	broader, usually visible from above	narrower, not visible from above
Anterior edge of pronotum in male	produced and emarginate, usually with 2 processes	simple and rounded
Frontoclypeal ridge in male	produced and emarginate	bearing 2 teeth or tubercles
Maxillary palps	short and stout	long and narrow
Elytral suture	with inflexed margin at apex (Fig. 38)	without inflexed margin
Metasternal suture	longer	shorter

various *Cis* species having a strongly tumid or carinate prosternum (*Cis tricornis* group or *Cis nitidus* group), but differ from them by virtue of the spinose protibial apex and inflexed elytral suture. Species of *Ceracis* have spinose protibial apices, but differ in having a concave prosternum with laminate intercoxal process, rounded anterior pronotal angles, and simple elytral suture.

Key to the North American Species of *Strigocis*

1. Vestiture of very short, stout bristles, which are less than 2.0 × as long as wide; pronotal punctation fine and dense, punctures less than 0.10 × as large as scutellar base and separated by less than 0.75 diameter; pronotal surface distinctly granulate and dull; abdominal fovea in male more than 0.60 × as long as body of sternite III; known from highlands of Mexico and probably occurring in southern Arizona ---------- *S. bilimeki* (p. 490)
— Vestiture of finer hairs; pronotal punctures separated by more than 0.75 diameter or punctures more than 0.15 × as large as scutellar base; abdominal fovea less than 0.60 × as long as body of sternite III; eastern United States and northern Mexico ---------- 2
2. Body shorter and stouter, EL/EW less than 1.33; elytral hairs colorless, less than 0.15 × as long as scutellar base and not or barely visible under 10× magnification; lateral margins of pronotum broader and with a raised lip; pronotal surface usually shiny ---- *S. opalescens* (p. 490)
— Body longer and narrower, EL/EW more than 1.33; elytral hairs yellow, more than 0.20 × as long as scutellar base and easily

visible under 10× magnification; lateral margins of pronotum narrower and without raised lip; pronotal surface usually dull ..... *S. opacicollis* (p. 490)

Strigocis bilimeki (Reitter), NEW COMBINATION

Cis bilimeki Reitter, 1878a: 33; Gorham, 1883: 222. Type locality: "Mexico." Lectotype, ♂, Oberthür Coll., MNHN.

Distribution. Mountains of northern Mexico; probably extending into southern Arizona. Marginal records: DURANGO: 11 mi. SW El Salto; HIDALGO: Tenango de Doria; TAMAULIPAS: Rancho del Cielo, 3700′, NW Gomez Farias.

Host fungi. Lenzites betulina [1(1)]; *Polyporus versicolor* [1].

Discussion. Individuals of this species are somewhat larger than those of *S. opacicollis* and *S. opalescens* (TL usually greater than 1.5 mm) and are easily distinguished by the short, stout, yellowish bristles, fine and dense pronotal punctation, dull surface, and large abdominal fovea in the male. The predicted occurrence of *S. bilimeki* in the Southwest is based on a collection from southern Arizona that was discarded because it was thought to be a contaminant population of *S. opacicollis*. Specimens and records were not retained, but I now think it is more likely that this "contaminant" collection was *S. bilimeki*, present in the original collection as a few larvae and thus overlooked. Further collecting in Arizona should verify this.

Strigocis opacicollis Dury

Strigocis opacicollis Dury, 1917: 20; Weiss and West, 1920: 8 (dist., biol.). Type locality: "Cincinnati, Ohio." Syntypes, Dury Coll., CIN.

Distribution. Eastern North America, from southern Vermont and New Hampshire to the Florida Keys, west as far as eastern Kansas, and south into Mexico (Fig. 100). Marginal records: NEW YORK: N. Fairhaven, Cayuga Co. VERMONT: Manchester, Bennington Co. NEW HAMPSHIRE: 7 mi. NW Wilton, Hillsboro Co. FLORIDA: Chipola Park, Dead Lake, Calhoun Co.; Plantation Key, Monroe Co. ARKANSAS: Washington Co. KANSAS: Onaga, Pottawatomie Co. NUEVO LEÓN: Chorros de Agua, 13 mi. W Montemorelos. HIDALGO: Tenango de Doria. VERACRUZ: 20 mi. E Cordoba; Orizaba.

Host fungi. Polyporus versicolor [29 (14)]; *Lenzites betulina* [7(1)]; *Polyporus hirsutus* [5]; *Polyporus maximus* [1(1)]; *Polyporus pinisitus* [1(1)]; *Polyporus subectypus* [1(1)]; *Polyporus adustus* [1]; *Polyporus gilvus* [1]; *Polyporus sanguineus* [1]; *Polyporus tenuis* [1].

Discussion. This is the most common and widespread species of *Strigocis* in North America. It differs from *S. opalescens* in the more elongate form, narrower lateral pronotal margins, and the size and color of the hairs. It is similar to *S. bilimeki* in general form and male armature (frontoclypeal ridge and pronotal apex each forming an emarginate plate), but the vestiture is quite different and the pronotal punctation is much denser.

In eastern North America, *S. opacicollis* is sympatric with *S. opalescens*, and the two may feed on the same fungi; the latter species, however, appears to be much rarer. In northern Mexico, all three *Strigocis* occur in the same areas along with two undescribed species. All appear to frequent the same fungi (*Polyporus versicolor* and its relatives) and as many as three have been taken on the same fruiting body.

Individuals from Plantation Key differ from those to the north in being smaller in size (TL = 1.0 to 1.3 mm) with the pronotal surface shiny and reddish in color, contrasting with the blackish elytra. This may be a dwarf race or a distinct species. Specimens from Veracruz are somewhat similar.

Strigocis opalescens (Casey), NEW COMBINATION

Xestocis opalescens Casey, 1898: 86; Dury, 1917: 17 (dist.). Type locality: "Pennsylvania (Westmoreland Co.)" [St. Vincent]. Holotype, ♂, Casey Coll., USNM.

Xestocis davisi Dury, 1917: 16. Type locality: "Staten Island, N. Y." Holotype, ♂, Dury Coll., CIN. NEW SYNONYMY.

Distribution. Eastern North America, from southern Michigan and New York south and west as far as northeastern Mexico. Marginal records: MICHIGAN: Detroit, Wayne Co.; NEW YORK: Staten Is., Richmond Co.; NORTH CAROLINA: 2.5 mi. NW Highlands, Macon Co.; MISSISSIPPI: Meridian, Lauderdale Co.; TAMAULIPAS: Rancho del Cielo, 3700′, NW Gomez Farias.

Host fungi. Polyporus versicolor [3(1)].

Discussion. Individuals of this species are shorter, broader, and more rounded than those of either S. *opacicollis* or S. *bilimeki*, the lateral pronotal margins are broader and somewhat raised, and the vestiture consists of very short and fine, pale hairs. Although it occurs throughout eastern North America and into Mexico, S. *opalescens* appears to be rare and there are few specimens in collections.

Genus *Hadraule* Thomson

Hadraule Thomson, 1863: 182; Lawrence, 1965: 282 (complete synonymy); Lohse, 1967: 295. Type species, by monotypy, *Cis elongatulus* Gyllenhal, 1827: 627.

Maphoca Casey, 1900: 165. Type species, by monotypy, *Maphoca blaisdelli* Casey, 1898: 165. NEW SYNONYMY.

Mapheae Dalla Torre, 1911: 21. Incorrect subsequent spelling.

Diphyllocis Reitter, — Dury, 1917: 4; Leng, 1920: 247; Arnett, 1962: 829; Hatch, 1962: 235 (not Reitter, 1885: 209).

Pityocis Peyerimhoff, 1918: 141. Type species, by monotypy, *Pityocis coarctatus* Peyerimhoff, 1918: 142 (= *Cis elongatulus* Gyllenhal).

Ennearthron (*Knablia*) Roubal, 1936: 53. Type species, by monotypy, *Cis elongatulus* Gyllenhal.

Included species. Maphoca blaisdelli Casey [western North America, *see* p. 491]; *Cis elongatulus* Gyllenhal [Eurasia and northeastern North America, *see* p. 492]; *Hadraule explanata* Lawrence, n. sp. [northeastern North America, *see* p. 493]. Total: 3 species.

The only species currently included in the genus *Hadraule* is the type, *H. elongatula,* although several others have been added at one time or other (*see* Lohse, 1964 and Lawrence, 1965). Casey's *Maphoca blaisdelli* was placed in a separate genus because of the 2-segmented antennal club, and Dury (1917) transferred the species to *Diphyllocis* for the same reason. Actually, *M. blaisdelli* is similar to *H. elongatula* in several respects, including prothoracic structure (Fig. 28), and the two appear to be congeneric in spite of the slight reduction of the first club segment in the former. Reitter's genus *Diphyllocis,* on the other hand, is based on a distinct and unrelated European species, *D. opaculus* (Reitter). Members of *Hadraule* are easily recognized by the small size, flattened form, 9-segmented antennae, and elongate prosternum.

Key to the North American Species of *Hadraule*

1. Pronotum slightly narrowed apically, widest behind middle, the margins broad and explanate, easily visible for their entire lengths from above (Fig. 21); head strongly declined, only partly visible from above; size larger, TL more than 1.5 mm ..... *H. explanata* (p. 493)
— Pronotum slightly broader apically, widest at anterior fourth, the margins narrow, not or barely visible for their entire lengths from above (Fig. 20); head only weakly declined, visible from above; size smaller, TL less than 1.5 mm 2
2. Antennal club apparently 2-segmented, the first club segment barely larger than the last funicular segment; pronotum reddish, much lighter in color than elytra ..... *H. blaisdelli* (p. 491)
— Antennal club 3-segmented; pronotum and elytra uniformly dark in color ..... *H. elongatula* (p. 492)

Hadraule blaisdelli (Casey), NEW COMBINATION

Maphoca blaisdelli Casey, 1900: 165; Lawrence, 1965: 279. Type locality: "California (Mokelumne Hill, Calaveras Co.)." Holotype, ♀, Casey Coll., USNM.

Diphyllocis blaisdelli (Casey), — Leng, 1920: 247; Criddle, 1926: 98 (dist.); Hatch, 1962: 235, pl. 48, fig. 8 (dist., biol.).

Distribution. Western North America, from southern British Columbia to southern California, east through Utah, Arizona, and New Mexico into Texas, and south into Mexico. Also known from Iowa, Ohio, Michigan, Massachusetts, Connecticut, and Florida. Marginal records: BRITISH COLUMBIA: Peachland; CALIFORNIA: 1.5 mi. NW Mt. Laguna, San Diego Co.; UTAH: Logan, Cache Co.; ARIZONA: 15 mi. E Douglas, Cochise Co.; NEW MEXICO: Deming, Luna Co.; TEXAS: San Antonio, Bexar Co.; VERACRUZ: San Juan de la Punta; IOWA: Iowa City, Johnson Co.; OHIO: Mt. Washington, Cincinnati, Hamilton Co.; MICHIGAN: Saugatuck, Allegan Co.; MASSACHUSETTS: Amherst, Hampshire Co.; CONNECTICUT: New Haven, New Haven Co.; FLORIDA: (no specific locality). Only one of the northeastern records (Saugatuck, Michigan) is known to be based on field collected specimens; the others are probably herbarium infestations (*see* below).

Host fungi. Lenzites saepiaria [3(2)]; *Polyporus adustus* [3(1)]; *Trametes sepium* [3]; *Polyporus munzii* [2]; *Polyporus versicolor* [2]; *Daedalea confragosa* [1(1)]; *Fomes annosus* [1(1)]; *Polyporus anceps* [1(1)]; *Polyporus biformis* [1(1)]; *Trametes hispida* [1(1)]; *Fomes robiniae* [1]. Also recorded from *Pleurotus* sp. and *Polyporus cuticularis.*

Discussion. This is the only widespread *Hadraule* in North America, the other two being restricted to the extreme northeastern part of the continent. The species may be distinguished from both *H. explanata* and *H. elongatula* by the 2-segmented antennal club and reddish prothorax.

H. blaisdelli is fairly common in California, where it breeds on several different fungi, and it extends throughout the Southwest and into southern Mexico. It has also been collected in Michigan and has been recorded as a herbarium pest from various localities in eastern North America. Specimens from Vancouver, British Columbia, were taken from a herbarium polypore and the Amherst specimens are from a lichen collection. In the National Fungus Collections at Beltsville, Maryland, a large number of dead specimens were found in various boxes of fungi, but there is reason to believe that this is an old infestation originating at the Missouri Botanical Garden. This is the only species of Ciidae that is known to be an herbarium pest.

Hadraule elongatula (Gyllenhal)

Cis elongatulus Gyllenhal, 1827: 627. Type locality: "Sparrsätra Westrogothiae" [Sweden]. Types, Gyllenhal Coll., Zool. Univ. Mus., Uppsala ?

Hadraule elongatula (Gyllenhal), — Thomson, 1863: 182.

Hadraula elongatula (Gyllenhal), — Pielou and Verma, 1968: 1184 (dist., biol.).

Enearthron striatum J. Sahlberg, 1901: 11. Type locality: "Fennia australi" [Finland]. Types, C. Sahlberg Coll., MZUH ?

Pityocis coarctatus Peyerimhoff, 1918: 142. Type locality: "Ain-Haouas près Djelfa." [Algeria]. Lectotype, ♂, Peyerimhoff Coll., MNHN.

Cis elongatus Schilsky, 1900: 59. Incorrect subsequent spelling.

Distribution. Widespread throughout Europe, Siberia, and North Africa. In North America, known only from Ludlow, NEW BRUNSWICK. Probably introduced from Europe.

Host fungi. Polyporus betulinus [1(1)].

Discussion. This species may be distinguished from *H. blaisdelli* by the 3-segmented antennal club and darker pronotum. *H. explanata* is somewhat larger with broader pronotal margins. Smaller specimens of *Cis striolatus* and its relatives may be confused with *H. elongatula* but they differ in having 10-segmented antennae and a shorter prosternum in front of the procoxae.

Hadraule elongatula has been recorded from various parts of the Palaearctic Region, but there is only a single record from North America. Although the New Brunswick population may represent an introduction, it is possible that this small and elusive beetle occurs throughout Canada. In the Old World, *H. elongatula*

has been taken in the galleries of *Dorcatoma* (Anobiidae) in *Liriodendron*, in bark beetle galleries (Scolytidae) in *Picea*, in association with *Pinus halepensis* in North Africa, and on a birch fungus in Scandinavia (Reitter, 1878a; Peyerimhoff, 1918; Palm, 1946, 1952). This population was apparently breeding in the conks of *Polyporus betulinus*.

Hadraule explanata NEW SPECIES

Holotype. ♀, MAINE: E Machias, Washington Co., June, Fenyes Collection [CAS].

Female. Length 1.55 mm. Body 2.48 × as long as broad, flattened, GD/EW 0.68. Head and pronotum reddish brown, elytra yellowish brown. Vestiture of very short, erect, colorless, fine bristles. Vertex flattened; frontoclypeal ridge simple. Antennal club 3-segmented. Pronotum (Fig. 21) 0.78 × as long as broad, widest at posterior fourth; anterior edge weakly rounded; sides subparallel, barely sinuate at middle, slightly converging anteriorly, the margins broad and distinctly crenulate, easily visible for their entire lengths from above; anterior angles distinctly produced and rounded; disc slightly convex, even; surface distinctly granulate and dull; punctures 0.18 × as large as scutellar base and separated by 1.0 to 2.0 diameters. Elytra 1.76 × as long as broad and 2.44 × as long as pronotum; sides subparallel, apices blunt; punctation dual and distinctly seriate; megapunctures at least 2.0 × as large as pronotal punctures, separated by less than 0.50 diameter between and within rows, subquadrate, shallow, and nude; micropunctures located mainly between rows, each bearing a fine erect, colorless bristle, which is 0.20 × as long as scutellar base. Prosternum slightly tumid; intercoxal process 0.62 × as wide as a procoxal cavity, parallel-sided. Protibial apex narrowly rounded.

Distribution. Known only from the type locality.

Host fungi. Unknown.

Discussion. This species is easily distinguished from the other two *Hadraule* by the broad and explanate lateral pronotal margins; it is also somewhat larger in size. In general form the species resembles *Cis striolatus*, but the latter differs in having 10-segmented antennae, angulate or dentate protibia, and narrower lateral pronotal margins. At present only a single female specimen is known, but it is sufficiently distinct to warrant description at this time. It is hoped that further collecting in the Northeast will turn up the male and reveal something of the biology of this species.

The name *explanatus* is derived from the Latin word meaning to make level or flat (referring to the broad, explanate lateral pronotal margins).

Genus *Plesiocis* Casey

Plesiocis Casey, 1898: 87; Dalla Torre, 1911: 20; Dury, 1917: 22; Leng, 1920: 247; Arnett, 1962: 829; Hatch, 1962: 233. Type species, by monotypy, *Plesiocis cribrum* Casey, 1898: 87.
Ennearthron Mellié, — Hubbard, 1892: 254, 255.

Included species. Plesiocis cribrum Casey [western and northern North America, *see* p. 494].

Excluded species. Plesiocis spenceri Hatch (*see* p. 482).

This genus contains the single species *P. cribrum*, which probably should be lumped together with the heterogeneous assemblage of forms currently included in *Ennearthron* (*see* discussion on p. 480). I prefer to retain the genus *Plesiocis*, which has been consistently recognized by American authors, until a thorough generic revision is possible. The North American species of *Ennearthron* are easily distinguished from *Plesiocis cribrum* by the characters given in the generic key as well as by the smaller size and less robust body form. The narrow and parallel-sided intercoxal process of the prosternum is similar to that found in *Ceracis*, but the protibial apex bears a stout tooth as in species of *Cis*. Although the relationships of *P. cribrum* are obscure at present, there is little doubt that it repre-

sents an independent line exhibiting reduction in antennal segmentation.

Plesiocis cribrum Casey

Plesiocis cribrum Casey, 1898: 87; Dury, 1917: 21 (dist.); Criddle, 1921: 80 (dist.); Weiss, 1923: 199 (biol.); Weiss and West, 1922: 199 (dist., biol.); Hatch, 1962: 234, pl. 48, fig. 5, 5a (dist., biol.). Type locality: "California (Mokelumne Hill, Calaveras Co.)." Holotype, ♂, Casey Coll., USNM.

Distribution. Northern and montane regions of North America, from British Columbia to the Gaspé Peninsula of Quebec, south to the Laguna Mountains in California, the edge of the Colorado Plateau in Arizona and New Mexico, the Great Lakes Region, and the Shenandoah Mountains of Virginia (Fig. 89). Marginal records: BRITISH COLUMBIA: Salmon Arm; QUEBEC: Gaspé; VIRGINIA: Stokesville, Augusta Co.; MICHIGAN: East Tawas, Iosco Co.; WISCONSIN: (no specific locality); NEW MEXICO: 5 mi. W Luna, Catron Co.; ARIZONA: Williams, Coconino Co.; CALIFORNIA: 1.5 mi. NW Mt. Laguna, San Diego Co.

Host fungi. Polyporus volvatus [48(30)]; *Polyporus anceps* [8(5)]; *Polyporus alboluteus* [2].

Discussion. This species may be distinguished from most North American Ciidae by the 9-segmented antennae, fairly short and broad body form, dentate protibial apex, coarse and dense punctation which is single and confused on the elytra, vestiture of short, stout bristles, and 4 sharp teeth on the clypeus of the male (Fig. 4). *Cis laminatus* is similar but has 10-segmented antennae and a raised, trisinuate plate on the clypeus of the male. *Cis duplex* differs in antennal segmentation and male armature, and is usually smaller in size. *Dolichocis manitoba* has 9-segmented antennae and similar coarse punctation, but the body is elongate and cylindrical (EL/EW usually more than 1.50), the protibial apices are simple, and the male sexual characters are different. *Ennearthron spenceri* and *E. aurisquamosum* are both similar to *P. cribrum* in antennal segmentation, protibial apices, and general body form, but they differ from the latter in having a broader prosternal intercoxal process, longer metasternal suture, and distinctly notched clypeus in the male (Fig. 8).

Plesiocis cribrum is widespread and abundant throughout the coniferous forests of western North America and appears to be rare in the eastern part of the continent. It occurs primarily on the conks of *Polyporus volvatus* but also breeds in *P. anceps*. At the southern end of its range, it shares the same habitat with *C. duplex* and the latter apparently replaces *P. cribrum* in southern Arizona.

Genus *Ceracis* Mellié

Ennearthron (*Ceracis*) Mellié, 1848: 375; Lawrence, 1967b: 95 (complete synonymy). Type species, by subsequent designation, *Ennearthron* (*Ceracis*) *sallei* Mellié, 1848: 377 (Lawrence, 1967b: 95).

Included species. See Lawrence (1967b: 97–98). Also included are *Ceracis magister* Lawrence, n. sp. [Florida, *see* p. 498] and *C. pecki* Lawrence, n. sp. [southeastern U. S., *see* p. 499]. Total: 42 species.

This genus has been treated in a previous paper (Lawrence, 1967b) and need not be discussed in detail here. In the following section, two new species are described, one species (*C. similis*) is added to the fauna (although not actually recorded from the United States), new keys to males and females are presented, and significant additions are made to distributions and host ranges based on recently accumulated data.

Key to the North American Species of *Ceracis*

Males

(Abdominal sternite III with pubescent fovea)

1. Antennae 10-segmented 2
— Antennae with less than 10 segments 3
2. Elytral punctation distinctly seriate, the larger punctures forming relatively straight rows; pronotal apex bearing 2 horns, each with a rounded knob above it; abdominal

fovea slightly transverse; color of elytra usually reddish ..... *C. singularis* (p. 502)
— Elytral punctation not distinctly seriate; pronotal apex with a raised, emarginate lamina; abdominal fovea circular; color of elytra usually black ..... *C. magister* (p. 498)
3. Antennae 9-segmented 4
— Antennae 8-segmented 12
4. Pronotal apex rounded or shallowly emarginate, without distinct tubercles, horns, or lamina 5
— Pronotal apex produced, forming a lamina or 2 horns or tubercles 7
5. Frontoclypeal ridge produced, forming a long, narrow, median horn; pronotal and elytral punctation very fine and sparse; metasternal suture more than 0.20 × as long as median length of metasternum ..... *C. monocerus* (p. 499)
— Frontyclypeal ridge simple or forming 2 rounded plates or tubercles; elytral punctation much coarser and denser than pronotal punctation; metasternal suture less than 0.20 × as long as median length of metasternum 6
6. Body longer and narrower, EL/EW more than 1.45; EL/PL more than 1.85; pronotal apex very shallowly emarginate; elytral punctation dual and confused; southern Arizona and western Mexico ..... *C. powelli* (p. 501)
— Body shorter and broader, EL/EW less than 1.45; EL/PL less than 1.85; pronotal apex rounded; elytral punctation single and uniform; Florida and the West Indies ..... *C. multipunctatus* (p. 499)
7. Elytral punctation single and uniform, very coarse and dense; EL/EW less than 1.35; surfaces of pronotum and elytra finely granulate or smooth and shiny 8
— Elytral punctation dual, the punctures falling into 2 size classes; if obscurely dual, then EL/EW more than 1.35 or pronotum coarsely granulate and dull in contrast to smooth and shiny elytra 9
8. Size larger, TL usually more than 1.55 mm; sides of elytra somewhat rounded; body somewhat shorter and broader; surfaces of pronotum and elytra smooth; pronotal apex bearing 2 approximate tubercles ..... *C. curtus* (p. 497)
— Size smaller, TL usually less than 1.55 mm; sides of elytra subparallel; body somewhat longer and narrower; surfaces of pronotum and elytra finely granulate; pronotal apices bearing 2 widely-spaced tubercles ..... *C. nigropunctatus* (p. 499)
9. Elytral punctation distinctly seriate, the larger punctures forming relatively straight rows; pronotal apex bearing 2 approximate, flattened horns with rounded apices ..... *C. pullulus* (p. 501)
— Elytral punctation not distinctly seriate; pronotal armature different 10
10. Body shorter and broader, EL/EW less than 1.37; pronotal apex with a short, broad, elevated, shallowly emarginate lamina ..... *C. pecki* (p. 499)
— Body longer and narrower, EL/EW more than 1.37; pronotal apex with a deeply emarginate lamina or 2 horns 11
11. Pronotal apex with a deeply emarginate lamina or 2 slightly tumid, subtriangular horns; elytral punctation coarser and denser, the punctures usually separated by less than 0.75 diameter; size somewhat larger, TL usually more than 1.50 mm; elytra somewhat longer and narrower, EL/EW usually more than 1.44; western North America ..... *C. californicus* (p. 497)
— Pronotal apex with 2 distinctly tumid, narrow, diverging horns; elytral punctation finer and sparser, the punctures usually separated by more than 0.75 diameter; size somewhat smaller, TL usually less than 1.55 mm; elytra somewhat shorter and broader, EL/EW usually less than 1.48; eastern North America ..... *C. thoracicornis* (p. 502)
12. Pronotal apex rounded or shallowly emarginate, without distinct horns, tubercles, or lamina; abdominal fovea strongly transverse and at least 0.50 × as long as body of sternite III 13
— Pronotal apex produced, forming a lamina or 2 horns or tubercles; abdominal fovea not or slightly transverse and less than 0.50 × as long as body of sternite III 14
13. Size larger, TL more than 1.40 mm; frontoclypeal ridge simple; pronotal disc strongly declined anteriorly, the apex rounded; elytra expanded apically ..... *C. obrieni* (p. 499)
— Size smaller, TL less than 1.40 mm; frontoclypeal ridge forming 2 tubercles; pronotal disc only weakly declined, the apex shallowly emarginate; elytra subparallel ..... *C. dixiensis* (p. 498)
14. Body longer and narrower, TL/EW more than 2.40; apex of pronotum with 2 narrowed, slightly diverging horns ..... *C. quadricornis* (p. 501)
— Body shorter and broader, TL/EW less than 2.40; apex of pronotum with a short, broad lamina or 2 flattened, subtriangular horns 15
15. Elytral punctation much coarser and denser than pronotal punctation 16
— Elytral punctation as fine and sparse as or

finer and sparser than pronotal punctation 18

16. Size smaller, TL usually less than 1.30 mm; EL/PL usually more than 1.60; pronotal punctation somewhat finer and sparser, the punctures usually less than 0.10 × as large as scutellar base and separated by more than 1.5 diameters; pronotal apex with 2 approximate, triangular horns; color black or dark brown, with pronotal apex yellowish; eastern North America ..... *C. minutissimus* (p. 499)

— Size larger, TL usually more than 1.30 mm; EL/PL usually less than 1.60; pronotal punctation somewhat coarser and denser, the punctures usually more than 0.10 × as large as scutellar base and separated by less than 1.5 diameters; pronotal apex with a short, broad, elevated lamina; color usually uniformly reddish; western North America and Mexico 17

17. Elytra shorter and broader, EL/EW usually less than 1.32; pronotal lamina shorter, broader, less abrupt, and strongly elevated at apex (Fig. 36); southern Texas and eastern Mexico ..... *C. schaefferi* (p. 502)

— Elytra longer and narrower, EL/EW usually more than 1.32; pronotal lamina longer, narrower, more abrupt, and weakly elevated (Fig. 35); western Mexico and Baja California ..... *C. similis* (p. 502)

18. Size smaller, TL less than 1.5 mm; abdominal fovea less than 0.33 × as long as body of sternite III; pronotal apex with 2 subparallel or slightly diverging, narrow horns; elytral punctation subseriate ..... *C. minutus* (p. 499)

— Size larger, TL more than 1.5 mm; abdominal fovea more than 0.33 × as long as body of sternite III; pronotal apex with a deeply emarginate lamina, giving the appearance of 2 broad, subtriangular horns; elytral punctation confused 19

19. Pronotal punctation as fine and sparse as elytral punctation, the punctures usually separated by 1 diameter or more; abdominal fovea slightly transverse ..... *C. sallei* (p. 501)

— Pronotal punctation somewhat coarser and denser than elytral punctation, the punctures usually separated by less than 1 diameter; abdominal fovea circular ..... *C. punctulatus* (p. 501)

Females

(Abdominal sternite III simple)

1. Antennae 10-segmented 2

— Antennae with less than 10 segments 3

2. Elytral punctation distinctly seriate, the larger punctures forming relatively straight rows; color of elytra usually reddish; eastern North America, north of the Florida peninsula ..... *C. singularis* (p. 502)

— Elytral punctation not distinctly seriate; color of elytra usually black; Florida Keys ..... *C. magister* (p. 498)

3. Antennae 9-segmented 4

— Antennae 8-segmented 12

4. Elytral punctation single and confused, very coarse and dense, the punctures separated by 0.50 diameters or less; EL/EW less than 1.40 5

— Elytral punctation distinctly dual, the punctures falling into 2 size classes; if obscurely dual, EL/EW more than 1.40 7

5. Pronotal punctation finer and sparser, the punctures less than 0.10 × as large as scutellar base and separated by more than 0.75 diameter; pronotal disc strongly declined anteriorly, its surface distinctly granulate and dull, in contrast to the smooth and shiny elytral surface ..... *C. multipunctatus* (p. 499)

— Pronotal punctation coarser and denser, the punctures more than 0.10 × as large as scutellar base and separated by less than 0.75 diameter; pronotal disc not or weakly declined anteriorly, its surface similar in texture to that of elytra 6

6. Size larger, TL usually more than 1.55 mm; sides of elytra somewhat rounded; pronotum shorter and broader, PL/PW usually less than 0.88; surfaces of pronotum and elytra smooth ..... *C. curtus* (p. 497)

— Size smaller, TL usually less than 1.55 mm; sides of elytra subparallel; pronotum longer and narrower, PL/PW usually more than 0.88; surfaces of pronotum and elytra finely granulate ..... *C. nigropunctatus* (p. 499)

7. Elytral punctation distinctly seriate, the larger punctures forming relatively straight rows; pronotal punctures separated by more than 1 diameter; southeastern U. S. and West Indies ..... *C. pullulus* (p. 501)

— Elytral punctation not distinctly seriate; if subseriate, pronotal punctures separated by less than 1 diameter and distribution western 8

8. Elytral punctation finer and sparser, the punctures usually smaller than those on pronotum and separated by more than 1 diameter; EL/PL more than 1.50; eastern North America 9

— Elytral punctation coarser and denser, the megapunctures larger than pronotal punctures and separated by less than 1 diameter; EL/PL less than 1.50 or distribution western 10

9. Pronotal punctation very fine and sparse, the punctures less than 0.10 × as large as scutellar base and separated by 1.5 diameters or more; pronotum somewhat shorter and broader, PL/PW usually less than 0.91; metasternal suture more than 0.20 × as long as median length of metasternum; pronotum usually lighter in color than elytra ..... *C. monocerus* (p. 499)
— Pronotal punctation coarser and denser, the punctures more than 0.10 × as large as scutellar base and separated by less than 1.5 diameters; pronotum somewhat longer and narrower, PL/PW usually more than 0.91; metasternal suture less than 0.20 × as long as median length of metasternum; pronotum and elytra similar in color or pronotum darker .... *C. thoracicornis* (p. 502)
10. Pronotum strongly declined anteriorly and relatively long, EL/PL less than 1.50; elytra shorter and broader, EL/EW less than 1.37; color usually reddish; southeastern U. S. ..... *C. pecki* (p. 499)
— Pronotum not or weakly declined anteriorly and relatively shorter, EL/PL more than 1.50; elytra longer and narrower, EL/EW more than 1.37; color usually black or red and black; western North America 11
11. Pronotum distinctly narrowed anteriorly; EL/PL more than 1.85; antennal segment III 2.0 × as long as IV; size smaller, TL usually less than 1.52 mm ..... *C. powelli* (p. 501)
— Pronotum not narrowed anteriorly; EL/PL less than 1.85; antennal segment III 3.0 × as long as IV; size larger, TL usually more than 1.45 mm ..... *C. californicus* (p. 497)
12. Pronotal disc strongly declined anteriorly; elytra expanded apically; southern Arizona and northern Mexico ..... *C. obrieni* (p. 499)
— Pronotal disc not or only weakly declined; elytra not expanded apically 13
13. TL/EW more than 2.35; elytral punctures separated by 0.75 diameter or more, not subconfluent anteriorly; southern Texas, eastern Mexico, and Central America ..... *C. quadricornis* (p. 501)
— TL/EW less than 2.35 or elytral punctures separated by less than 0.75 diameter and becoming subconfluent anteriorly 14
14. Elytral punctation coarser and denser than that of pronotum, the elytral punctures becoming subconfluent anteriorly 15
— Elytral punctation finer and sparser than or as fine and sparse as that of pronotum, the elytral punctures not subconfluent anteriorly 8
15. Size smaller, TL usually less than 1.30 mm; EL/PL more than 1.60; color of elytra uniformly black 16
— Size larger, TL usually more than 1.30 mm; EL/PL less than 1.60; color of elytra reddish or black and red, rarely black 17
16. Pronotum somewhat shorter and broader, PL/PW usually less than 0.90; antennal segment III 1.50 × as long as IV; eastern North America ..... *C. minutissimus* (p. 499)
— Pronotum somewhat longer and narrower, PL/PW usually more than 0.90; antennal segment III 2.0 × as long as IV; western North America ..... *C. dixiensis* (p. 498)
17. Elytra shorter and broader, EL/EW usually less than 1.32; southern Texas and eastern Mexico ..... *C. schaefferi* (p. 502)
— Elytra longer and narrower, EL/EW usually more than 1.32; western Mexico and Baja California ..... *C. similis* (p. 502)
18. Size smaller, TL less than 1.10 mm; elytral punctation subseriate; pronotal surface lightly granulate and shiny ..... *C. minutus* (p. 499)
— Size larger, TL usually more than 1.10 mm; elytral punctation confused; pronotal surface distinctly granulate and dull 19
19. Pronotal punctation about as fine and sparse as elytral punctation, the punctures usually separated by more than 1 diameter ..... *C. sallei* (p. 501)
— Pronotal punctation coarser and denser than elytral punctation, the punctures usually separated by less than 1 diameter ..... *C. punctulatus* (p. 501)

Ceracis californicus (Casey)

Ennearthron californicum Casey, 1884: 36.
Ceracis californicus (Casey),— Lawrence, 1967b: 107–110, figs. 15, 29. *See* Lawrence (1967b) for complete synonymy.

Distribution. See Lawrence (1967b). Also known from Rio Florido, 50 mi. from Parral, CHIHUAHUA.

Host fungi. See Lawrence (1967b).

Ceracis curtus (Mellié)

Ennearthron curtum Mellié, 1848: 367, pl. 12, fig. 15.
Ceracis curtis (Mellié), — Lawrence, 1967b: 110–112, fig. 30. *See* Lawrence (1967b) for complete synonymy.

Distribution. See Lawrence (1967b). Also known from Great Inagua, BAHAMAS; Isla de Pinos, CUBA; Dunedin,

Pinellas Co., FLORIDA; and Windsor, 10 mi. S Falmouth, Trelawny Par., JAMAICA.

Host fungi. Polyporus hydnoides [2(1)]; *Fomes sclerodermeus* [1].

Ceracis dixiensis (Tanner)

Octotemnus dixiensis Tanner, 1934: 47.
Ceracis dixiensis (Tanner), — Lawrence, 1967b: 112–113, fig. 33.

Distribution. See Lawrence (1967b). Also known from Rio Florido, 50 mi. from Parral, CHIHUAHUA.

Host fungi. Trametes hispida [10(8)]; *Ganoderma* sp. [1].

Ceracis magister NEW SPECIES

Holotype. ♂, FLORIDA: Lignum Vitae Key, Monroe Co., June 1, 1968, Lot 2600 J. F. Lawrence, ex *Fomes robiniae* [MCZ No. 31694]. Allotype, ♀, same data [MCZ].

Male. Length 1.80 mm. Body 2.18 × as long as broad. Head, pronotum, and elytra black, elytral suture somewhat reddish. Vertex with a deep, semicircular, transverse impression, preceded by a median elevation; frontoclypeal ridge produced and deeply emarginate, forming 2 triangular plates. Antennae 10-segmented; segment III 1.12 × as long as IV. Pronotum 0.93 × as long as broad, widest at posterior third, strongly declined anteriorly; sides weakly rounded; anterior edge produced forming a flat, elevated lamina which is deeply emarginate, giving an appearance of 2 somewhat rounded plates; disc impressed anteriorly just behind lamina and bearing a short, oblique carina on each side of it; surface distinctly granulate; punctures 0.17 × as large as scutellar base and separated by 1.50 to 2.0 diameters. Elytra 1.30 × as long as broad and 1.48 × as long as pronotum; sides subparallel, apices blunt; punctation dual and confused, much coarser and denser than pronotal punctation. Metasternum 0.48 × as long as wide; suture 0.15 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.25 × as long as body of sternite, distinctly margined, and located posterad of center.

Female. Length 1.77 mm. Body 2.15 × as long as broad. Vertex slightly convex; frontoclypeal ridge simple. Pronotum 0.96 × as long as broad; anterior edge strongly rounded, simple. Elytra 1.30 × as long as broad and 1.54 × as long as pronotum. Sternite III without a pubescent fovea.

Variation. Pronotum yellowish orange to black, usually black, often somewhat reddish anteriorly. Elytra yellowish to black, usually black and somewhat reddish along suture. In smaller males the frontoclypeal tubercles are rounded and the pronotal lamina is shallowly emarginate, while in some larger specimens the pronotum bears two distinct, rounded plates which are slightly divergent. Size and dimensions vary as follows in a series of 21 males and 20 females from Lignum Vitae Key, Monroe Co., Florida (Lot 2600):

TL mm: ♂ 1.45–2.07 (1.74 ± 0.033), ♀ 1.55–1.92 (1.68 ± 0.023);
TL/EW: ♂ 2.14–2.32 (2.21 ± 0.010), ♀ 2.06–2.33 (2.17 ± 0.010);
PL/PW: ♂ 0.88–0.97 (0.94 ± 0.005), ♀ 0.86–0.97 (0.92 ± 0.007);
EL/EW: ♂ 1.29–1.38 (1.33 ± 0.005), ♀ 1.30–1.40 (1.34 ± 0.005);
EL/PL: ♂ 1.39–1.64 (1.50 ± 0.013), ♀ 1.50–1.75 (1.61 ± 0.015);
GD/EW: ♂ 0.87–0.97 (0.92 ± 0.005), ♀ 0.90–0.97 (0.93 ± 0.005).

Total size range in material examined: 1.45–2.25 mm.

Paratypes. FLORIDA: 2, Lignum Vitae Key, Monroe Co., May 27, 1968, Lot 2577 JFL, ex *Fomes robiniae* [JFL]; 48, same locality, June 1, 1968, Lot 2600 JFL, ex *Fomes robiniae* [FMNH, JFL, MCZ, USNM]; 4, same locality and date, Lot 2601 JFL, ex *Fomes robiniae* [JFL]; 11, same locality, June 5, 1968, Lot 2623 JFL, ex *Fomes robiniae* [JFL].

Distribution. Known only from Lignum Vitae Key, Florida.

Host fungi. Fomes robiniae [4(4)].

Discussion. This is one of the two North American *Ceracis* with 10-segmented antennae, and it is easily distinguished from the other, *C. singularis,* by the confused elytral punctation, darker color, and different male armature. It appears to be most closely related to *C. pecki,* from which it differs in antennal segmentation, color, and relative length of pronotum. *C. magister* and *C. pecki* belong to a group of Central American and West Indian species (all undescribed) that breed in melanic conks and are usually fairly large, with 9- or 10-segmented antennae and a short pronotal lamina in the male.

Ceracis magister is known only from the Florida Keys and may occur in the Greater Antilles. On Lignum Vitae Key, it breeds in the conks of *Fomes robiniae,* along with *Cis niedhauki, Malacocis brevicollis,* and *Ceracis punctulatus.*

Ceracis minutissimus (Mellié)

Cis minutissimus Mellié, 1848: 334, pl. 11, fig. 12.
Ceracis minutissimus (Mellié), — Lawrence, 1967b: 113–114, figs. 18, 32.

Distribution and host fungi. See Lawrence (1967b).

Ceracis minutus Dury

Ceracis minuta Dury, 1917: 25; Lawrence, 1967b: 114–115, figs. 19, 33.

Distribution. See Lawrence (1967b). Also known from the BAHAMAS; Lignum Vitae Key, Big Pine Key, Plantation Key, and Key Largo, Monroe Co., FLORIDA; Kingston, Windsor, Mt. Diablo, and Ewarton, JAMAICA.

Host fungi. Polyporus pinisitus [10(6)]; *Polyporus hydnoides* [7(4)]; *Stereum papyrinum* [5(3)]; *Polyporus maximus* [3(3)]; *Polyporus occidentalis* [3(3)]; *Polyporus sanguineus* [3(3)]; *Daedalea elegans* [1(1)]; *Trametes corrugata* [1(1)]; *Fomes sclerodermeus* [1].

Ceracis monocerus Lawrence

Ceracis monocerus Lawrence, 1967b: 115–116, figs. 20, 30. Replacement name for *Ennearthron unicorne* Casey, 1898: 90 (not *Ceracis unicornis* Gorham, 1898: 332).

Distribution and host fungi. See Lawrence (1967b).

Ceracis multipunctatus (Mellié)

Ennearthron multipunctatum Mellié, 1848: 368, pl. 12, fig. 16.
Ceracis multipunctatus (Mellié), — Lawrence 1967b: 116–118, figs. 24, 32.

Distribution. See Lawrence (1967b). Also known from Wakulla Springs State Park, Wakulla Co., FLORIDA; Adelphi, 3 mi. NW Ulster Spr., 10 mi. S Falmouth, and Ewarton, JAMAICA.

Host fungi. Ganoderma zonatum [6(5)]; *Fomes sclerodermeus* [4(4)]; *Ganoderma applanatum* [4(4)]; *Ganoderma lucidum* [1]; *Polyporus hydnoides* [1]; *Polyporus supinus* [1].

Ceracis nigropunctatus Lawrence

Ceracis nigropunctatus Lawrence, 1967b: 118–119, figs. 16, 27.

Distribution. See Lawrence (1967b). Also known from Antigua Morelos, TAMAULIPAS, and Madden Dam, CANAL ZONE.

Host fungi. Polyporus hydnoides [9(4)]; *Ganoderma* sp. [2]; *Polyporus hirsutus* [2]; *Fomes sclerodermeus* [1(1)].

Ceracis obrieni Lawrence

Ceracis obrieni Lawrence, 1967b: 119–120, figs. 25, 29.

Distribution. See Lawrence (1967b). Known also from Peña Blanca, Santa Cruz Co., ARIZONA.

Host fungi. See Lawrence (1967b).

Ceracis pecki NEW SPECIES

Holotype. ♂, FLORIDA: Florida Caverns State Park, Jackson Co., Sept. 6, 1968, Lot 2670 J. F. Lawrence (S. B. Peck, coll.)

ex *Poria nigra* [MCZ No. 31695]. Allotype, ♀, same data. [MCZ].

Male. Length 1.77 mm. Body 2.22 × as long as broad. Head and pronotum dark, reddish brown, elytra reddish. Vertex with a deep transverse impression, preceded by a median elevation; frontoclypeal ridge produced, forming a short, broad, slightly concave, elevated lamina, which is shallowly emarginate at apex. Antennae 9-segmented; segment III 2.0 × as long as IV. Pronotum 0.97 × as long as broad, widest at middle; sides weakly rounded; anterior edge produced, forming a flat, slightly elevated lamina which is shallowly emarginate; disc impressed anteriorly just behind lamina and bearing a short oblique carina on each side of it; surface distinctly granulate; punctures 0.20 × as large as scutellar base and separated by 0.50–1.0 diameter. Elytra 1.28 × as long as broad and 1.37 × as long as pronotum; sides subparallel, apices blunt; punctation indistinctly dual and confused; punctures coarser and denser than those on pronotum. Metasternum 0.44 × as long as wide; suture 0.14 × as long as median length of sternum. Abdominal sternite III bearing a median, circular, pubescent fovea, which is 0.50 × as long as body of sternite, indistinctly margined and located about in center.

Female. Length 1.70 mm. Body 2.19 × as long as broad. Vertex slightly convex; frontoclypeal ridge simple. Pronotum 1.00 × as long as broad; anterior edge strongly rounded, simple. Elytra 1.29 × as long as broad and 1.43 × as long as pronotum. Sternite III without a pubescent fovea.

Variation. Pronotum yellowish orange to brown, usually reddish brown. Elytra yellowish to brown, usually reddish. Frontoclypeal and pronotal laminae in smaller males barely developed. Size and dimensions vary as follows in a series of 25 males and 25 females from Florida Caverns State Park, Jackson Co., Florida (Lot 2760):

TL mm: ♂ 1.47–2.02 (1.68 ± 0.028),
♀ 1.32–1.95 (1.66 ± 0.031);
TL/EW: ♂ 2.11–2.33 (2.20 ± 0.011),
♀ 2.12–2.25 (2.19 ± 0.007);
PL/PW: ♂ 0.93–1.03 (0.97 ± 0.005),
♀ 0.93–1.00 (0.98 ± 0.004);
EL/EW: ♂ 1.21–1.37 (1.28 ± 0.007),
♀ 1.23–1.32 (1.29 ± 0.005);
EL/PL: ♂ 1.25–1.50 (1.38 ± 0.021),
♀ 1.35–1.48 (1.42 ± 0.008);
GD/EW: ♂ 0.86–0.93 (0.90 ± 0.004),
♀ 0.86–0.94 (0.90 ± 0.004).

Total size range in material examined: 1.32–2.13 mm.

Paratypes. FLORIDA: 52, same data as holotype [FMNH, JFL, MCZ, USNM]; ILLINOIS: 1, Starved Rock State Park, LaSalle Co., X–24–1953, leaf mold, C. Ziolkowski leg. [FMNH]; MARYLAND: 1, Oakland, 10.7 [USNM]; VIRGINIA: 1, (no specific locality) [CIN].

Distribution. Eastern United States, from Illinois and Maryland south to Florida.

Host fungi. Poria nigra [1(1)].

Discussion. This species is characterized by the relatively large size, 9-segmented antennae, short and broad elytra with coarse and dense, obscurely dual, confused punctation, relatively elongate pronotum with fine, sparse punctation and coarsely granulate surface, reddish color, and short, broad pronotal lamina in the male. *C. magister* and *C. singularis* are similar, but the former is darker in color with a relatively shorter pronotum, the latter has distinctly seriate elytral punctation, and both have 10-segmented antennae. Other species with 9-segmented antennae have single elytral punctation (*C. curtus* and *C. nigropunctatus*), seriate elytral punctation (*C. pullulus*), finer and sparser elytral punctation (*C. monocerus* and *C. thoracicornis*) or longer and narrower elytra (*C. powelli* and *C. californicus*). Larger specimens of *C. sallei* resemble this species, but the antennae are 8-segmented, the pronotum is relatively shorter, and the male armature is different.

Ceracis pecki is known from a few scattered localities but may be distributed

throughout the Southeast. It appears to be most closely related to *C. magister* and to several undescribed forms from Central America. It has been taken only in *Poria nigra*, which is unusual in having a dark chocolate or violet-brown fruiting body.

Ceracis powelli Lawrence

Ceracis powelli Lawrence, 1967b: 120–121, figs. 23, 27.

Distribution and host fungi. See Lawrence (1967b).

Ceracis pullulus (Casey)

Ennearthron pullulum Casey, 1898: 90.
Ceracis pullulus (Casey), — Lawrence, 1967b: 121–123, figs. 22, 28.

Distribution. See Lawrence (1967b). Also known from Pine Mountain State Park, Harris Co., GEORGIA; Atlantic Beach, Carteret Co., NORTH CAROLINA; Cerro Doña Juana, Ponce, PUERTO RICO; West Union, Oconee Co., SOUTH CAROLINA; 1 mi. NW Adams, Robertson Co., TENNESSEE; and Cinnamon Bay, St. John, VIRGIN ISLANDS.

Host fungi. Polyporus gilvus [20(8)]; *Polyporus licnoides* [7(6)]; *Polyporus porrectus* ? [4(4)]; *Ganoderma zonatum* [4(2)]; *Polyporus iodinus* [2(1)]; *Polyporus hydnoides* [2]; *Polyporus corrosus* [1(1)]; *Poria nigra* [1(1)]; *Polyporus vinosus* [1].

Ceracis punctulatus Casey

Ceracis punctulata Casey, 1898: 90; Lawrence, 1967b: 123–124, fig. 34.
Ceracis punctulatus rubiculus Lawrence, 1967b: 124–127, figs. 13, 34.

Distribution. See Lawrence (1967b). Also known from Big Pine Key, Bill Find's Key, Crawl Key, Grassy Key, Key Largo, Lignum Vitae Key, Plantation Key, and Upper Matecumbe Key, Monroe Co., FLORIDA; and Windsor, 10 mi. S Falmouth, Trelawny Par., JAMAICA.

Host fungi. Polyporus gilvus [46(25)]; *Polyporus hydnoides* [18(9)]; *Fomes robiniae* [5(2)]; *Polyporus fulvocinereus* [3(2)]; *Ganoderma zonatum* [3(1)]; *Polyporus licnoides* [2(2)]; *Stereum papyrinum* [2(2)]; *Polyporus sanguineus* [2]; *Polyporus porrectus* ? [1(1)]; *Fomes fomentarius* [1]; *Ganoderma curtisii* [1]; *Ganoderma lucidum* [1]; *Ganoderma* sp. [1]; *Polyporus adustus* [1]; *Polyporus pargamenus* [1]; *Polyporus pinisitus* [1]; *Stereum ostrea* [1]; *Trametes corrugata* [1].

Discussion. A large series of specimens collected in the Florida Keys shows a great deal of variation in size and color, and individuals are, on the average, smaller and more reddish than those from central and southern Florida. These island populations seem to prefer a wider variety of fungi and were found breeding on *Polyporus fulvocinereus* and *Stereum papyrinum*, as well as *Polyporus hydnoides* and *Fomes robiniae*. The species appears to be common in the area and is the only ciid collected on Bill Find's Key, a small red mangrove island near Sugarloaf Key.

Ceracis quadricornis Gorham

Ceracis quadricornis Gorham, 1886: 359; Lawrence, 1967b: 127–128, figs. 17, 30.

Distribution. See Lawrence (1967b). Also known from Chorros de Agua, 13 mi. W Montemorelos, NUEVO LEÓN; and Antiguo Morelos, TAMAULIPAS.

Host fungi. Polyporus occidentalis [7(4)]; *Polyporus hydnoides* [5(4)]; *Polyporus maximus* [4(3)]; *Polyporus hirsutus* [2(1)]; *Trametes corrugata* [1(1)]; *Polyporus crocatus* [1]; *Trametes cirrifer* [1].

Ceracis sallei Mellié

Ennearthron (*Ceracis*) *sallei* Mellié, 1848: 377, pl. 12, fig. 22.
Ceracis sallei Mellié, — Lawrence, 1967b: 128–130, fig. 11, 26.

Distribution. See Lawrence (1967b).

Host fungi. Ganoderma applanatum [31(16)]; *Ganoderma curtisii* [3(1)]; *Ganoderma zonatum* [2(1)]; *Polyporus hydnoides* [2(1)]; *Fomes connatus* [1(1)]; *Ganoderma lobatum* [1(1)]; *Fomes pini-*

cola [1]; *Fomes sclerodermeus* [1]; *Ganoderma* sp. [1]; *Polyporus cinnabarinus* [1].

Ceracis schaefferi Dury

Ceracis schaefferi Dury, 1917: 25; Lawrence, 1967b: 130–131, figs. 14, 28.

Distribution and host fungi. *See* Lawrence (1967b).

Ceracis similis Horn

Ceracis similis Horn, 1894: 391; Casey, 1898: 90; Dury, 1917: 27. Type locality: "Coral de Piedra, Sierra el Taste" [Baja California]. Types, CAS.

Distribution. Baja California Sur and Nayarit south to El Salvador. Marginal records: Porto Balandra, Carmen Is.; San José del Cabo, BAJA CALIFORNIA SUR; San Blas, NAYARIT; 45 mi. N Acatlán, PUEBLA; 2 mi. S Quezaltepeque, EL SALVADOR.

Host fungi. Ganoderma zonatum [3(3)]; *Ganoderma* sp. [2(2)]; *Ganoderma applanatum* [1(1)].

Discussion. Although this species has not been recorded from the United States, it is included here because of its occurrence on several of the islands in the Gulf of California. It is possible that further collecting in extreme southern California may reveal the presence of *C. similis* there. The species most closely resembles *C. schaefferi* from eastern Mexico and southern Texas.

Ceracis singularis (Dury)

Xestocis singularis Dury, 1917: 14.
Ceracis singularis (Dury), — Lawrence, 1967b: 131–132, figs. 12, 33.

Distribution. *See* Lawrence (1967b). Also known from Chattahoochie State Park, Houston Co., ALABAMA; Florida Caverns State Park, Jackson Co., FLORIDA; Spring Mill State Park, Lawrence Co., INDIANA; Wildcat Den State Park, Muscatine Co., IOWA; and Madison, Dane Co., WISCONSIN.

Host fungi. Polyporus gilvus [12(7)]; *Ganoderma applanatum* [8(2)]; *Fomes robiniae* [4(1)]; *Fomes igniarius* [2(1)]; *Ganoderma curtisii* [2(1)]; *Poria nigra* [2(1)]; *Fomes sclerodermeus* [2]; *Polyporus pargamenus* [2]; *Fomes ribis* [1(1)]; *Lenzites saepiaria* [1(1)]; *Daedalea confragosa* [1]; *Fomes annosus* [1]; *Ganoderma* sp. [1]; *Ganoderma tsugae* [1]; *Polyporus licnoides* [1]; *Polyporus supinus* [1]; *Polyporus versicolor* [1]; *Trametes hispida* [1]; *Trametes plebeja* [1].

Ceracis thoracicornis (Ziegler)

Cis thoracicornis Ziegler, 1845: 270.
Ceracis thoracicornis (Ziegler), — Lawrence, 1967b: 132–136, figs. 21, 31. *See* Lawrence (1967b) for complete synonymy.

Distribution. *See* Lawrence (1967b). Numerous additional records have made no significant changes in the range.

Host fungi. Polyporus pargamenus [41(15)]; *Polyporus supinus* [25(15)]; *Polyporus adustus* [15(6)]; *Polyporus versicolor* [11(3)]; *Lenzites betulina* [10(6)]; *Daedalea ambigua* [9(7)]; *Ganoderma applanatum* [7]; *Polyporus sector* [6(2)]; *Daedalea unicolor* [6(2)]; *Fomes ulmarius* [6(1)]; *Ganoderma lucidum* [5(2)]; *Ganoderma tsugae* [5(1)]; *Polyporus hirsutus* [4(1)]; *Polyporus squamosus* [3(2)]; *Polyporus abietinus* [3(1)]; *Polyporus gilvus* [3]; *Fomes sclerodermeus* [2(1)]; *Trametes corrugata* [2(1)]; *Stereum ostrea* [2]; *Trametes plebeja* [2]; *Ganoderma* sp. [1(1)]; *Polyporus spraguei* [1(1)]; *Polyporus tulipiferae* [1(1)]; *Poria vitrea* [1(1)]; *Trametes hispida* [1(1)]; *Trametes trogii* [1(1)]; *Boletus* sp. [1]; *Daedalea elegans* [1]; *Fomes fomentarius* [1]; *Fomes fraxineus* [1]; *Fomes pinicola* [1]; *Ganoderma curtisii* [1]; *Polyporus cinnabarinus* [1]; *Polyporus dichrous* [1]; *Polyporus hydnoides* [1]; *Polyporus sulphureus* [1]; *Polyporus vinosus* [1].

Genus *Sulcacis* Dury

Sulcacis Dury, 1917: 20; Lawrence, 1965: 278 (complete synonymy); Lohse, 1967: 284. Type species, by subsequent designation, *Sulcacis lengi* Dury, 1917: 21 (Lawrence, 1965: 278).

Entypus Redtenbacher, 1847: 350 (not Dahlbom, 1843: 35). Type species, by monotypy, *Cis affinis* Gyllenhal, 1827: 628 (misidentified as *Apate fronticornis* Panzer).

Entypus (*Entypocis*) Lohse, 1964: 121. Type species, by original designation, *Cis bidentulus* Rosenhauer, 1847: 58.

Sulcacis (*Entypocis*) Lohse, — Lohse, 1967: 284.

Included species. *Cis affinis* Gyllenhal, 1827: 628 [Eurasia]; *Cis bidentulus* Rosenhauer, 1847: 58 [southern Europe, northern Africa]; *Cis curtulus* Casey [northern North America, *see* p. 503]; *Apate fronticornis* Panzer, 1809: 98: 7 [Eurasia]; *Rhopalodontus japonicus* Nobuchi, 1960: 39 [Japan]; *Sulcacis lengi* Dury [eastern North America, *see* p. 504]. Total: 6 species.

Excluded species. *Cis bicornis* Rosenhauer (*see* p. 488); *Rhopalodontus tokunagai* Nobuchi (*see* p. 488).

This genus was discussed in detail by Lohse (1964, under *Entypus* and *Entypocis*) and Lawrence (1965), but the concept is somewhat modified in the present treatment by the transfer of *C. bicornis* and *R. tokunagai* to *Strigocis* (*see* p. 488). Species of *Sulcacis* may be distinguished from most other North American ciids by the spinose protibial apices, biconcave prosternum with a relatively broad, tapering intercoxal process, rounded anterior pronotal angles, and indistinctly dual vestiture, consisting of longer and shorter bristles. The most closely related group is *Malacocis*, in which the body form is shorter and broader and the prosternum very short and straplike.

Key to the North American Species of *Sulcacis*

1. Antennae 9-segmented; elytral punctation finer, punctures usually less than 0.20 × as large as scutellar base; pronotal surface dull; male with frontoclypeal ridge simple and abdominal fovea transversely oval ..... *S. lengi* (p. 504)

— Antennae 10-segmented; elytral punctation coarser, punctures usually more than 0.20 × as large as scutellar base; pronotal surface somewhat shiny; male with frontoclypeal ridge bidentate and abdominal fovea circular ..... *S. curtulus* (p. 503)

Sulcacis curtulus (Casey), NEW COMBINATION

Cis curtula Casey, 1898: 83; Weiss and West, 1920: 8 (dist., biol.); Lawrence, 1965: 277. Type locality: "New York." Holotype, ♂, Casey Coll., USNM.

Cis montana Casey, 1898: 82. Type locality: "Montana (Missoula)." Holotype, ♂, Casey Coll., USNM. NEW SYNONYMY.

Cis sorror Casey, 1898: 83; Hatch, 1962: 230, pl. 48, fig. 3, 3a (dist., biol.). Type locality: [Victoria] "Vancouver Island . . . " [British Columbia]. Holotype, ♂, Casey Coll., USNM. NEW SYNONYMY.

Cis cylindricus Dury, 1917: 8; Weiss, 1920a: 110–111 (biol.); Weiss and West, 1920: 8 (biol.); Weiss and West, 1921a: 61 (dist., biol.); Weiss and West, 1921b: 169 (dist., biol.); Hatch, 1962: 230 (syn. with *sorror*). Type locality: "Umatilla Co., Oregon." Syntypes, Dury Coll., CIN. NEW SYNONYMY.

Sulcacis niger Dury, 1917: 21. Type locality: "Southern Illinois." Holotype, ♀, Dury Coll., CIN. NEW SYNONYMY.

Cis criddlei Dury, 1919: 158. Type locality: "Aweme, Manitoba." Holotype, ♂, Dury Coll., CIN. NEW SYNONYMY.

Cis hystriculus Casey, — Weiss and West, 1921a: 61 (biol.). Misidentification.

Distribution. Widespread throughout the northern and montane regions of North America, from the northern coast of British Columbia to southern Quebec and New England, south to San Diego County, California, the mountains of southern Arizona and northern Mexico, and the states of Nebraska, Illinois, and North Carolina (Fig. 110). Marginal records: BRITISH COLUMBIA: Terrace. ALBERTA: McMurray. MANITOBA: Aweme. QUEBEC: Chelsea. NEW HAMPSHIRE: Intervale, Mt. Surprise, Carroll Co. NORTH CAROLINA: Southern Pines, Moore Co. ILLINOIS: Cahokia, St. Clair Co. NEBRASKA: Central City, Merrick Co.; 15 mi. W Sydney, Cheyenne Co. COLORADO: Pueblo, Pueblo Co. NEW MEXICO: (no specific locality). CHIHUAHUA: Rio Florido, 50 mi. from Parral. ARIZONA: Miller Canyon, 10 mi. W Hereford, Huachuca Mts., Cochise Co. CALIFORNIA: 10 mi. N Descanso, San Diego Co.

Host fungi. *Polyporus versicolor* [69

(35)]; *Polyporus hirsutus* [12(6)]; *Polyporus adustus* [11(3)]; *Lenzites betulina* [8(5)]; *Trametes hispida* [6(4)]; *Pleurotus ostreatus* [3]; *Polyporus cinnabarinus* [2 (1)]; *Fomes igniarius* [2]; *Schizophyllum commune* [1(1)]; *Ganoderma applanatum* [1]; *Polyporus gilvus* [1]; *Polyporus vulpinus* [1]; *Steccherinum ochraceum* [1]; *Stereum hirsutum* [1].

Discussion. This species is similar in general form and punctation to *Dolichocis manitoba*, which is more elongate (EL/EW more than 1.50), with 9-segmented antennae, narrowly rounded protibial apex, and a fovea on the vertex in the male. *Sulcacis lengi* is somewhat shorter and broader and differs in having 9-segmented antennae and finer punctation. *Cis hystriculus* resembles *S. curtulus* in several respects, but differs in having the protibial apex dentate, the body more elongate, the pronotal punctation denser, the elytral bristles colorless (rather than yellow), and the abdominal fovea absent in the male. It appears to be most closely related to the Palaearctic *Sulcacis bidentulus* (Rosenhauer).

Sulcacis curtulus breeds in a number of fungi but prefers *Polyporus versicolor* and its relatives, as do other *Sulcacis* whose feeding habits have been recorded. Although the species is absent from the southwestern deserts, it is fairly widespread throughout the western mountains and along the Pacific Coast, frequenting both dry and humid habitats. Along the coast of California, it breeds in the conks of *Polyporus versicolor* and related fungi, in association with *Cis fuscipes*, *Cis vitulus*, *Cis versicolor*, and *Octotemnus laevis*. In the drier parts of the western mountains and at higher elevations, *S. curtulus* is often found alone in the same habitats. The species is much less common in eastern North America, although it is known from widely scattered localities.

Sulcacis lengi Dury

Sulcacis lengi Dury, 1917: 21; Weiss 1919b: 203–204 (biol.); Weiss and West, 1920: 8 (dist., biol.); Lawrence, 1965: 277. Type locality: "Vermont" [Bennington Co.]. Syntypes, Dury Coll., CIN.

Distribution. Eastern North America, from Maine to the Carolinas and west to eastern Kansas and Texas (Fig. 99). Marginal records: MAINE: Weld, Franklin Co.; NORTH CAROLINA: Calypso, Duplin Co.; SOUTH CAROLINA: Mountain Rest, Oconee Co.; MISSISSIPPI: 4 mi. W Starkville, Oktibbeha Co.; TEXAS: Huntsville, Walker Co.; KANSAS: Salina, Saline Co.; IOWA: Estherville, Emmet Co.; MICHIGAN: (no specific locality).

Host fungi. Polyporus versicolor [11(3)]; *Lenzites betulina* [5(2)]; *Polyporus pubescens* [1(1)]; *Polyporus hirsutus* [1]; *Boletus* sp. [1].

Discussion. This species is similar to *Malacocis brevicollis* in punctation, vestiture, protibial apices, and secondary sexual characters, and it may represent a link between *Sulcacis* and *Malacocis.* Members of the genus *Malacocis*, however, are characterized by the shorter and broader body form, and shortened pronotum, prosternum, and metasternum; in addition, *M. brevicollis* has 10-segmented antennae. *S. curtulus* differs in being more elongate and coarsely punctate, with 10-segmented antennae and different secondary sexual characters.

Sulcacis lengi occurs throughout the eastern part of the continent and breeds in the fruiting bodies of *Polyporus versicolor* and its relatives, in association with *Cis fuscipes*, *Strigocis opacicollis*, *Octotemnus laevis*, and several other ciid species.

Genus *Malacocis* Gorham

Malacocis Gorham, 1886: 356. Type species, by monotypy, *Malacocis championi* Gorham, 1883: 356.

Brachycis Casey, 1898: 86; Dury, 1917: 21; Leng, 1920: 247; Arnett, 1962: 829. Type species, by monotypy, *Brachycis brevicollis* Casey, 1898: 87. NEW SYNONYMY.

Included species. Brachycis brevicollis Casey [eastern North America, *see* p. 505];

Malacocis championi Gorham, 1883: 356 [Guatemala]. Total: 2 species.

Excluded species. Malacocis bahiensis Pic, 1916: 6 [Brazil]. *See* discussion below.

The genus *Malacocis* includes two described and several undescribed species from North and Central America and the West Indies. They are all characterized by the very short and broad body form, vestiture of short to moderately long bristles, straplike prosternum with tapering intercoxal process (Fig. 27), and spinose protibial apex (Fig. 57). The antennae are 10-segmented in the North American *M. brevicollis*, but in the Central American *M. championi* they are 9-segmented, and in an undescribed Mexican form there are only 8 segments. In the male, the pronotal apex is always simple and the frontoclypeal region usually bears two small teeth or tubercles. Some species of *Ceracis* are similar, but the prosternal intercoxal process is laminate and the vestiture consists of very short, fine hairs. The most closely related genus appears to be *Sulcacis*, in which the form is more elongate and the prosternum longer in front of the coxae.

Since Casey's species *Brachycis brevicollis* differs from *M. championi* in little more than antennal segmentation, which has undergone reduction in several groups of Ciidae, I have synonymized the junior name *Brachycis* above. Pic's species *Malacocis bahiensis* does not belong in this group at all, but rather is a member of the *Cis taurus* group (= *Macrocis* Reitter, *see* p. 439).

Malacocis brevicollis (Casey), NEW COMBINATION

Brachycis brevicollis Casey, 1898: 87; Dury, 1917: 21 (dist.); Gibson, 1918: 113 (dist.); Weiss, 1919a: 145–147 (biol.); Weiss and West, 1920: 8 (dist., biol.). Type locality: "New York (Ithaca)." Holotype, ♀, Casey Coll., USNM.

Distribution. Eastern North America, from northern Maine to the Florida Keys and west to southern Manitoba, eastern Kansas, and Texas (Fig. 108). Marginal records: MAINE: Baxter State Park, Piscataquis Co. QUEBEC: Montreal; Knowlton. FLORIDA: Lignum Vitae Key, Monroe Co. TEXAS: Austin, Travis Co. OKLAHOMA: South of Broken Bow, McCurtain Co. KANSAS: 5 mi. S Lawrence, Douglas Co. MANITOBA: Aweme. ONTARIO: 10 mi. SE Upsala.

Host fungi. Polyporus gilvus [36(16)]; *Fomes igniarius* [13(8)]; *Fomes robiniae* [6(3)]; *Fomes robustus* [4(2)]; *Fomes pomaceus* [3(2)]; *Polyporus licnoides* [3]; *Fomes everhartii* [2(1)]; *Fomes pini* [1(1)]; *Polyporus corrosus* [1(1)]; *Fomes fomentarius* [1]; *Fomes johnsonianus* [1]; *Polyporus hydnoides* [1]; *Polyporus vinosus* [1]; *Poria ferruginosa* [1]; *Poria laevigata* [1].

Discussion. Malacocis brevicollis is easily distinguished by the very short and broad body form, the short and straplike prosternum, shortened metasternum, spinose protibial apices, vestiture of short, stout, bristles, and lack of sexual ornaments on the clypeus or pronotum of the male. *Sulcacis lengi* is somewhat more elongate, with the prosternum and metasternum less reduced. In addition, *M. brevicollis* is usually larger in size and the elytra are usually brownish with reddish yellow bristles, while the smaller *S. lengi* has blackish elytra with yellow bristles. Another unique character in *M. brevicollis* is the tendency for the elytral punctures to become transversely confluent on the anteromesal part of the disc, so that a series of indistinct transverse ridges is formed.

There is considerable variation in color and vestiture within this species. Most nonteneral specimens are brownish and many have reddish brown elytra with black or dark brown prothorax. The bristles are shorter in specimens from northern populations, while those from the Southwest have longer bristles that fall into two size classes. One population from Key Largo is comprised entirely of small individuals that are darker in color and have shorter and more yellowish bristles than those of

other southern populations. This may well be a distinct species, but it is not treated as such here. The genus *Malacocis* contains a number of forms (mostly undescribed) from the West Indies, Mexico, and Central America, which should be studied as a unit before any more new species are described.

Malacocis brevicollis is probably the most common and characteristic North American inhabitant of the orange-brown conks characteristic of *Fomes robinae, F. igniarius, Polyporus gilvus* and other fungi usually included in the genera *Phellinus* and *Inonotus*. It may be associated with *Ceracis singularis, Ceracis punctulatus,* or *Ceracis pullulus,* as well as the tenebrionid *Platydema ellipticum* (Fabricius), but it usually occurs alone in the northern part of the range and in the larger, woodier conks.

Subfamily Orophiinae

Orophiina Thomson, 1863: 195.
Orophyidae Kiesenwetter, 1877: 194.
Octotemnidae Reitter, 1878b: 21.
Apatini (in part), — Seidlitz, 1872: 90 (in family Anobiidae).

Included genera. Octotemnus Mellié, *Paratrichapus* Scott, *Rhopalodontus* Mellié, *Scolytocis* Blair, and *Xylographus* Mellié.

Genus *Rhopalodontus* Mellié

Ropalodontus Mellié, 1847: 109; Mellié, 1848: 233. Type species by monotypy, *Cis perforatus* Gyllenhal, 1813: 385.
Rhopalodontus Mellié, — Gaubil, 1849: 123; Lacordaire, 1857: 550; Thomson, 1863: 195; Abeille de Perrin, 1874b: 76; Kiesenwetter, 1877: 194; Reitter, 1902a: 57; Dalla Torre, 1911: 21; Winkler, 1927: 794; Lohse, 1964: 117; Lawrence, 1965: 275; Lohse, 1967: 283; Lohse, 1969: 48–52. Justifiable emendation.
Rhopalodontus (*Cedrinus*) Abeille de Perrin, 1876: 312. Type species, by monotypy, *Rhopalodontus* (*Cedrinus*) *camelus* Abeille de Perrin, 1876: 312.
Cedrinus Abeille de Perrin, — Winkler, 1927: 791.
Cis Latreille, — Gyllenhal, 1813: 385.

Included species. Rhopalodontus americanus Lawrence, n. sp. [Wisconsin, *see* p. 507]; *R. armifrons* Reitter, 1913: 655 [Algeria]; *R. baudueri* Abeille de Perrin, 1874a: 52 [southern Europe]; *R. camelus* Abeille de Perrin, 1876: 312 [Lebanon]; *R. harmandi* Lesne, 1917: 191 [Japan]; *R. novorossicus* Reitter, 1902a: 58 [southeastern Europe]; *Cis perforatus* Gyllenhal, 1813: 385 [Eurasia]; *R. perrini* Reitter, 1878d: 221 [southeastern Europe]; *R. populi* Brisout de Barneville, 1877: cvii [southern Europe]; *R. strandi* Lohse, 1969: 50 [Scandinavia]. Total: 10 species.

Doubtfully included species. Rhopalodontus gyllenhali Gistel, 1857: 59 [Europe]; *R. sassaparillae* Motschulsky, 1852: 22 [Europe]. *See* discussion below.

Excluded species. Rhopalodontus japonicus Nobuchi (*see* p. 503); *R. tokunagai* Nobuchi (*see* p. 488).

Members of this genus may be distinguished from species of *Octotemnus* by the 10-segmented antennae, spinose protibial apices (Fig. 59), and vestiture of moderately long and fine, erect hairs. The male abdominal fovea in *Rhopalodontus* is covered (Fig. 31), as it is in *Octotemnus,* and this condition separates the two genera from *Xylographus, Scolytocis,* and *Paratrichapus*. In *Scolytocis* the antennae are 9-segmented, with a more compact club, while in *Paratrichapus* the tarsi have three segments (instead of four). The species of *Xylographus* are usually distinguished from those of *Rhopalodontus* by the form of the tibiae, which are spinose along the outer edge; this character may break down, however, in certain Indo-Pacific species. The male sexual ornaments in this genus are not spectacular and usually consist of tubercles on the frontoclypeal ridge and occasionally the pronotal apex.

Rhopalodontus gyllenhali and *R. sassaparillae* are doubtfully included in this genus, since types have not been seen and descriptions are completely inadequate. Neither name has been used since, and both probably should be rejected altogether. *Rhopalodontus japonicus* and *R.*

tokunagai have been transferred to *Sulcacis* and *Strigocis*, respectively (*see* p. 503 and 488).

Species of *Rhopalodontus* occur throughout Eurasia from Scandinavia to northern Africa, Burma, and Thailand (undescribed forms), and a single species has recently been discovered in North America (*see* below).

Rhopalodontus americanus NEW SPECIES

Holotype. ♂, WISCONSIN: Woodruff, Oneida Co., July 26, 1968, C. H. Porter, No. 68–57, ex *Polyporus betulinus* [FMNH]. Allotype, ♀, same data [FMNH].

Male. Length 1.82 mm. Body 2.21 × as long as broad, strongly convex. Head and pronotum reddish orange, elytra yellowish orange (teneral). Vestiture consisting of long, fine, erect, yellowish hairs. Vertex slightly concave with a low, median elevation; frontoclypeal ridge bearing 2 rounded tubercles which are separated by 2.0 basal widths. Antennal segment III 1.40 × as long as IV. Pronotum 0.83 × as long as broad, widest at posterior third; anterior edge strongly rounded, slightly flattened at middle; sides strongly rounded, the margins very narrow and weakly crenulate, not visible from above; anterior angles not produced, rounded; disc strongly convex, even; surface finely granulate and shiny; punctures 0.20 × as large as scutellar base and separated by 0.50 to 1.0 diameter. Elytra 1.45 × as long as broad and 1.92 × as long as pronotum; sides subparallel, apices blunt; punctation single and confused; punctures coarser and denser than those on pronotum, about 0.30 × as large as scutellar base and separated by 0.20 to 0.50 diameter, each puncture bearing a fine, erect, yellowish hair, which is about 1.25 × as long as scutellar base. Prosternum (Fig. 25) short and concave, 0.33 × as long as a procoxal cavity; intercoxal process short and subtriangular. Protibia with outer apical angle produced, rounded, and bearing 9 stout spines (Fig. 59). Metasternum 0.46 × as long as wide; strongly convex, flattened in middle; suture absent. Abdominal sternite III bearing a median, transversely oval, pubescent fovea, which is partly covered by a posteriorly projecting, subtriangular flap (Fig. 31).

Female. Length 1.97 mm. Body 2.19 × as long as broad. Vertex slightly convex; frontoclypeal ridge simple. Pronotum 0.82 × as long as broad; anterior edge strongly rounded. Elytra 1.44 × as long as broad and 1.93 × as long as pronotum. Sternite III without a pubescent fovea.

Variation. Pronotum yellowish orange to reddish brown, usually reddish brown. Elytra yellowish to reddish brown, usually reddish brown. Frontoclypeal tubercles in some males subacute. Anterior edge of pronotum in large males slightly emarginate at middle. Size and dimensions vary as follows in a series of 13 males and 13 females:

TL mm: ♂ 1.65–2.05 (1.84 ± 0.030), ♀ 1.75–1.97 (1.87 ± 0.022);
TL/EW: ♂ 2.00–2.21 (2.12 ± 0.017), ♀ 2.11–2.26 (2.15 ± 0.011);
PL/PW: ♂ 0.77–0.85 (0.81 ± 0.008), ♀ 0.81–0.87 (0.83 ± 0.005);
EL/EW: ♂ 1.32–1.47 (1.39 ± 0.012), ♀ 1.36–1.51 (1.42 ± 0.010);
EL/PL: ♂ 1.78–2.00 (1.90 ± 0.016), ♀ 1.81–2.04 (1.93 ± 0.019);
GD/EW: ♂ 0.85–0.93 (0.88 ± 0.006), ♀ 0.85–0.92 (0.89 ± 0.006).

Paratypes. WISCONSIN: 26, Woodruff, Oneida Co., July 26, 1968, C. H. Porter, No. 68–57, ex *Polyporus betulinus* [JFL, MCZ, USNM, UWS]; 5, same locality and date, C. H. Porter, No. 68–59, ex *Russula* sp. [JFL, UWS]; 5, Vilas Co. (no specific locality), July 26, 1968, C. H. Porter, No. 68–80, ex *Polyporus fibrillosus* [UWS]; 5, same locality and date, C. H. Porter, No. 68–83, ex *Fomes* sp. [JFL, UWS].

Distribution. Known only from northern Wisconsin.

Host fungi. Polyporus betulinus [1(1)];

Polyporus fibrillosus [1]; *Fomes* sp. [1]; *Russula* sp. [1].

Discussion. This species may be distinguished from all other North American Ciidae by the characters given in the generic key. It is similar to *Sulcacis curtulus* in general form, punctation, antennal segmentation, and protibial structure, but in that species the vestiture consists of shorter and stouter bristles, the prosternal intercoxal process is much longer, and the abdominal fovea in the male is not covered by a subtriangular flap. *R. americanus* is apparently related to the Palaearctic species *R. perforatus* (Gyllenhal), *R. novorossicus* Reitter, and *R. strandi* Lohse. It differs from *R. perforatus* in being more elongate (TL/EW more than 2.00), and having a shorter and broader prosternal intercoxal process. It may be distinguished from *R. novorossicus* by the longer hairs, coarser elytral punctation, and relatively simple pronotal apex. *R. americanus* closely resembles *R. strandi*, which was described from Scandinavia, but differs from the latter in being smaller and relatively shorter and broader, according to Lohse (*in litt.*), who has examined specimens of both species. According to Lohse's description, *R. strandi* is 1.7 to 2.2 mm long and 2.35 × as long as broad (*see* figures for *R. americanus* above). The aedeagus in *R. americanus* is similar to that of *R. strandi* (Lohse, 1969: 50, fig. 2b), except that the median lobe is slightly longer than the tegmen.

Although this new American species is known only from northern Wisconsin, it may be more widespread in the Boreal parts of the continent, where it may breed in *Polyporus betulinus* and perhaps *Fomes fomentarius*, both of which are common on birch. Host records are not available for *R. strandi*, but *R. perforatus* has been reported from *Fomes fomentarius* and *Polyporus betulinus* in Scotland (Paviour-Smith, 1969) and from *F. fomentarius* in Scandinavia (Saalas, 1923: Palm, 1959).

Genus *Octotemnus* Mellié

Octotemnus Mellié, 1847: 110; Mellié, 1848: 384; Lacordaire, 1857: 554; Jacquelin du Val, 1861: 239; Abeille de Perrin, 1874b: 90; Casey, 1898: 91; Reitter, 1902a: 60; Dalla Torre, 1911: 26; Dury, 1917: 28; Leng, 1920: 247; Arnett, 1962: 830. Type species, by subsequent designation, *Cis glabriculus* Cyllenhal, 1827: 627 (Jacquelin du Val, 1861: 239).

Orophyus (*Octotemnus*) Mellié, — Kiesenwetter, 1877: 197.

Orophyus Redtenbacher, 1847: 350; Lacordaire, 1857: 553; Thomson, 1863: 196; Dalla Torre, 1911: 26. Type species, by monotypy, *Cis mandibularis* Gyllenhal, 1813: 717.

Octotemnus (*Orophius*) Redtenbacher, — Reitter, 1878a: 21; Reitter, 1902a: 61.

Orophyus Kiesenwetter, 1877: 195. Incorrect subsequent spelling.

Orophinus Marschall, 1873: 226. Incorrect subsequent spelling.

Cis Latreille (in part), — Gyllenhal, 1813: 717; Gyllenhal, 1827: 627.

Included species. Orophius dilutipes Blackburn, 1891: 308 [Australia]; *Orophius diabolicus* Pic, 1916: 6 [India]; *Cis glabriculus* Gyllenhal, 1827: 629 [Eurasia]; *Orophius hebridarum* Blair, 1941: 178 [New Hebrides]; *Octotemnus* (*Orophius*) *japonicus* Miyatake, 1954: 64 [Japan]; *Octotemnus laevis Casey* [North America, *see* p. 509]; *Orophius laminifrons* Motschulsky, 1860: 17 [Japan]; *Cis mandibularis* Gyllenhal, 1813: 717 [Eurasia]; *Octotemnus mindanaonus* Chujo, 1966: 530 [Philippines]; *Octotemnus omogensis* Miyatake, 1954: 61 [Japan]; *Octotemnus opacus* Mellié, 1848: 386 [Madeira]; *Octotemnus palawanus* Chujo, 1966: 531 [Philippines]; *Octotemnus parvulus* Miyatake, 1954: 62 [Japan]; *Octotemnus* (*Orophius*) *punctidorsum* Miyatake, 1954: 63 [Japan]; *Orophius quadridentatus* Pic, 1916: 6 [Indo-China]; *Orophius testaceus* Pic, 1916: 6 [India]; *Octotemnus walkeri* Blair, 1940: 136 [Australia]. Total: 17 species.

This is a well-defined group of Orophiinae in which the antennae are 8-segmented, the tibiae spinose along most of the outer edge (Fig. 60), and the abdominal fovea in the male is covered by a flap (Fig. 31).

In *Xylographus* and *Scolytocis* the tibiae are similar, but the antennae are 10- or 9-segmented and the abdominal fovea is naked or absent. In *Rhopalodontus* and *Paratrichapus*, the tibiae are spinose at the apices only and the antennae are 10-segmented. Most species of *Octotemnus* are subglabrous with a few scattered, erect hairs; the Madeiran species, *O. opacus*, however, has the entire surface covered with fine, decumbent, but easily visible hairs. Secondary sexual characters in the genus are unique in that males of several species have enlarged mandibles resembling those of stag beetles (Lucanidae). Males of some species have lateral setiferous tubercles on the vertex (also in *Xylographus*), but the pronotal apex is never modified. The genus occurs throughout the Palaearctic and Indo-Pacific regions, with a single species occurring in the northern part of North America.

Octotemnus laevis Casey

Octotemnus laevis Casey, 1898: 91; Blatchley, 1910: 901 (dist., biol.); Dury, 1917: 27 (dist., biol.); Gibson, 1917: 150 (dist.); Gibson, 1918: 113 (dist.); Weiss and West, 1920: 8 (dist., biol.); Blackman and Stage, 1924: 86 (biol.); Graves, 1960: 66 (biol.). Type locality: "Rhode Island." Holotype, ♂, Casey Coll., USNM.

Octotemnus denudatus Casey, 1898: 91; Gibson, 1915: 137 (dist.); Dury, 1917: 27 (syn.); Weiss and West, 1920: 8 (dist., biol.); Fall, 1926: 200 (dist.); Hatch, 1962: 235, pl. 48, fig. 9 (dist., biol.). Type locality: California. Holotype, ♂, Casey Coll., USNM.

Distribution. Widespread throughout the northern part of North America, from southern Alaska to Quebec and Nova Scotia, south along the Pacific Coast to Monterey County, California, in the Sierra Nevada to Tulare County, in the Midwest to southern Iowa and Kansas, and on the East Coast to Alabama (Fig. 109). Marginal records: ALASKA: Skagway. BRITISH COLUMBIA: Terrace. ALBERTA: Edmonton. MANITOBA: Winnipeg. QUEBEC: St. Jean; Laniel. NOVA SCOTIA: Truro. ALABAMA: (no specific locality). MINNESOTA: Cormorant, Becker Co. MANITOBA: Aweme. ALBERTA: Cypress Hills. WASHINGTON: Kooskooskie, Walla Walla Co. CALIFORNIA: Dorset Camp, Sequoia National Park, Tulare Co.; Big Sur, Monterey Co.

Host fungi. Polyporus versicolor [86 (49)]; *Polyporus hirsutus* [11(1)]; *Polyporus pubescens* [7(4)]; *Lenzites betulina* [6(2)]; *Polyporus conchifer* [5(4)]; *Ganoderma applanatum* [5(1)]; *Polyporus abietinus* [1]; *Polyporus adustus* [1]; *Polyporus albellus* [1]; *Polyporus galactinus* [1]; *Polyporus pargamenus* [1]; *Polyporus squamosus* [1]; *Polyporus sulphureus* [1]; *Stereum* sp. [1].

Discussion. This species is easily distinguished by the ovoid body form, spinose tibiae, 8-segmented antennae, subconical procoxae with incomplete intercoxal process, vestiture of very short, fine hairs and scattered long fine hairs, and the triangular flap covering the abdominal fovea in the male. In *Rhopalodontus americanus*, the prosternum and male abdomen are similar, but the body is more elongate and parallel-sided, the tibiae spinose at the apices only, the antennae 10-segmented, and the vestiture of long, fine hairs only.

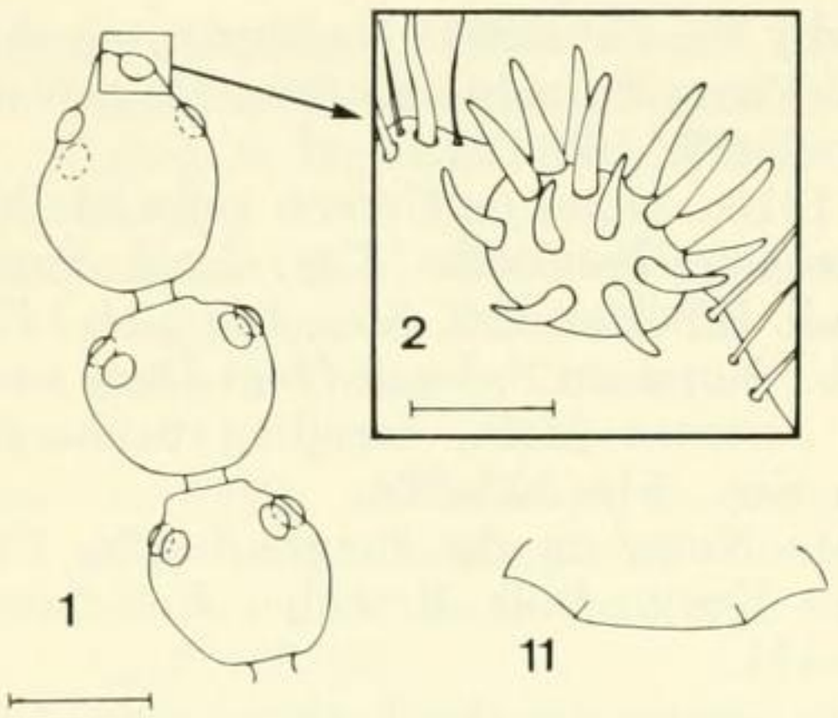
Octotemnus laevis is closely related to and possibly conspecific with *Octotemnus glabriculus* (Gyllenhal) of the Palaearctic region. The range is typically northern and the species is not very common in the Southeast. This is one of the most common species breeding in *Polyporus versicolor* and its relatives. Like *Cis fuscipes*, it appears to be equally common in the Northeast and on the Pacific Coast.

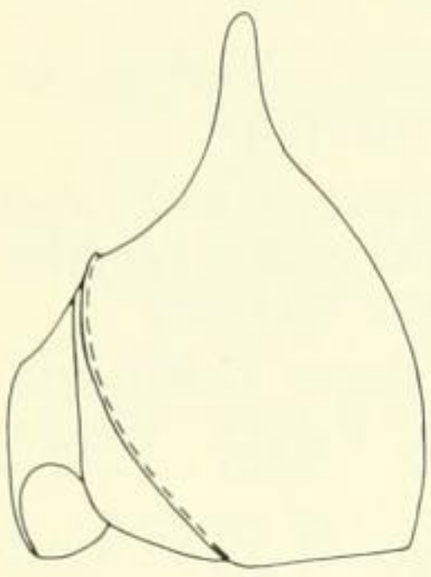
LITERATURE CITED

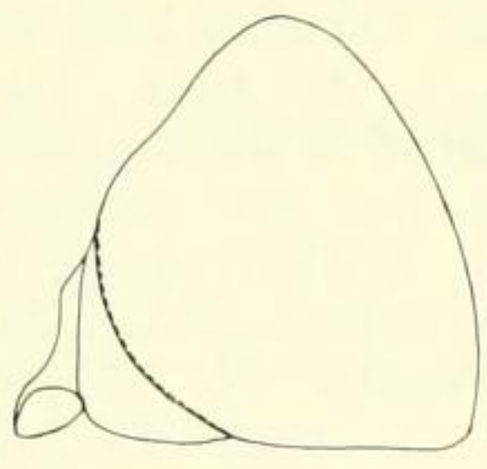
ABEILLE DE PERRIN, E. 1874a. [Note]. Bull. Soc. Ent. France, **1874:** 52–53.

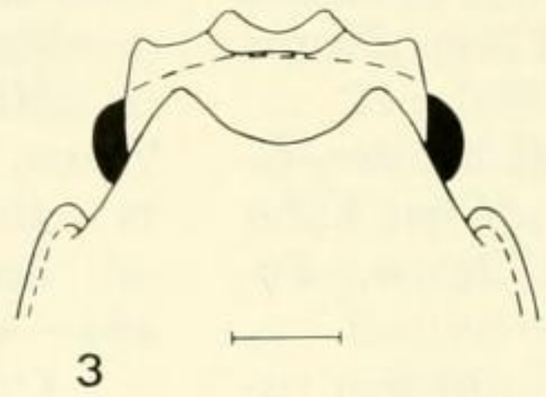
———. 1874b. Essai Monographique sur les Cisides Européens et Circamediterranéens. Marseille, Camoin. 100 pp.

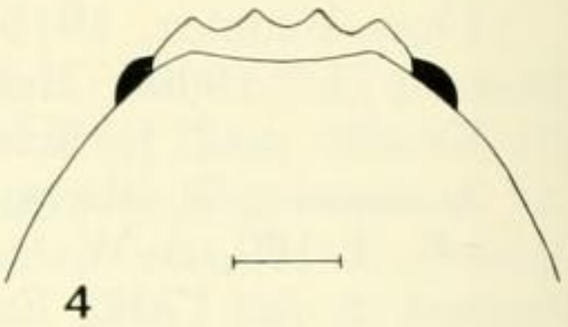
———. 1876. Notes sur les Cisides européens et circamediterranéens. Ann. Soc. Ent. France, **45:** 309–314.

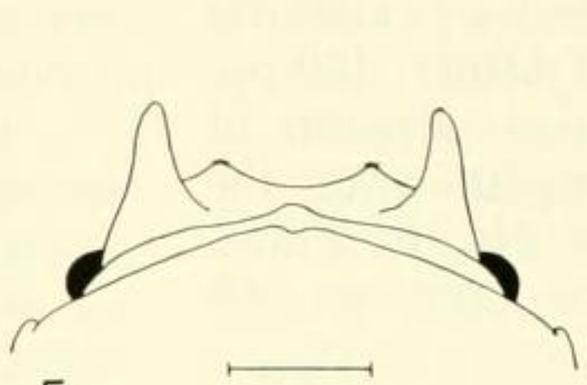


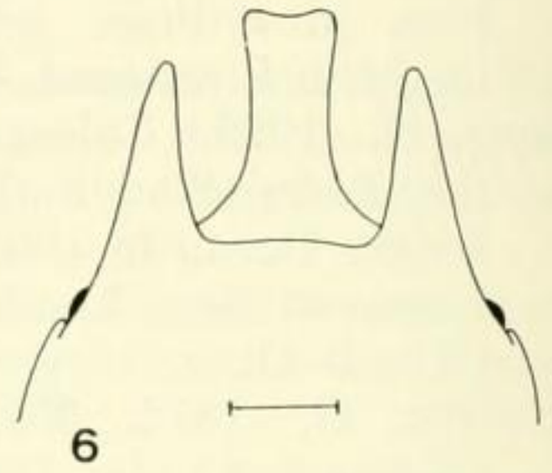


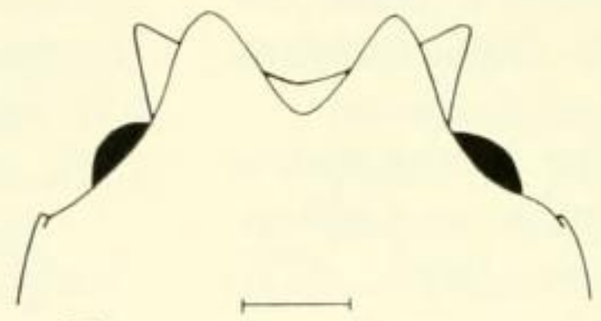


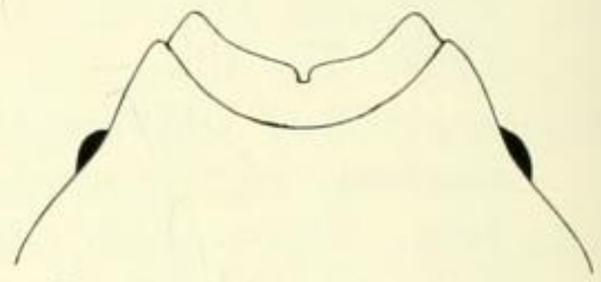


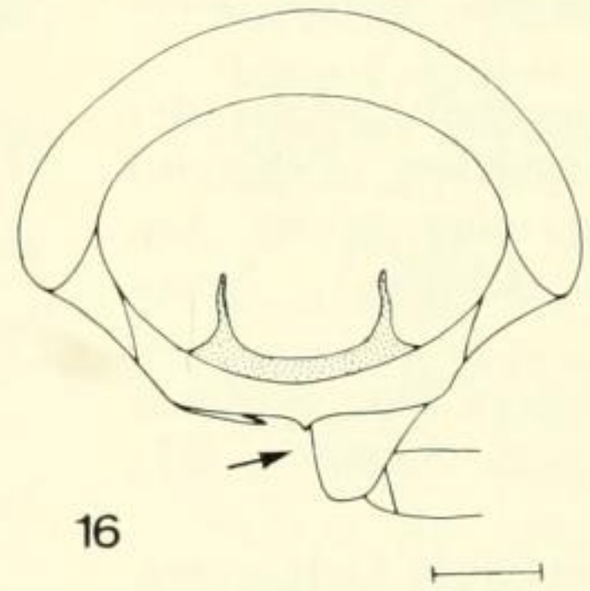


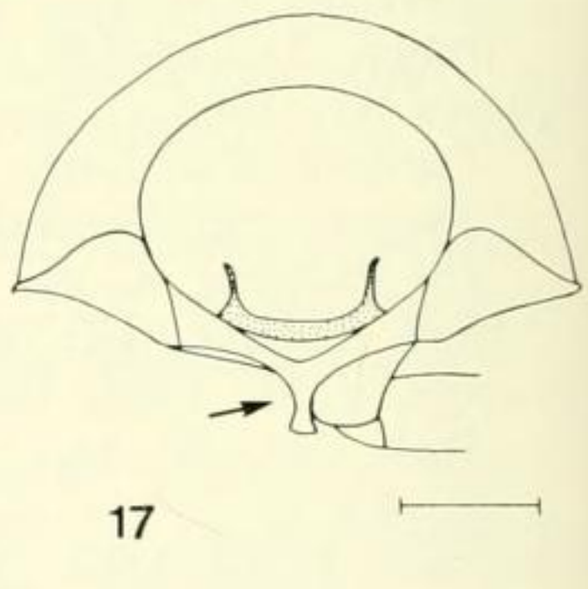












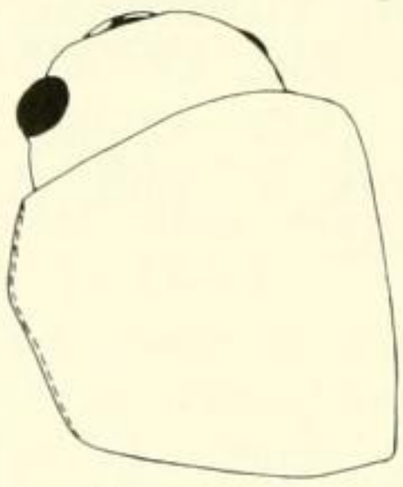
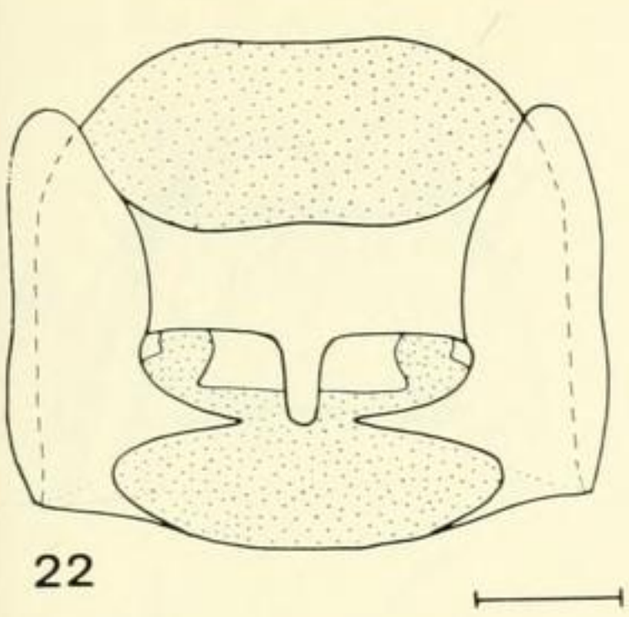
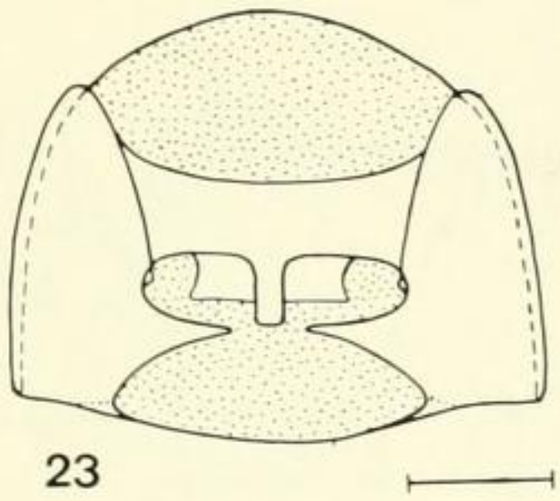


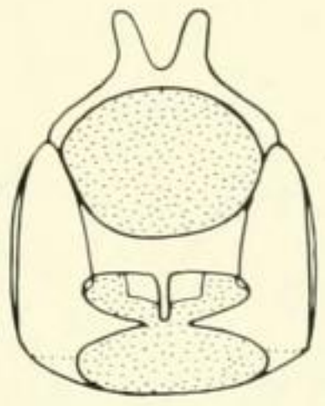
Fig. 1. *Cis vitulus* Mannerheim, antennal club [.076 mm]. 2. Same, section of terminal club segment, showing sensillifer [.018 mm]. 3. *C. vitulus* Mannerheim, head and pronotal apex of male, dorsal view. 4. *Plesiocis cribrum* Casey, same. 5. *C. niedhauki*, n. sp., same [.125 mm]. 6. *C. miles* (Casey), same [.125 mm]. 7. *C. Castlei* (Dury), same [.125 mm]. 8. *Ennearthron aurisquamosum*, n. sp., same [.125 mm]. 9–13. Diagrammatic cross-sections of prosternum and hypomera, showing concave, biconcave, flat, tumid, and carinate prosterna. 14. *Strigocis opacicollis* Dury, prothorax of male, lateral view [.125 mm]. 15. *Sulcacis lengi* Dury, same [.125 mm]. 16. *Octotemnus laevis* Casey, prothorax, anterior view [.125 mm]. 17. *Cis fuscipes* Mellié, same. 18. *Orthocis punctatus* (Mellié), head and pronotum, dorsolateral view. 19. *O. longulus* Dury, same. 20. *Hadraule elongatula* (Gyllenhal), head and pronotum, dorsal view. 21. *H. explanata*, n. sp., same. Unless otherwise indicated, 1 line = .250 mm.



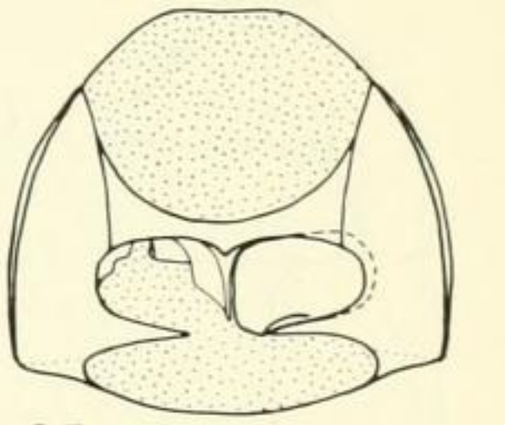
22



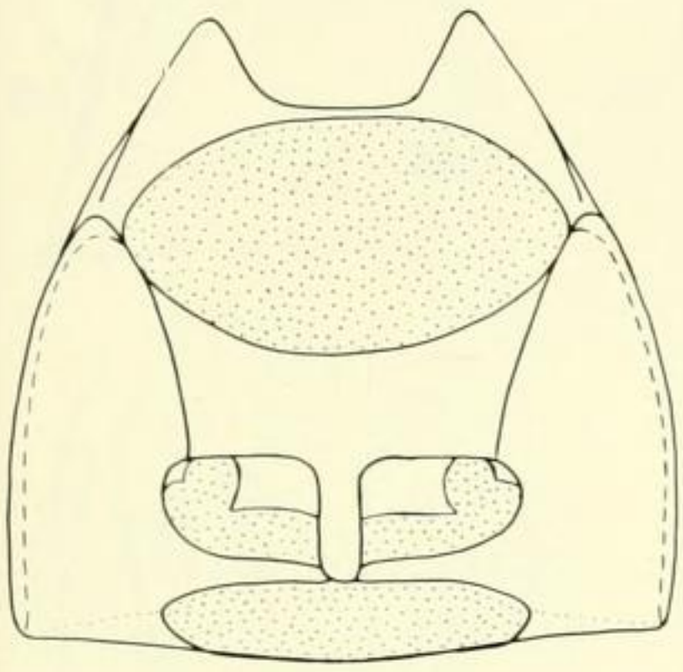
23



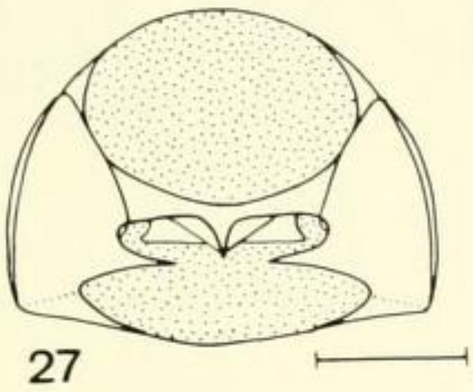
24



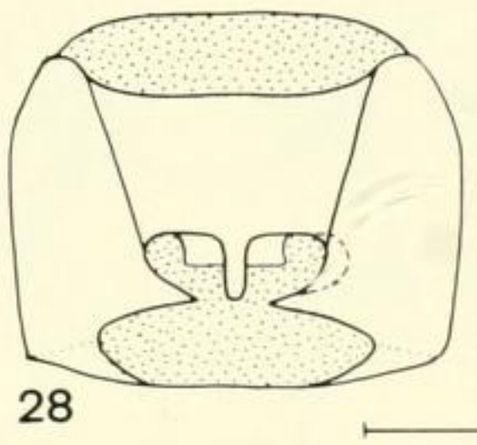
25



26

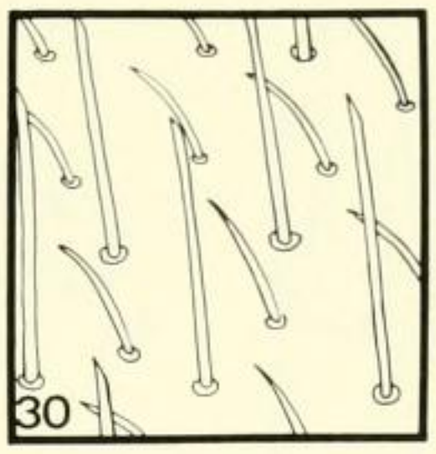


27

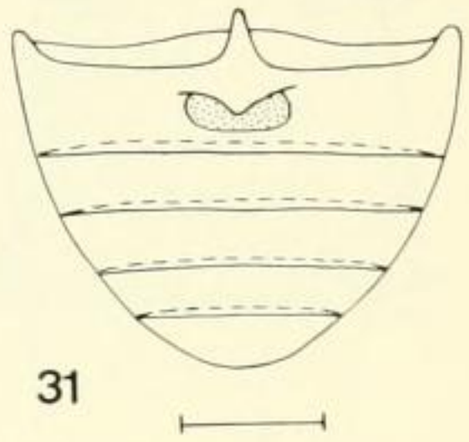


28

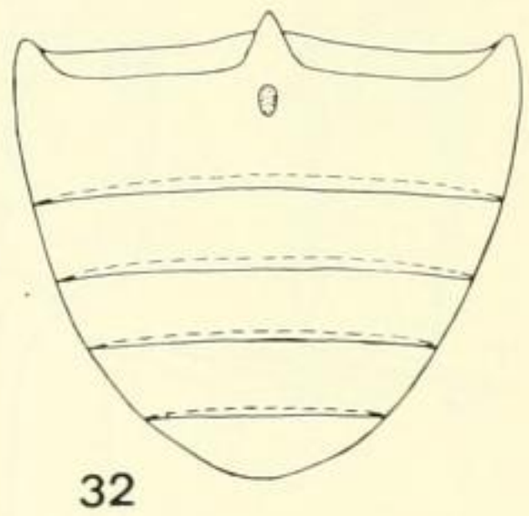
29



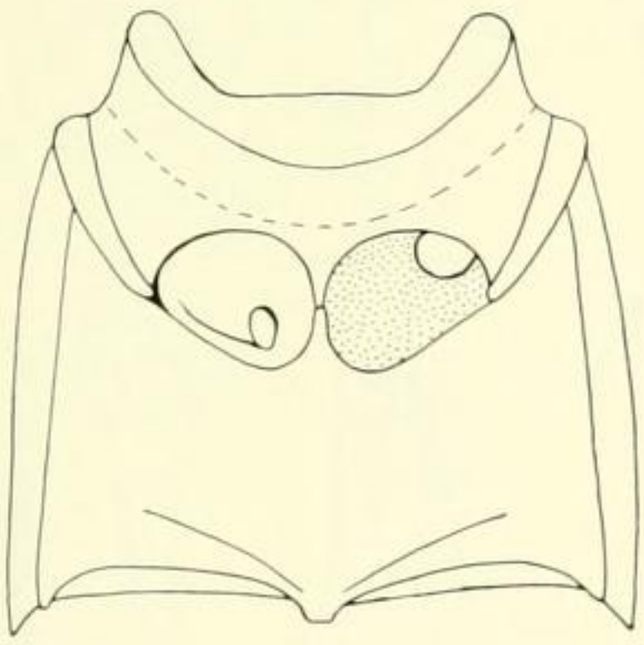
30



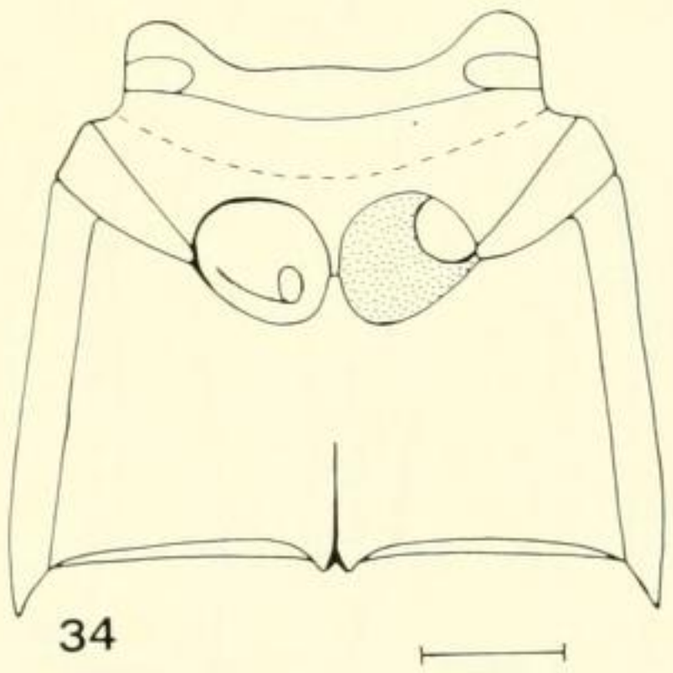
31



32



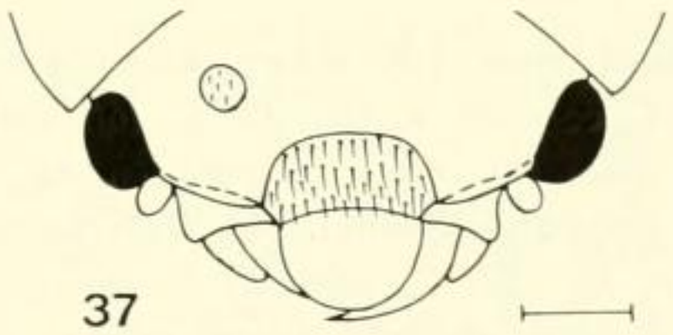
33



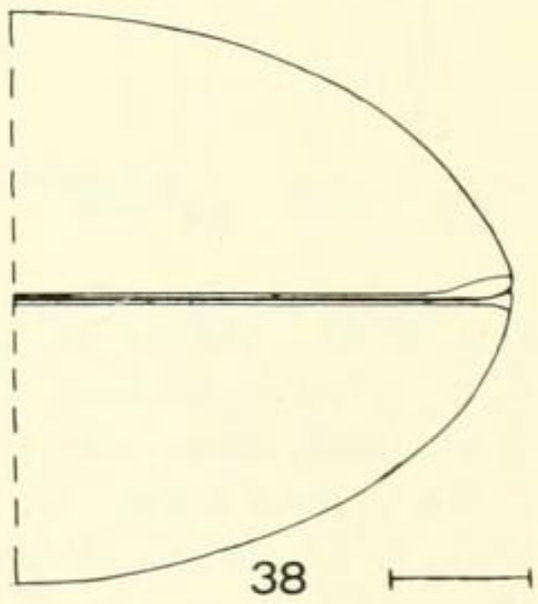
34

35

36

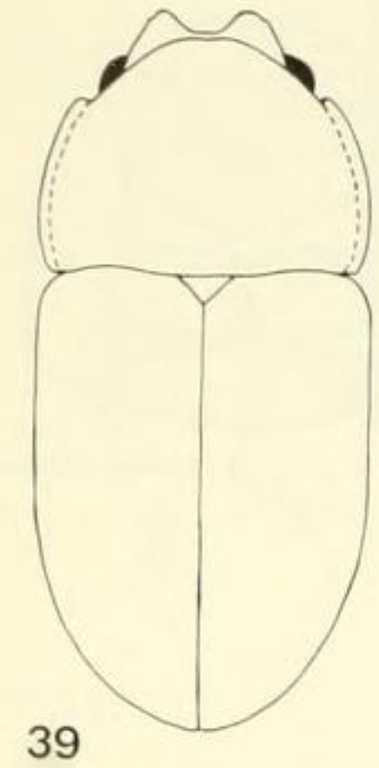


37

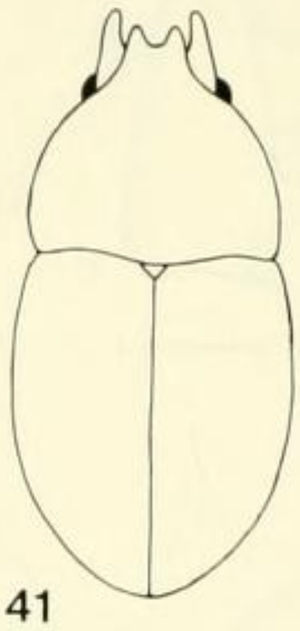


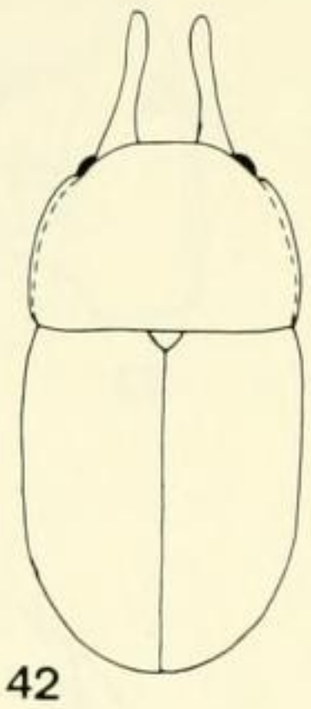
38

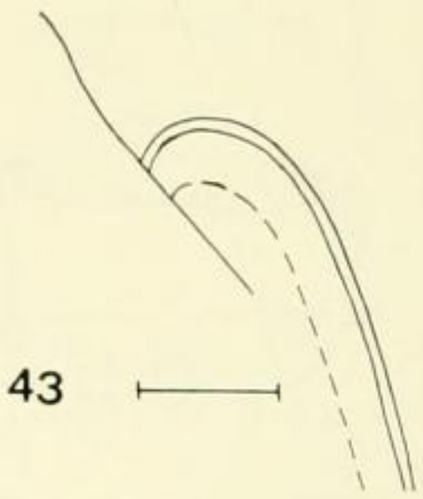
Figs. 22–28. Prothorax of male, ventral view. 22. *Orthocis punctatus* (Mellié). 23. *Cis fuscipes* Mellié. 24. *Ceracis thoracicornis* (Ziegler). 25. *Rhopalodontus americanus*, n. sp. 26. *Cis vitulus* Mannerheim. 27. *Malacocis brevicollis* (Casey). 28. *Hadraule blaisdelli* (Casey) [.125 mm]. 29. *Cis crinitus*, n. sp., section of elytral surface, showing long, erect, dark bristles and short, decumbent, light hairs. 30. *Cis horridulus* Casey, same, showing longer, erect and shorter, inclined bristles. 31. *Rhopalodontus americanus*, n. sp., abdomen of male, ventral view. 32. *Cis tetracentrum* Gorham, same. 33. *Octotemnus laevis* Casey, pectus (meso- and metathorax), ventral view [.125 mm]. 34. *Cis vitulus* Mannerheim, same. 35. *Ceracis similis* Horn, pronotal apex of male, dorsal view. 36. *Ceracis schaefferi* Dury, same. 37. *Orthocis huesanus* Kraus, head of male, anterodorsal view [.125 mm]. 38. *Orthocis punctatus* (Mellié), elytral apices, posterodorsal view. Unless otherwise indicated, 1 line = .250 mm.

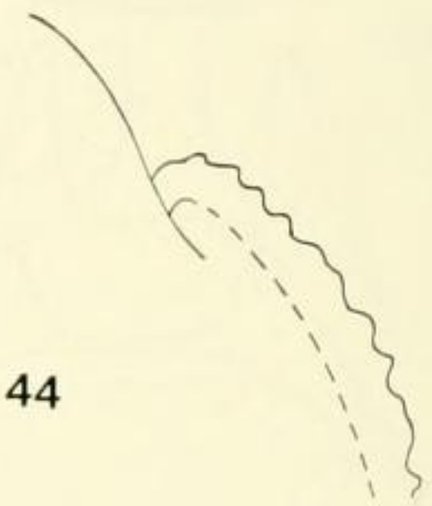

39


40


41


42


43


44


45


46


47


48


49


50


51

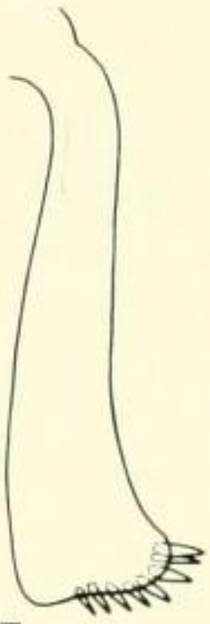

52


53


54


55


56

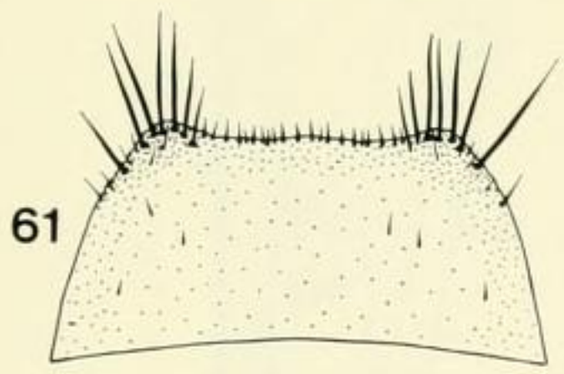

57

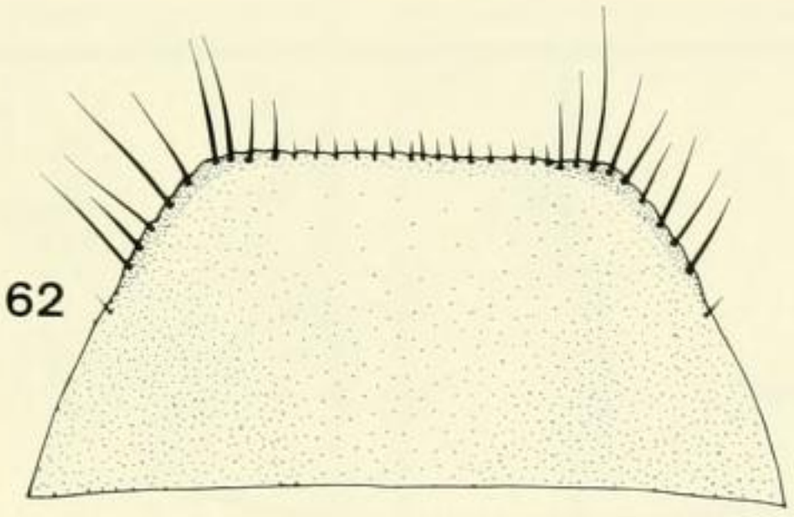

58

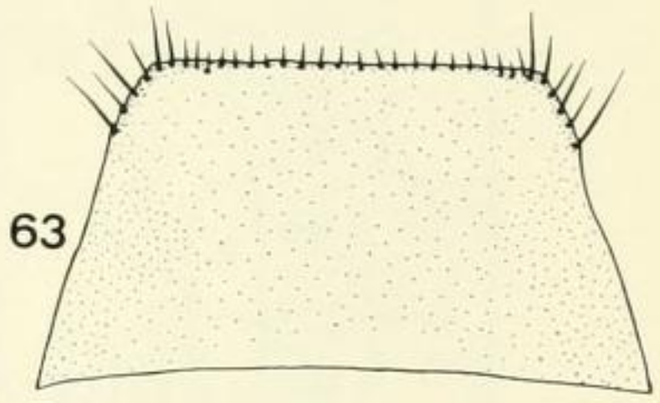

59

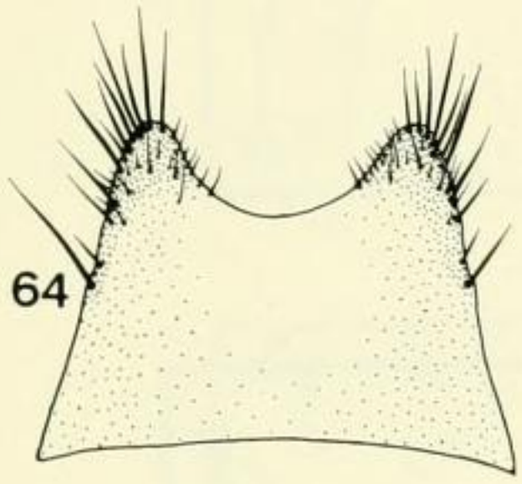

60

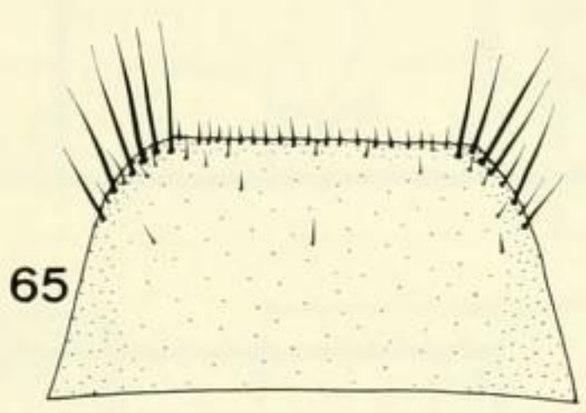
Figs. 39–42. Outline of male, dorsal view [all drawn to same scale]. 39. *Cis megastictus*, n. sp. 40. *C. stereophilus*, n. sp. 41. *C. rotundulus*, n. sp. 42. *C. cornelli*, n. sp. 43. *C. tetracentrum* Gorham, anterior angle and lateral margin of pronotum, dorsal view [1 line = .063 mm]. 44. *C. discolor*, n. sp., same. 45–60. Right tibia of male, posterior view [all drawn to same scale]. 45. *Orthocis punctatus* (Mellié). 46. *Dolichocis manitoba* Dury. 47. *Cis festivulus*, n. sp. 48. *C. cayensis*, n. sp. 49. *C. robiniophilus*, n. sp. 50. *C. cornelli*, n. sp. 51. *C. rotundulus*, n. sp. 52. *C. acritus*, n. sp. 53. *C. stereophilus*, n. sp. 54. *C. levettei* (Casey), showing apical spines. 55. *C. megastictus*, n. sp. 56. *C. discolor*, n. sp. 57. *Malacocis brevicollis* (Casey). 58. *Ceracis thoracicornis* (Ziegler). 59. *Rhopalodontus americanus*, n. sp. 60. *Octotemnus laevis* Casey.

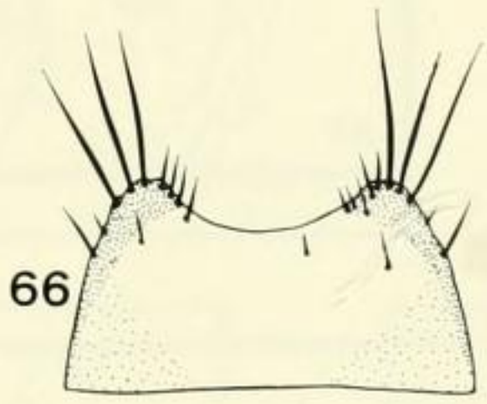


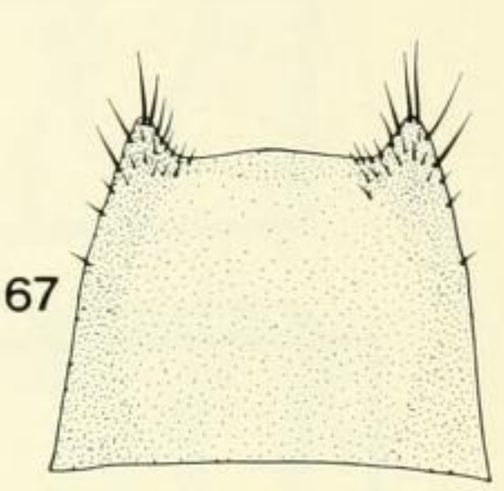


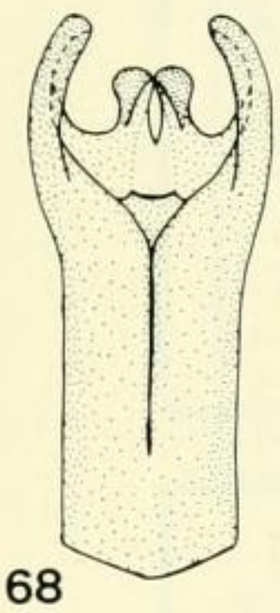


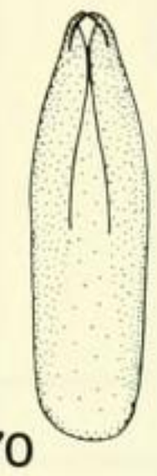


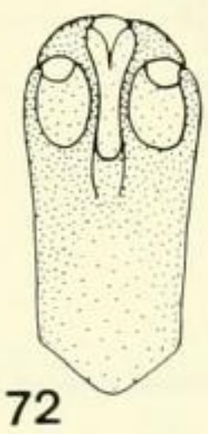


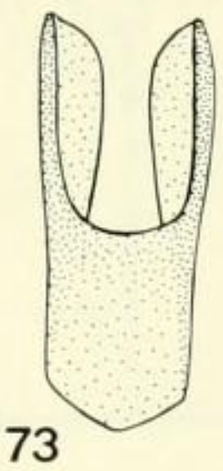


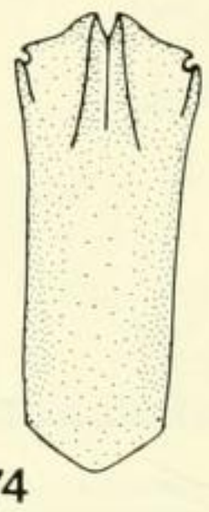


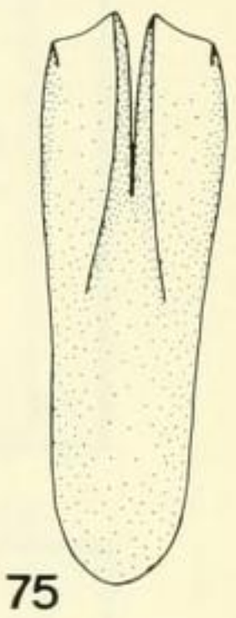


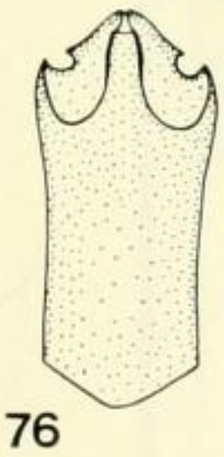


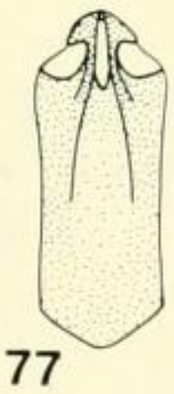


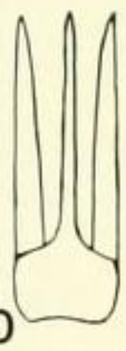


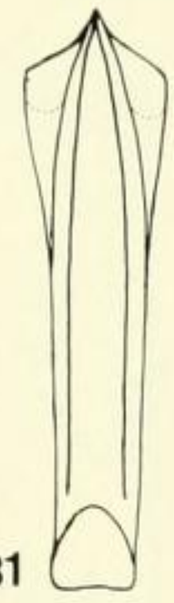


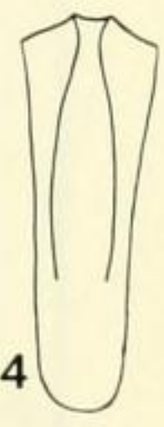




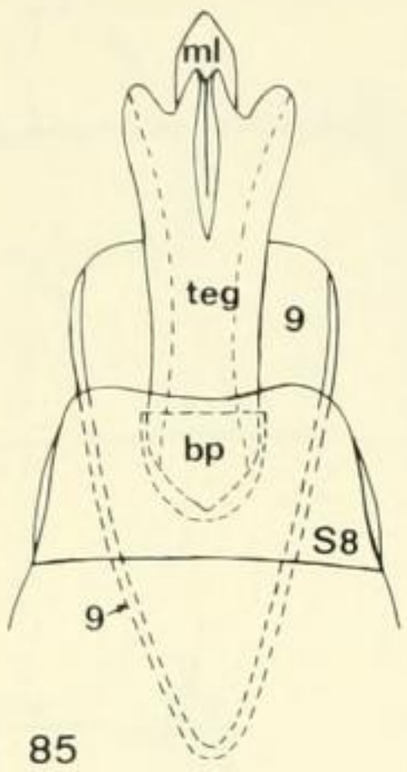




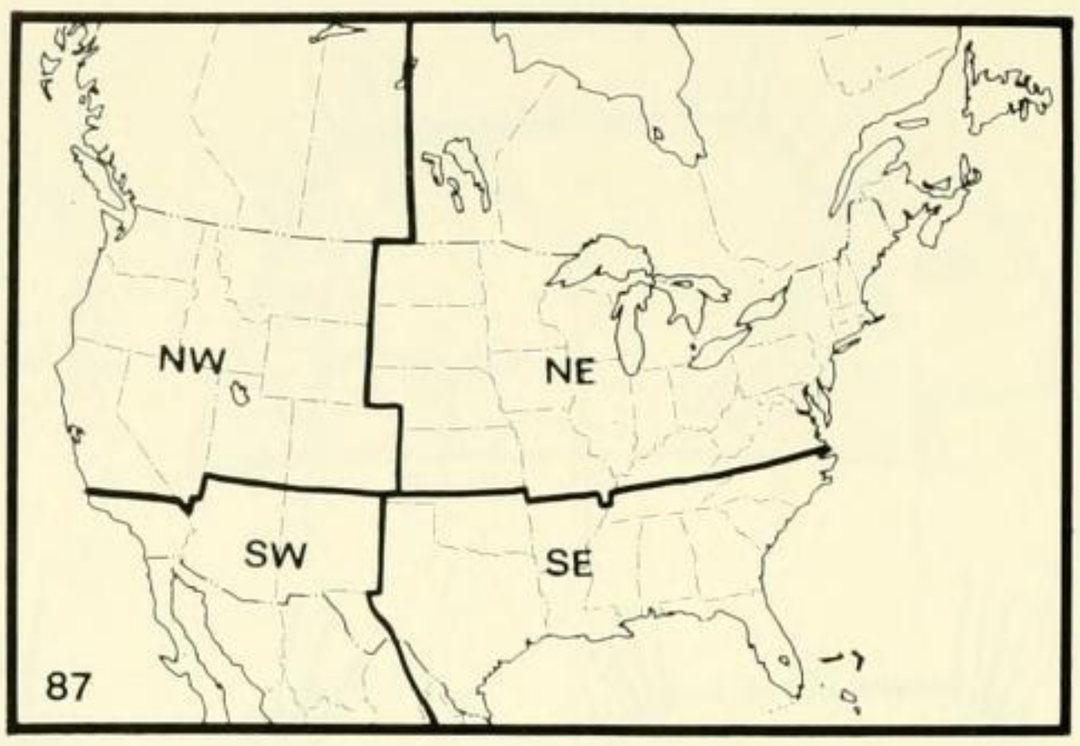




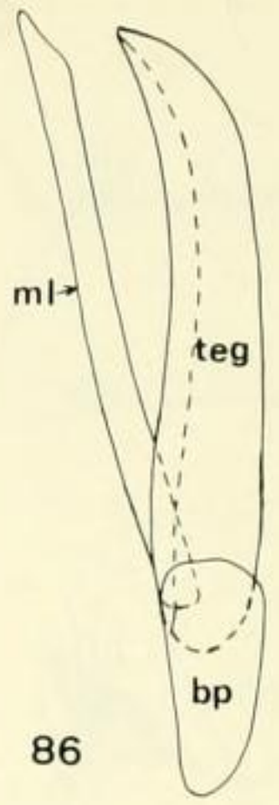
Figs. 61–67. Abdominal sternite VIII of male [all drawn to same scale]. 61. *Cis robiniophilus*, n. sp. 62. *C. discolor*, n. sp. 63. *C. acritus*, n. sp. 64. *C. megastictus*, n. sp. 65. *C. festivulus*, n. sp. 66. *C. stereophilus*, n. sp. 67. *C. cornelli*, n. sp. 68–77. Tegmen of aedeagus [all drawn to scale]. 68. *C. discolor*, n. sp. 69. *C. tristis* Mellié. 70. *C. striolatus* Casey. 71. *C. robiniophilus*, n. sp. 72. *C. festivulus*, n. sp. 73. *C. acritus*, n. sp. 74. *C. megastictus*, n. sp. 75. *C. americanus* Mannerheim. 76. *C. cornelli*, n. sp. 77. *C. stereophilus*, n. sp. 78–84. Median lobe of aedeagus, outline only [all drawn to same scale]. 78. *C. megastictus*, n. sp. 79. *C. cornelli*, n. sp. 80. *C. acritus*, n. sp. 81. *C. discolor*, n. sp. 82. *C. stereophilus*, n. sp. 83. *C. robiniophilus*, n. sp. 84. *C. festivulus*, n. sp.



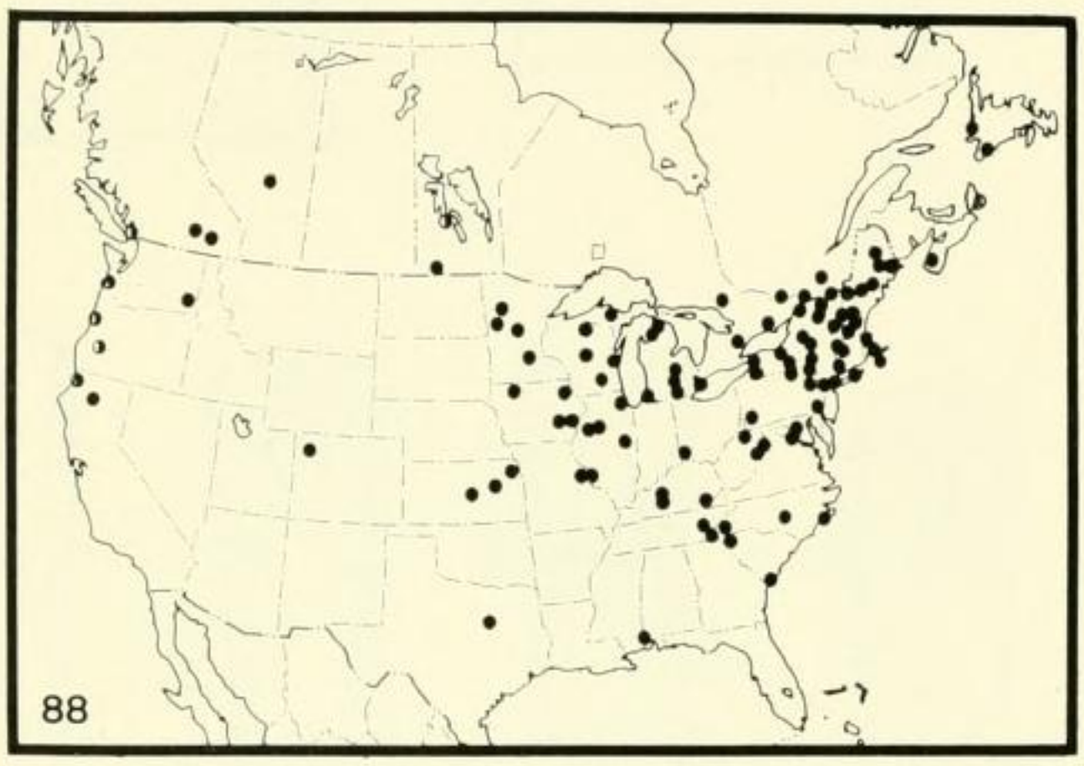
85

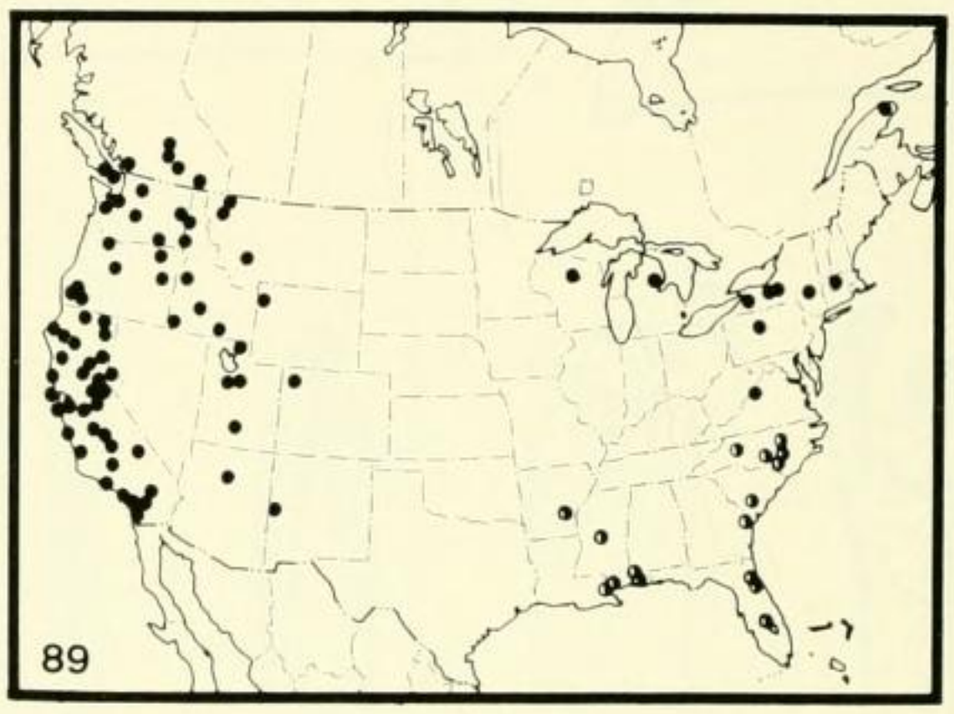


87



86


88


89


90

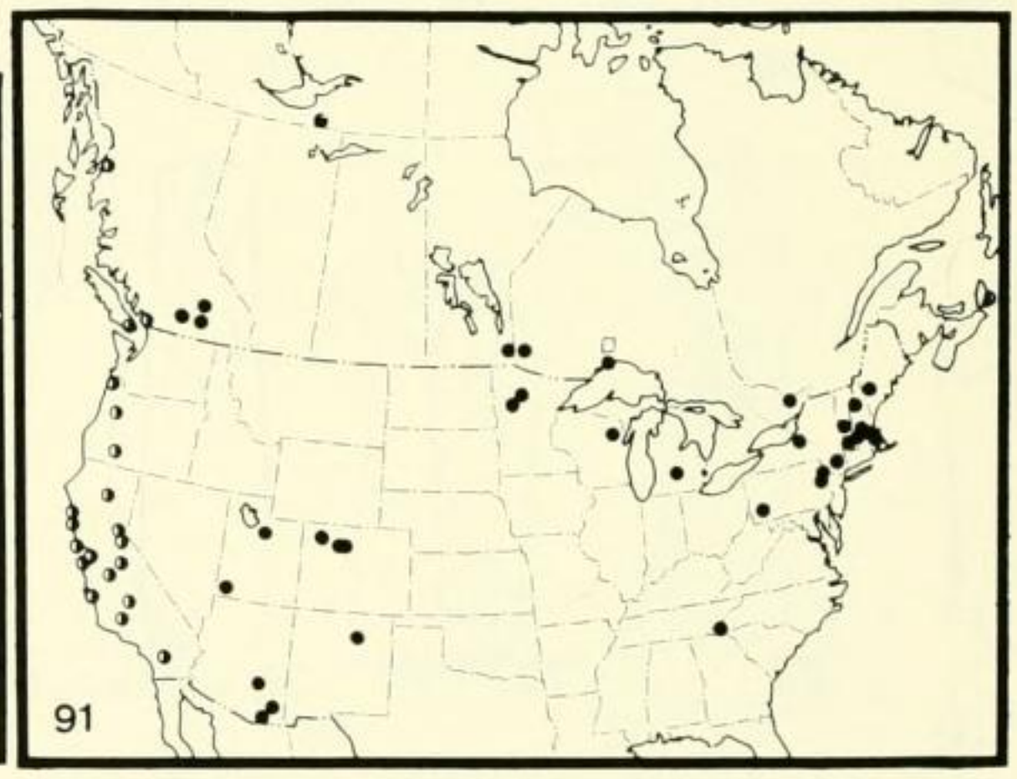
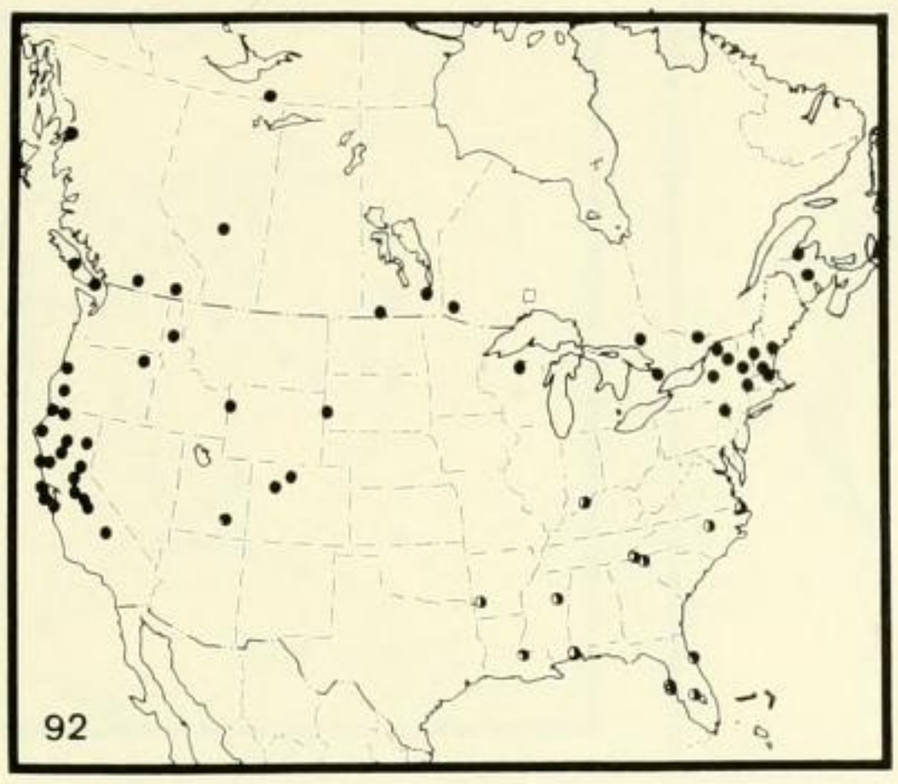
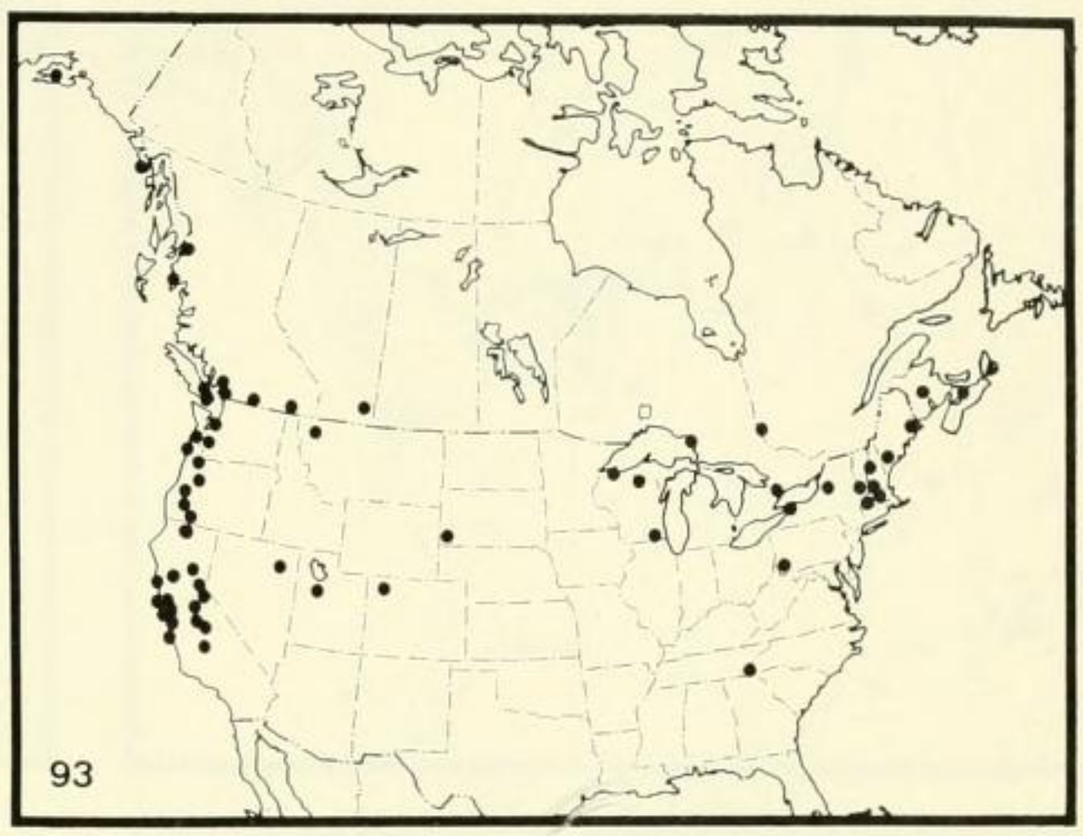
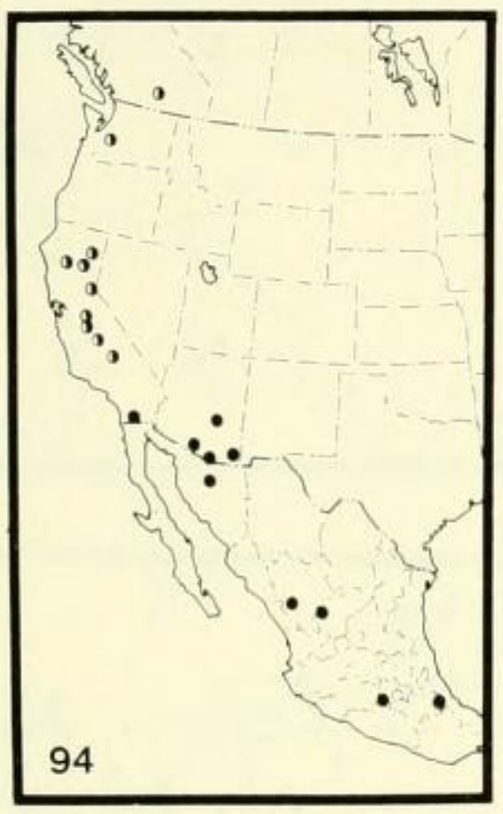
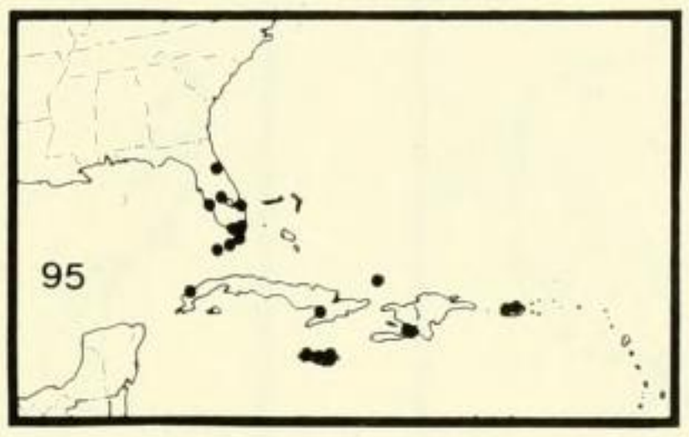

91

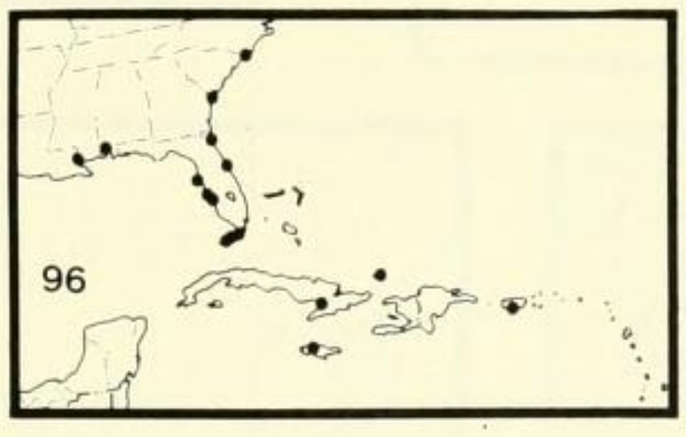
Fig. 85. Diagram of terminal abdominal segments and aedeagus, ventral view. 86. Diagram of aedeagus, lateral view. 87. Map of four regions of North America discussed on p. 432 and Tables 2 and 3. 88–91. Distribution maps. 88. *Cis levettei* (Casey) [full dot] and C. *maritimus* (Hatch) [half dot]. 89. *Plesiocis cribrum* Casey [full dot] and *Cis rotundulus*, n. sp. [half dot]. 90. *Cis ephippiatus* Mannerheim. 91. *Cis horridulus* Casey [full dot] and C. *hystriculus* Casey [half dot]. [S8 = sternite VIII; 9 = segment IX or genital ring; bp = basal piece; teg = tegmen; ml = median lobe.]

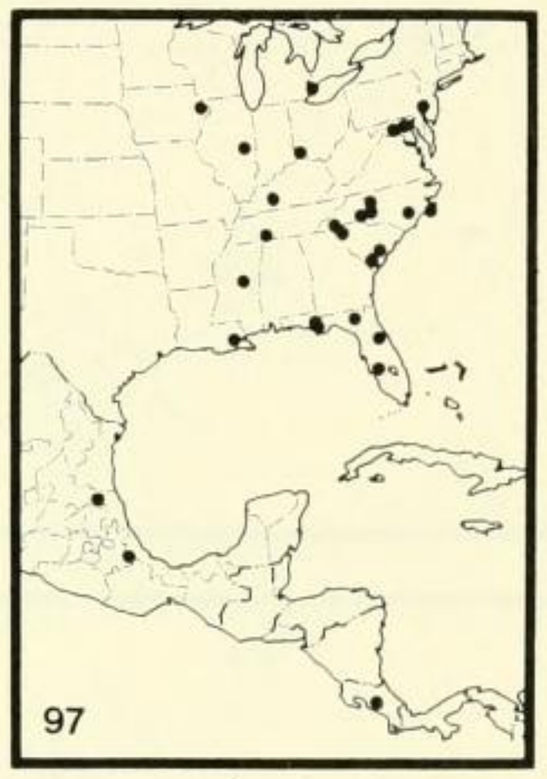


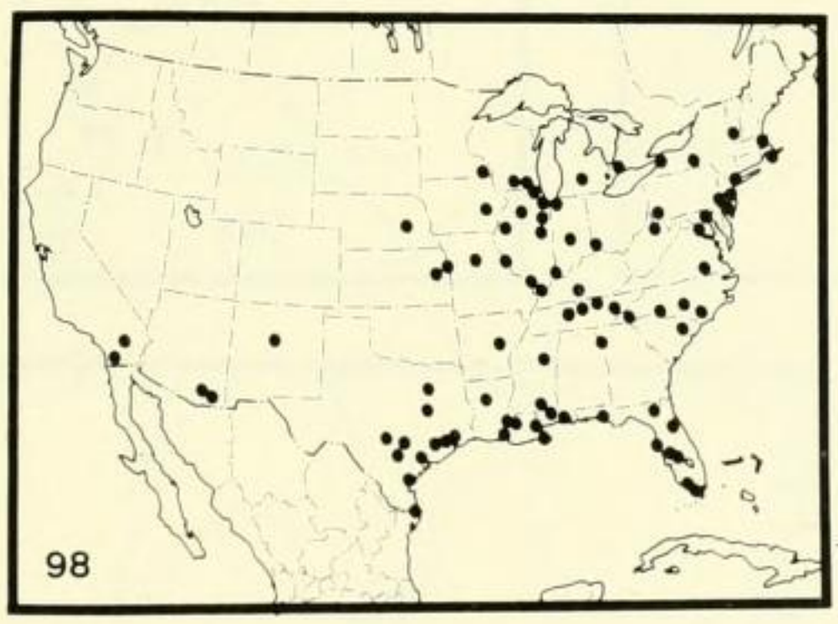


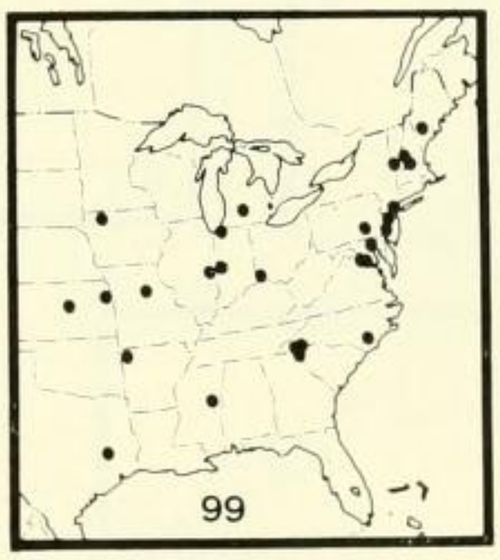


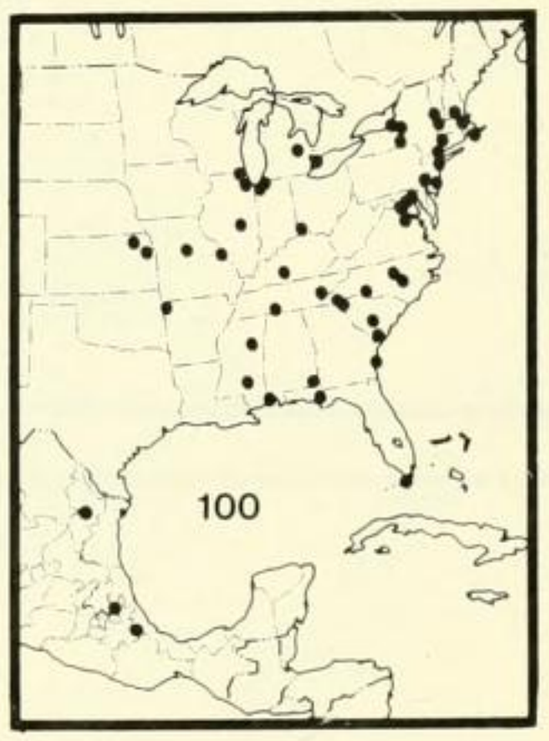




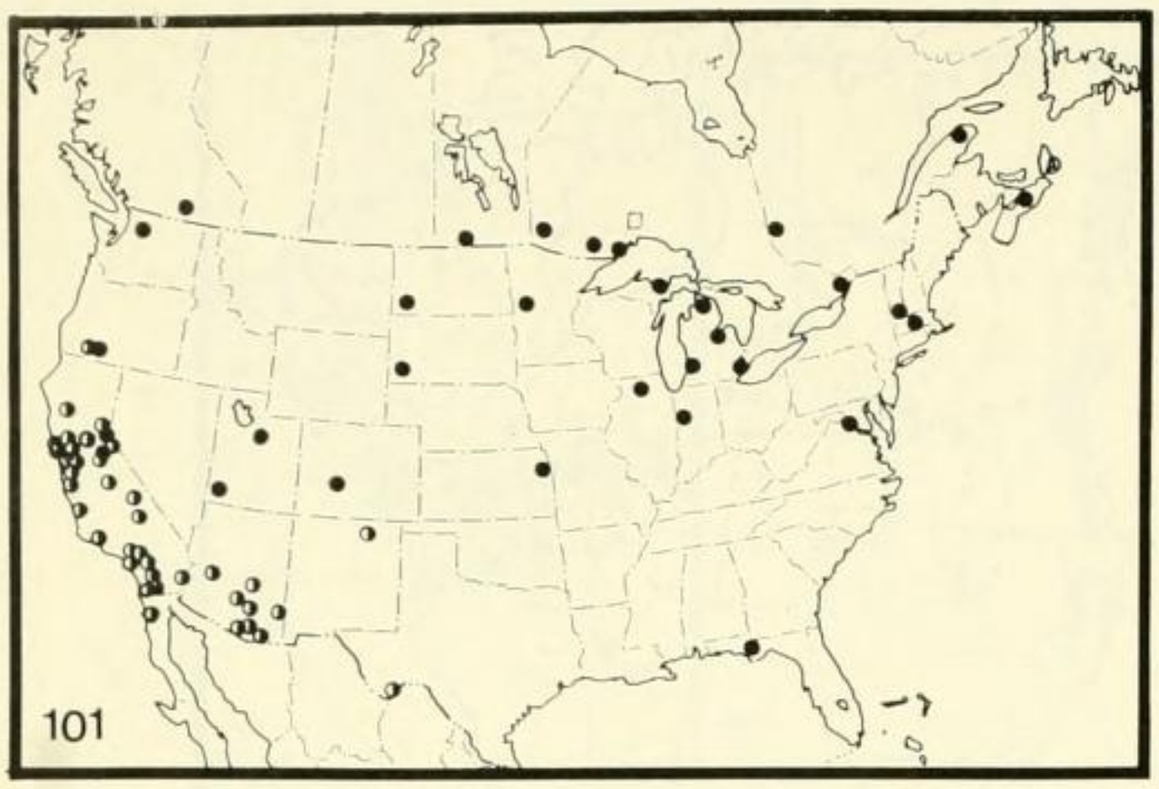


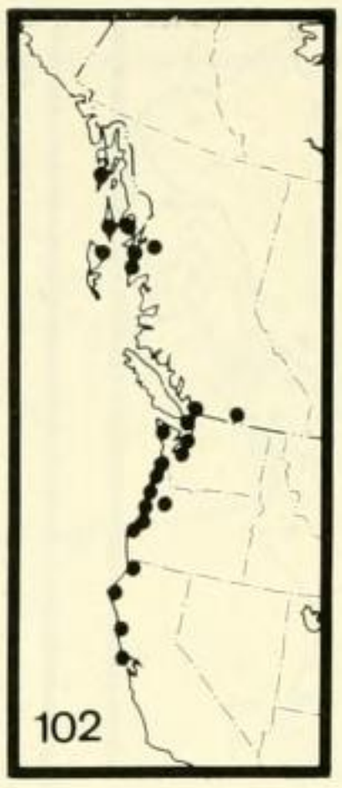


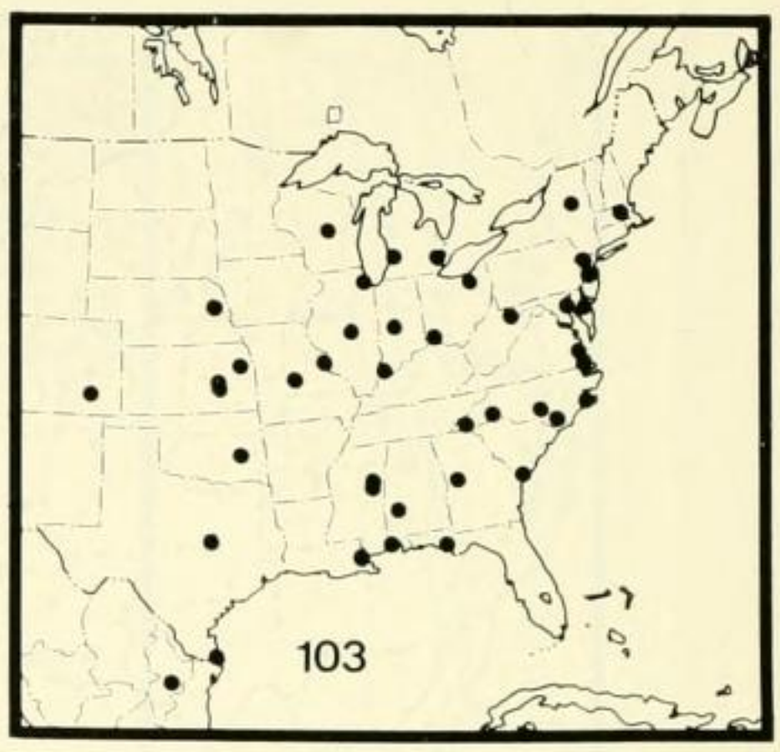


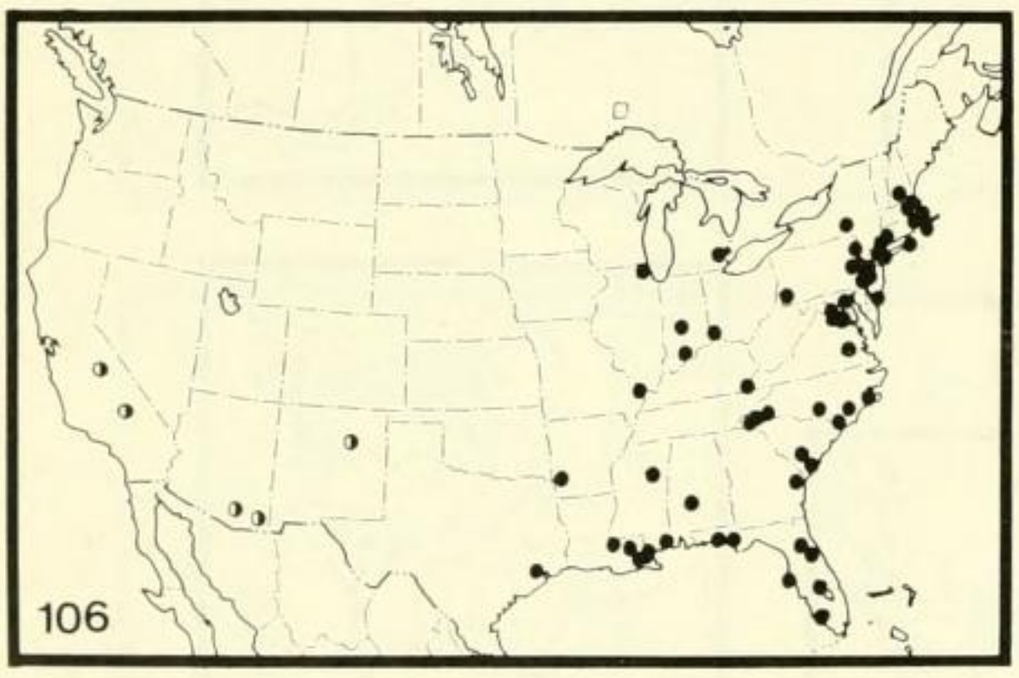


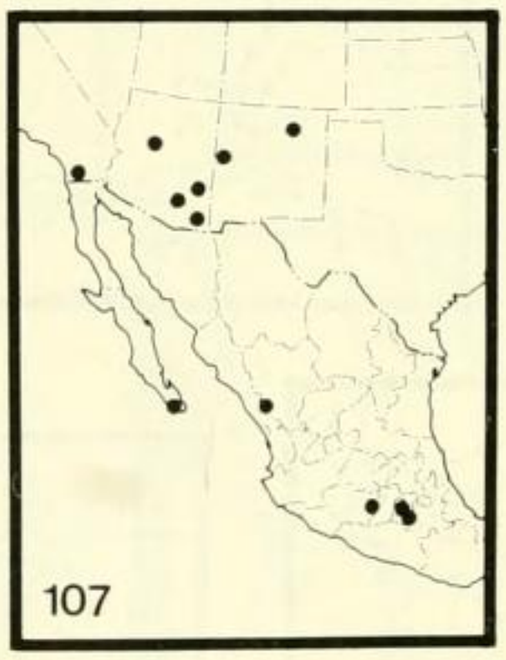
Figs. 92–100. Distribution maps. 92. *Dolichocis manitoba* Dury [full dot] and *Cis ursulinus* Casey [half dot]. 93. *Cis americanus* Mannerheim. 94. *C. tetracentrum* Gorham [full dot] and *C. angustus* Hatch [half dot]. 95. *C. hirsutus* Casey. 96. *C. crinitus*, n. sp. 97. *C. castlei* (Dury). 98. *C. creberrimus* Mellié [North American localities only]. 99. *Sulcacis lengi* Dury. 100. *Strigocis opacicollis* Dury.

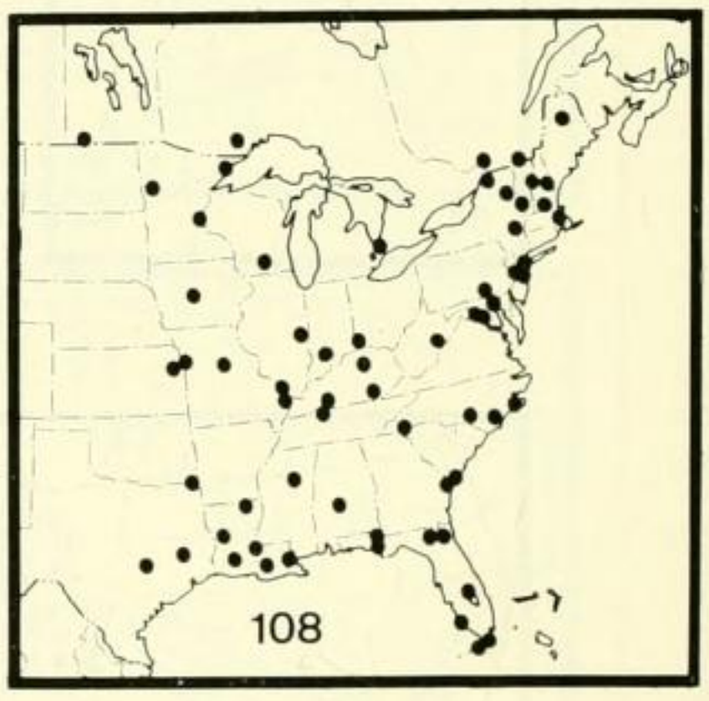


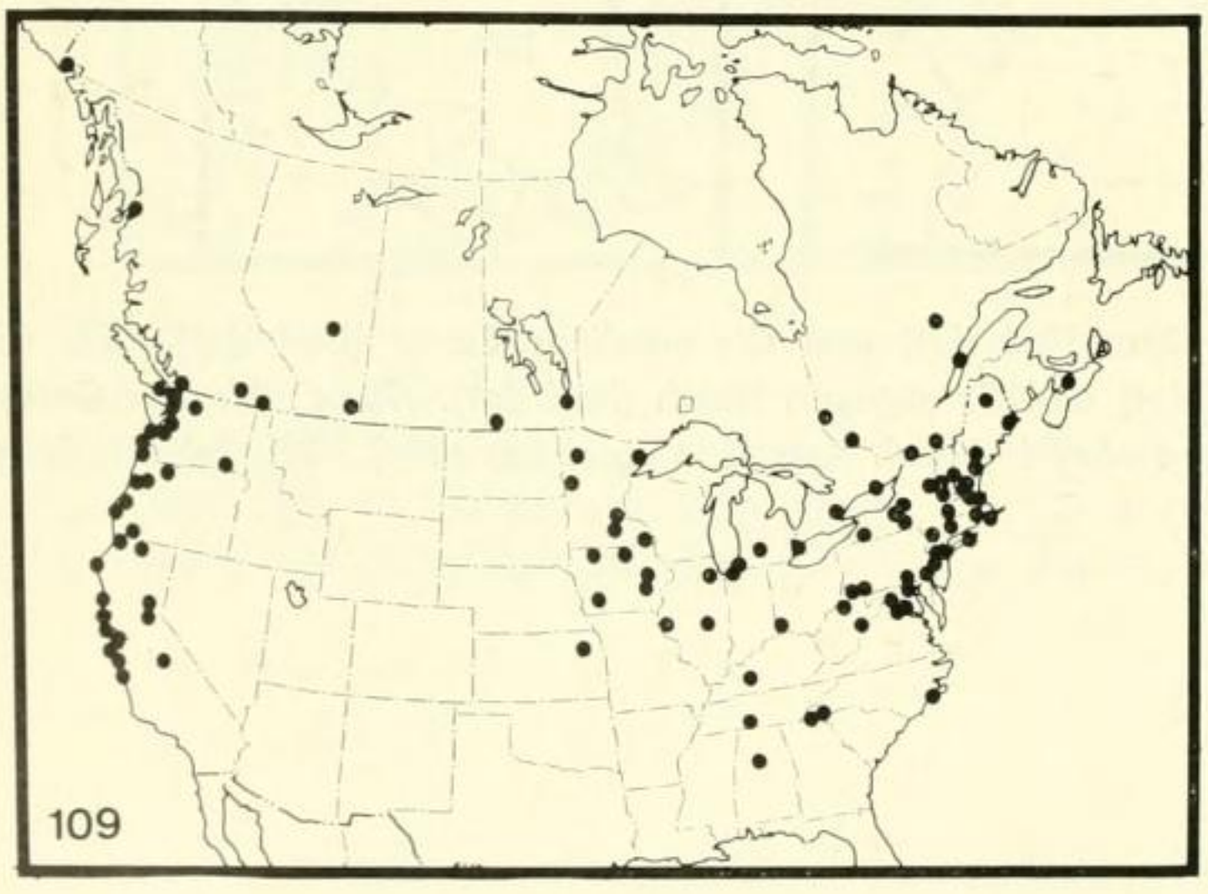


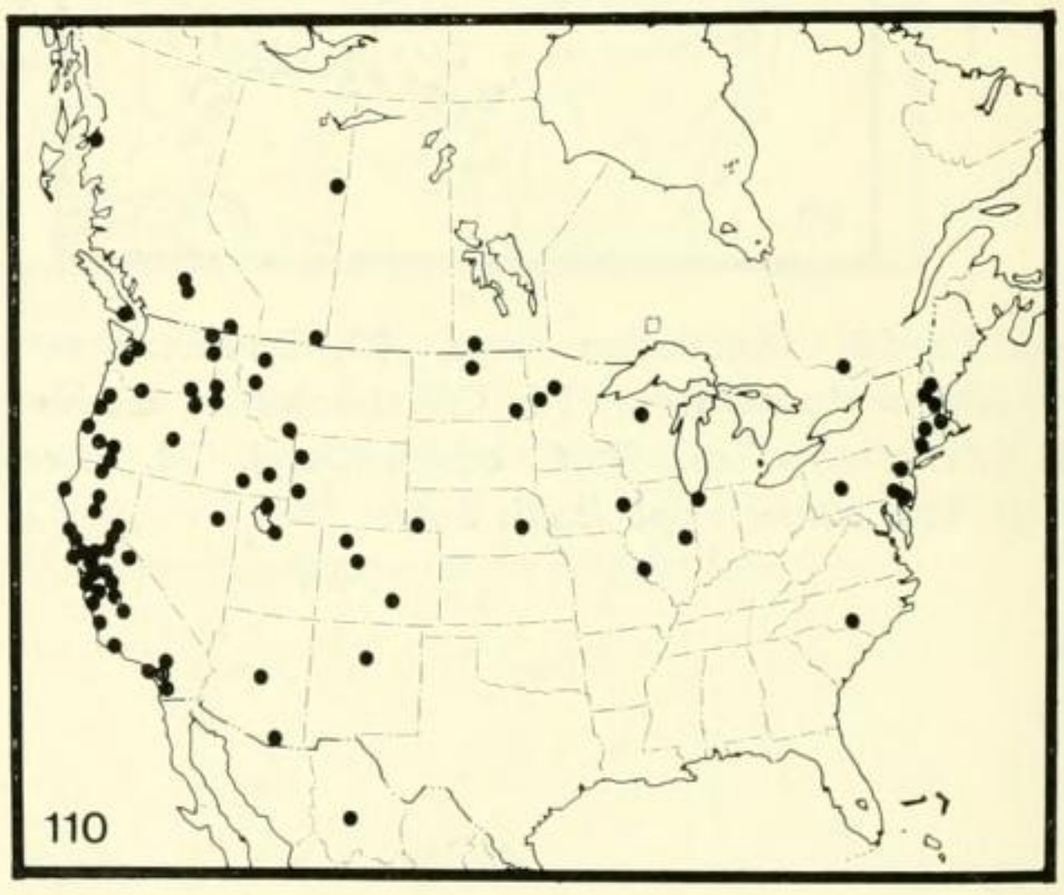












Figs. 101–110. Distribution maps. 101. *Cis striolatus* Casey [full dot] and *C. versicolor* Casey [half dot]. 102. *C. biarmatus* Mannerheim. 103. *C. tristis* Mellié. 104. *C. pistoria* Casey. 105. *C. vitulus* Mannerheim [full dot] and *C. congestus* Casey [half dot]. 106. *C. subtilis* Mellié [full dot] and *C. acritus*, n. sp. [half dot]. 107. *C. duplex* Casey. 108. *Malacocis brevicollis* (Casey). 109. *Octotemnus laevis* Casey. 110. *Sulcacis curtulus* (Casey).