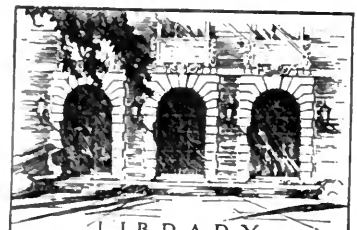

A Revision of the North American and European Staphylinid Beetles of the Subtribe Gyrophaenae (Aleocharinae, Bolitocharini)

CHARLES H. SEEVERS

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INTRODUCTION

Staphylinid beetles frequently occur in great abundance on both fresh and decaying mushrooms. The fungus-feeding Gyrophaenae comprise one of the most characteristic elements on fresh mushrooms and in many areas are the first beetles to appear on them; but these staphylinids rapidly reach the peak of their abundance and are then largely replaced by the predaceous species that infest the decaying mushrooms to feed on various insect larvae.

The Gyrophaenae comprise about 400 known species, distributed roughly as follows: Europe, 26; Africa, 30; India, 120; Asia (excluding India), Australia, and the Pacific islands, 55; North America (excluding Mexico), 74; Latin America, 97.

This paper was originally intended as a revision of the Nearctic species, but its scope has been broadened, for comparative purposes, to include the Palearctic species. A careful revision of the European species by Wüsthoff (1937) has made this comparison feasible. Independent consideration of the European and American species has tended in the past to obscure the close relationships that exist. An attempt has been made to present a unified view of the Holarctic gyrophaenine fauna, exclusive of the Asiatic components, about which very little is known.

ACKNOWLEDGMENTS

The co-operation of a number of individuals was a major factor in the completion of the project. I am very much indebted to Dr. Edward S. Ross and Mr. Hugh B. Leech of the California Academy of Sciences for the privilege of studying the Gyrophaenae in the Adalbert Fenyes collection; to Dr. Edward A. Chapin and Dr. Richard E. Blackwelder for permission to study the Casey types and other material in the United States National Museum; to Dr. Mont A. Cazier of the American Museum of Natural History for the loan of Notman types and other specimens; to Dr. Floyd Werner

for examining specimens in the Melsheimer collection at the Museum of Comparative Zoology; and to Messrs. R. R. Dreisbach, C. A. Frost, Dr. Milton W. Sanderson, and Mr. G. Stace Smith for sending interesting material to me. I am especially indebted to Mr. Henry S. Dybas of the Division of Insects for his enthusiastic participation in the collecting of material, much of which proved to be of exceptional interest. The editorial advice given by Mr. Rupert L. Wenzel, Curator of Insects, during the final preparation of the paper is much appreciated.

Holotypes of the new species are deposited in Chicago Natural History Museum (C.N.H.M.), the California Academy of Sciences (C.A.S.), and the United States National Museum (U.S.N.M.). Paratypes of the new species are in the above institutions and in the following additional collections: The American Museum of Natural History (A.M.N.H.), the Illinois Natural History Survey (I.N.H.S.), the Museum of Comparative Zoology (M.C.Z.), and my own collection (C.S.).

GENERAL CONSIDERATIONS

Ecology

The Gyrophaenae are mycetophagous insects and obligatory inhabitants of the fungi during the larval and adult stages. The adults and larvae are found on many fresh mushrooms soon after the latter appear, whether in late spring, summer, or autumn. Inasmuch as gilled mushrooms are short-lived, the eggs must be laid on them in time for the larvae to complete their feeding before the mushrooms decay. It is presumed that the larvae fall to the ground to pupate, but this requires verification. There are advantages in a short larval life and pupation in the ground; first, because the available food is present for only a short time; and, second, because predaceous staphylinids invade decaying mushrooms in large numbers and could rapidly deplete the gyrophaenine larvae and pupae. Before ecological studies on these fungicoles can be advanced very far, more knowledge of the life history of representative species must be available. Larvae are abundant and easy to recognize; the eighth abdominal segment is produced into a glandular process. Böving and Craighead (1930, pl. 14, A, D, I, p. 115) illustrated the larvae of *Gyrophaena* sp. and Paulian (1941) described and figured *Gyrophaena cristofera* Cameron from the Belgian Congo.

Since the Gyrophaenae are fungus-feeders, the problem of host specificity is an important one. The tissues of mushrooms vary appreciably in chemical and physical properties and it would be interesting to know what limitations these properties impose on the feeding habits of various species of Gyrophaenae. This paper has little to contribute to an understanding of this problem, since I was not able to keep accurate records of the fungi on which the specimens were found. It was quite apparent, though, that many species of *Gyrophaena* visit numerous species of fungi. Species of the subgenus *Gyrophaena* are found almost exclusively on fleshy, gilled mushrooms, although some species may occasionally be found on fleshy polypore fungi. Subgenera *Eumicrota* and *Agaricochara*, on the other hand, are primarily attracted to polypore fungi of the bracket type, more rarely to stemless gilled mushrooms that are attached to logs.

The most comprehensive studies on the host relationships of the Gyrophaenae were published recently (1948) in an interesting book, *Käfer und Pilze*, by Scheerpeltz and Höfler. Scheerpeltz, an entomologist, and Höfler, a botanist, made thirty-five excursions in the vicinity of Vienna, Austria, for the purpose of recording the fungi of the area and their associated beetles. The book provides interesting ecological analyses of the fungus habitat niche, and contains keys for the identification of the fungus-inhabiting beetles that the two authors collected. Since it is not feasible to summarize completely their findings in this paper, the reader is referred to their book for details.

Scheerpeltz and Höfler devoted much of their discussion of host specificity in fungus beetles to the eighteen species of Gyrophaenae which they found in the Vienna area. They observed that the adults of most species of *Gyrophaena* visited more than one species of mushroom, presumably to feed. They believed that the females were much more selective in their choice of mushrooms upon which to oviposit. A distinction was made between *Brutpilze*, or brood fungi, upon which the larvae develop, and *Standpilze*, which were visited by adults, chiefly males. The species about which they had the most data, *Gyrophaena joyioides* Wüsthoff, seemed to have only one *Brutpilz*, *Collybia platyphylla*, although the 1,420 adult specimens were found on no less than twenty species of mushrooms. They believed that a preponderance of adult females on a particular species of fungus is evidence that it is a *Brutpilz*. They found no evidence that *G. bihamata* Thomson, collected on seventeen species

of mushrooms, manifested any special preference for one or a few fungi. The data on the other species of *Gyrophaena* seem too limited to have much significance. The studies of Scheerpeltz and Höfler seem to me to be very important in presenting various problems associated with fungus-feeding beetles, and in helping to solve them. The Gyrophaenae are excellent material for ecological studies, and it is hoped that the taxonomic treatment of the subtribe in this paper will provide a foundation for such studies in North America.

CLASSIFICATION AND DISTRIBUTION

General

Gyrophaena and allied genera are currently considered to comprise a subtribe of the Bolitocharini, a heterogeneous tribe in the enormous subfamily Aleocharinae. The present classification of the Aleocharinae is one of convenience only, but must be utilized until a better system can be worked out.

Relatively few genera of Gyrophaenae have been proposed; more than 350 of the species have been assigned to *Gyrophaena* alone. Inasmuch as the relationships of the tropical species are still poorly known, it is at present impossible to construct a satisfactory generic classification of the subtribe. The current concept of *Gyrophaena* will almost certainly have to be modified. *Phanerota* and *Encephalus* seem to be easily definable categories, but *Brachida* and allied genera constitute a complex requiring considerable study.

The Holarctic fauna contains four genera: *Gyrophaena* Mannerheim, *Encephalus* Kirby, *Phanerota* Casey, and *Brachida* Mulsant and Rey. In this paper three subgenera of *Gyrophaena* are recognized, although it is probable that *Eumicrota* Casey and *Agaricochara* Kraatz will be separated from *Gyrophaena* when the Neotropical species are better known. The North American Gyrophaenae show important affinities with both Palearctic and Neotropical faunas. The subgenus *Gyrophaena* seems to be primarily a Holarctic category; there are few representatives in the Neotropical region, but studies on species of the Old World tropics have not progressed to the point where subgeneric assignments can be accurately made. The subgenus *Eumicrota* seems to be exclusively New World in distribution, with more species in Latin America than in North America; but Asiatic species may prove to belong here. The species of the subgenus *Agaricochara*, heretofore thought to occur only in the Palearctic region, are now shown to be much more abundant in the New World.

Encephalus is a small genus with four species in the Palearctic, one from New Zealand and one from the Nearctic (the first record of the genus in the New World). *Phanerota*, noteworthy for its huge eyes, was thought by Casey to be restricted to the New World, but it is now evident that the genus occurs in Asia and Africa as well. The Indo-Malayan species of *Acanthophaena* (usually placed as a subgenus of *Gyrophaena*) are doubtless members of *Phanerota*. Three species of *Phanerota* occur in the eastern United States and many more in the Neotropical region. *Brachida* and allied genera apparently constitute a segment of the subtribe not represented in North America, although moderately abundant in the neotropics and in the Old World. The predominantly tropical nature of this complex is indicated by the fact that its twenty species are recorded from India, Australia, the Fiji Islands, New Caledonia, Borneo, Cochin China, Africa, Japan, and Europe.

The North American Gyrophaenae: Historical

Prior to Casey's papers (1906 and 1911) on the Aleocharinae, only five valid species of North American Gyrophaenae had been proposed, these by Say (1834), Erichson (1840), and Melsheimer (1844). Using better optical equipment, Casey believed that he was able to distinguish 51 species and one subspecies of the subtribe, 47 of which he proposed as new. He segregated these species into four genera. It seems desirable at this point to summarize Casey's classification, inasmuch as the present monograph is a revision of it. The groupings are based on his key.

Subtribe **GYROPHAENAE**

According to Casey (1906, 1911)

Genus **PHANEROTA** Casey

angularis Casey (Texas)
dissimilis Erichson (Missouri, Indiana)
fasciata Say (Rhode Island, Pennsylvania)
floridana Casey (Florida)
ocularis Casey (New York)
peninsularis Casey (Lower California)

Genus **PHAENOGYRA** Mulsant and Rey

californica Casey (California)

Genus **EUMICROTA** Casey

atoma Casey (North Carolina)
corruscula Erichson (New York, Texas)
humeralis Casey (Pennsylvania)
melania Casey (Missouri)
minutissima Casey (Mississippi)
oligotina Casey (Missouri)
pallidula Casey (New York)
pinalica Casey (Arizona)
socia Erichson (North Carolina, Texas)
texanella Casey (Texas)

Genus **GYROPHAENA** Mannerheim

vitrina Casey (New York, Pennsylvania)
attonsa Casey (New York)
flavicornis Melsh. (New York, Lake Superior)
uteana Casey (Utah)
gaudens Casey (Wisconsin)
monticola Casey (Colorado)
pacifica Casey (British Columbia)
lobata Casey (New York)
involuta Casey (New York)
antennalis Casey (New York)
modesta Casey (New York)
insolens Casey (Isle Royale)
fuscicollis Casey (New York)
gilvicollis Casey (New York)
laurana Casey (Colorado)
criddlei Casey (Manitoba)
coniciventris Casey (Missouri)
genitiva Casey (Missouri)
sculptipennis Casey (New York, Wisconsin)
subpunctata Casey (New York)
lacustris Casey (Canada, Iowa, Wisconsin)
lacustris inconspicua Casey (Pennsylvania)
laetula Casey (New York, Pennsylvania)
rhodeana Casey (Rhode Island)
fustifer Casey (New York)
centralis Casey (New York)
perpolita Casey (Wisconsin)
tenebrosa Casey (Colorado)
keeni Casey (British Columbia)
subnitens Casey (Ontario)
compacta Casey (Rhode Island, Missouri)
obesula Casey (Pennsylvania)
micans Casey (Mississippi)
egena Casey (Pennsylvania, Rhode Island)
exilis Casey (Ontario)

Casey's studies on the Gyrophaenae suffer from several weaknesses that characterize much of his work. One of the chief criticisms of his taxonomy is that he failed to take into account intraspecific variation. Inasmuch as most of the species of *Gyrophaena* s. str. do not seem to be subject to much variation, a majority of the species of this subgenus proposed by him are valid. On the other hand, species of *Phanerota* and *Eumicrota*, which exhibit much more variation in color, were split by Casey into many forms that have no validity.

Although Casey fully recognized the importance, for diagnostic purposes, of the remarkable interspecific variation in male tergite characters within the Gyrophaenae, he was not consistent in use of these characters. He proposed many species for which no males were available, a practice that greatly complicated the taxonomy of the group. The species that Casey based on females have been extremely difficult to recognize. It seems to me that no new species of *Gyrophaena* should be proposed unless the male characters are described. Casey's practice of including the descriptions in a key to the species did not prove to be satisfactory; diagnostic characters were often obscured by non-essential details. It was necessary for me to examine thousands of specimens before it was possible to identify his species.

Casey's papers give no indication that he attempted to relate the American species of the subtribe to their European allies.

European genera were included in his key, but there is no mention of the close relationship that exists between many European and American species.

Fenyes accumulated a rather large collection of Gyrophaenae but did not publish on the group except to list the species of the world in his volume on the Aleocharinae in the *Genera Insectorum* (1918–21). He reduced *Eumicrota, Phanerota,* and *Phaenogyra* to subgeneric rank and synonymized twenty-nine of Casey's species. No evidence was presented to support his views. Fenyes' chief contribution was his recognition of the affinities existing between the Palearctic and Nearctic faunas. He listed five European species as occurring in North America (there is evidence for the existence of only two of them), and synonymized a number of Casey's species with them. I cannot agree with most of Fenyes' species determinations nor with many of his synonymies; personal examination of his Gyrophaenae revealed that his specimens were poorly identified. In numerous instances several species (as many as fourteen) were identified as one. Fenyes' views on the subtribe are summarized as follows:

Genus **GYROPHAENA** Mannerheim

Subgenus **Gyrophaena** Mannerheim

affinis Sahl. (Europe, North America)
  fuscicollis Casey
  lacustris Casey
  inconspicua Casey
bihamata Thom. (Europe, North America)
  pacifica Casey
fasciata Marsh. (Europe, North America)
  centralis Casey
  fustifer Casey
  laetula Casey
  rhodeana Casey
nana Paykull (Europe, North America)
  keeni Casey
  perpolita Casey
  tenebrosa Casey
pulchella Heer (Europe, North America)
  antennalis Casey
  criddlei Casey
  insolens Casey
  laurana Casey
flavicornis Melsheime
compacta Casey
  obesula Casey
  micans Casey
coniciventris Casey
  genitiva Casey
egena Casey
  exilis Casey
gaudens Casey
involuta Casey
lobata Casey
monticola Casey
modesta Casey
gilvicollis Casey
sculptipennis Casey
subnitens Casey
uteana Casey
subpunctata Casey
vitrina Casey
  attonsa Casey
(?)*rufa* Melsheimer

Subgenus **Eumicrota** Casey

corruscula Erichson
minutissima Casey
  atoma Casey
  oligotina Casey
pinalica Casey
socia Erichson
  humeralis Casey
  melania Casey
  pallidula Casey
  texanella Casey

Subgenus **Phaenogyra** Mulsant and Rey

californica Casey

Subgenus **Phanerota** Casey

vinula Erichson
angularis Casey
dissimilis Erichson
fasciata Say
flavocincta Jekel
floridana Casey
ocularis Casey
peninsularis Casey

Genus **AGARICOCHARA** Kraatz

geniculata Mäklin (Alaska)

The North American Gyrophaenae: Distribution

It would be of interest to know to what extent the distributions of the North American Gyrophaenae are correlated with the number and kind of mushrooms occurring in different sections of the continent. The ecological relationships of these beetles are too poorly known to allow for more than very broad speculations. Present evidence indicates that there are about twice as many species east of the Rocky Mountains (56) as there are west of this range (23). The gyrophaenine fauna seems to be rare in many areas of the west; the individual species are rather local in distribution and few have as wide ranges as the eastern ones. The coastal states of the west have few species; only three have been recorded from California.

The subgenus *Gyrophaena* is especially well represented in the north temperate region, particularly north of 40° N. Lat. in the eastern United States. Forty-one species are known to occur east of the Rocky Mountains, and all of them have been collected at least as far north as 39° (about the latitude of Washington, D.C., Cincinnati, Ohio, and Topeka, Kansas). Twenty-three of these (more than one-half) occur north of 45° and nineteen of them are known to occur in the area between 35° and 40°; but only three of these species have been collected south of 35°. Twenty-nine of the species of the subgenus that occur east of the Rocky Mountains have been collected in the Chicago area. Collections made in the southern Appalachian Mountains of North Carolina and Tennessee show the subgenus to be abundant there, and it is very likely that almost as many species will be found there as in the northern states. Many of the species in the eastern United States have wide distribution patterns, as the data (summarized elsewhere) show. West of the Rocky Mountains the subgenus *Gyrophaena* is represented by

sixteen species, an appreciable number of which occur in the mountains of New Mexico (6) and Arizona (6).

The subgenus *Eumicrota* is primarily a southern group, with many species in Latin America and only a few species in the northern United States. All of the seven North American species occur in the southern United States, but only three extend as far north as 40°. West of the 100th meridian, *Eumicrota* is represented by two species, in Arizona and New Mexico.

The subgenus *Agaricochara* has somewhat the same distributional pattern as *Eumicrota*. The species are probably most numerous in Latin America, although none from that region has yet been assigned to this subgenus. Only a few species occur in the northern United States. West of the 100th meridian, *Agaricochara* is represented by a few species in Arizona and New Mexico, and perhaps by an Alaskan species, a record not yet confirmed.

Phanerota apparently contains more Neotropical than Temperate species. Three species are recognized as occurring in the eastern United States; two of these range very widely and the third seems to be restricted to the Gulf states. *Phanerota fasciata* and *dissimilis* seem to occur in most of the states east of the Rocky Mountains, extending north to about 42°. Both species are very abundant and frequently occur together. The genus does not seem to be present west of the 100th meridian in the United States, although one species does occur in Lower California.

A striking feature of the distribution of the Gyrophaenae in our northern states is the large number of species that may frequent a small area. Thirty-eight species of the subtribe have been found in the Chicago area (within a radius of fifty miles of downtown Chicago), a region that includes northeastern Illinois, northwestern Indiana, and a small corner of Michigan. This may be the richest gyrophaenine fauna in the Nearctic region. Not infrequently, one small forest with a rich mushroom flora may harbor many species; seventeen species have been collected in one beach-maple forest in La Porte County, Indiana, over the past five years, and during one week I collected eighteen species in a small area of the Chequamegon National Forest in northern Wisconsin. Quite frequently very closely allied species may be found in the same area, even together on the same fungi. The twenty-nine species of the subgenus *Gyrophaena* known to occur in the Chicago area belong to fourteen of the species groups that are recognized in this paper: Five species belong to the *pulchella* group, four to the *bihamata* group, three to the *keeni* group, two each to six other groups, and one each to five groups.

REVISION OF HOLARCTIC GYROPHAENAE

Material and Methods

This revision is based on the study of more than 16,000 specimens. The principal sources of material were the very excellent collection of the late Dr. Adalbert Fenyes in the California Academy of Sciences, the Casey collection and miscellaneous unidentified specimens in the United States National Museum, the American Museum collection (including Notman's types), and my collection in Chicago Natural History Museum.

By necessity, more than by choice, examination of the Casey types was one of the final phases of the investigation and served chiefly to corroborate identifications of Casey species and to correct a few errors. Inasmuch as the genitalia of the Casey types could not be dissected out for study, topotypic material that could be mounted on slides proved to be more important. The Fenyes collection furnished nine of Casey's species from type localities, and on one trip to the Catskill Mountains I secured almost all of the fourteen Casey species from that area. Other Casey species were represented by material from collecting sites reasonably close to type localities. Available collections supplemented one another well; the Fenyes collection contains many specimens from the western states, the southwest, and New England; the Hubbard and Schwarz collection (U.S.N.M.) has many from the southwest, the Lake Superior region, and the southeastern states; and my collection has an abundance of material from the midwestern states. Mr. Henry Dybas and I collected thousands of specimens representing fifty species over a period of about ten years.

Only four of the ninety-eight North American and European species listed in the accompanying catalogue were not available for study: *G. geniculata* Mäklin (Alaska), *G. munsteri* Strand (Europe), *G. rosskotheni* Wüsthoff (Europe), and *Encephalus kraatzi* Hochhuth (Russia). None of these species is especially important. Males of three North American species—*rhodeana* Casey, *laurana* Casey, and *obesula* Casey—were not available for dissection, so it was not possible to figure their aedeagi. The Fenyes collection was very rich in

European material, containing all but a few species. This enabled me to make slide preparations of the males of the European species and to make comparisons with the Nearctic species. Correct identifications of European species was possible with the aid of the excellent revision of the European species by Wüsthoff (1937), who figured the aedeagi and male tergite characters.

The following suggestions are offered for those who may wish to collect and identify these minute beetles. A large number of specimens should be collected whenever possible, to insure an adequate representation of the species of an area and to increase the probability of acquiring males of each. A few hours of collecting when fungi are abundant usually yield hundreds of specimens, often comprising a number of species. Material should be collected in alcohol to insure clean specimens and to facilitate segregation of species before they are mounted. An aspirator is an almost indispensable aid in collecting specimens. Probably the most rapid and satisfactory method of identifying species is by examination of the abdominal characters of male specimens. Other characteristics should not, of course, be ignored. In the majority of species, males are easily distinguished from females by the modified eighth tergite. In many instances, examination of this tergite enables one to determine at once the group to which the species belongs. To identify the species with certainty it is usually necessary to examine the aedeagus. I have adopted the routine practice of placing one or more males of a species series in cold potassium hydroxide solution for a few hours. After a time it usually is possible to extrude the aedeagus by lightly pressing the abdomen. After the soft tissues have been sufficiently macerated, the specimen may be readily freed of them by pressure; it may then be washed in water and transferred to 70 per cent alcohol. The entire specimen, with aedeagus, may now be studied with the aid of a stereoscopic microscope. Rapid determinations may be made of material prepared in this way.

In many instances it is desirable to study the specimen with a compound microscope. In such cases, it is necessary to mount the specimen on a slide, using the standard techniques for clearing and mounting. The entire beetle and the separated aedeagus may be mounted under the same cover glass. Care must be exercised to orient the aedeagus so that a direct side view is obtained. This is more easily done if one or both of the lateral lobes are removed before the aedeagus is mounted. Although the lateral lobes also

vary from species to species, only the median lobes are figured in this paper. The very tiny median lobe may drift for some time after the slide has been prepared; if so, it should be manipulated into the proper position for study by lightly pressing on the cover glass after the medium has thickened somewhat.

Bolitocharini: Subtribe Gyrophaenae

Species of the tribe Bolitocharini seem to have only one diagnostic character in common, the tarsal formula 4, 4, 5. Since Erichson's classic monograph on the Staphylinidae appeared in 1840, species of the subfamily Aleocharinae have been organized into tribes on the basis of the number of tarsomeres, antennomeres, and palpomeres present. The expediency of this artificial tribal classification is perhaps justified when the vast number of species of Aleocharinae is taken into consideration. Future studies on the Aleocharinae should endeavor to provide a more natural tribal classification.

At this point it may be well to discuss several points of disagreement between the generic classification used in this paper and that used by Scheerpeltz and Höfler. These differences doubtless stem in part from the fact that their classification was based only on European species. Their recognition of *Agaricophaena* Reitter as a genus seems to be unjustified; I do not see how it can be separated from *Agaricochara* Kraatz. Scheerpeltz and Höfler consider *Agaricochara* to be generically distinct from *Gyrophaena*. When the American species of *Agaricochara* are taken into account, differences seem less significant, and I prefer to give *Agaricochara* subgeneric rank. I favor a broad concept of *Gyrophaena*, at least until more is known about the tropical species.

Scheerpeltz and Höfler recognized three subgenera of *Gyrophaena: Gyrophaena* s. str., *Phaenogyra* Mulsant and Rey, and *Leptarthrophaena* Scheerpeltz and Höfler. *Phaenogyra* is my *strictula* group of species; it seems to me to be no more deserving of subgeneric rank than most of the other species groups of *Gyrophaena*. In the discussion of the *strictula* group later in the paper, it will be shown that the characters customarily used to diagnose *Phaenogyra* are not reliable.

The subgenus *Leptarthrophaena* was proposed by Scheerpeltz and Höfler to separate five European species—*affinis, rosskotheni, pulchella, obsoleta,* and *nitidula*—from the other European species of *Gyrophaena*. Antennal segments 5–10 are not distinctly transverse

in these five species, a feature which may, indeed, separate them from their European congeners; but when the American species of *Gyrophaena* are taken into consideration, it is impossible to separate *Gyrophaena* into subgenera on the basis of antennal characters. In this paper, the species of *Leptarthrophaena* are distributed in several species groups. An advantage of the use of "species groups" is illustrated by this case; no formal names need be proposed and the species may be regrouped as new evidence becomes available.

Key to North American Gyrophaenae

This key attempts to provide a means of segregating the gyrophaenine genera, subgenera, and species groups that occur in North America without resorting to male characters more than is necessary. This, and other keys in the paper, may not prove satisfactory if only a few specimens are available, especially if no males are among them.

Gyrophaena (*Agaricochara*) *simplex* sp. nov. cannot be identified as an *Agaricochara* by this key; inasmuch as its pronotum is somewhat less than twice as wide as long, it is keyed out to *Gyrophaena* s. str. by couplet 3.

1. Pronotal hypomera reflected against the pronotum, invisible from the side; body broad, stout, compact ..... *Encephalus* Kirby (p. 752)
   Pronotal hypomera visible from the side, although feebly so in some species; body, as a rule, loosely organized 2

2. Infra-orbital carina absent; eyes extremely large and coarsely faceted, the distance between them less than three-fifths the total width of head. *Phanerota* Casey (p. 747)
   Infra-orbital carina present; eyes moderately large and finely faceted, the distance between them three-fourths the total width of head. *Gyrophaena* Mannerheim (p. 673) 3

3. Pronotum twice as wide as long or nearly so; mesosternal process extending to about the middle of the mesocoxal cavities 4
   Pronotum never more than two-thirds wider than long and usually somewhat less; mesosternal process usually extending well beyond the middle of the mesocoxal cavities ..... *Gyrophaena* s. str. (p. 673) 5

4. Antennomeres increasing abruptly in size beyond the fourth segment; segments 5–10 not incrassate or very slightly so. Subgenus *Eumicrota* Casey (p. 732)
   Antennomeres increasing gradually in size beyond the fourth segment; segments 4–10 incrassate ..... Subgenus *Agaricochara* Kraatz (p. 740)

5. Elytral punctures broad and shallow 6
   Elytral punctures not as above 7

6. Reticulation of head, pronotum and elytra strong ..... *affinis* group (p. 694)
   Reticulation of head, pronotum and elytra obsolescent .. *frosti* group (p. 716)

7. Elytral punctures coarse, deep, and densely arranged 8
   Elytral punctures not as above 9

8. Eighth male tergite with four slender processes, the inner pair almost as long as the others (fig. 100, *b*) ..... *nana* group (p. 673)
   Eighth male tergite with the inner processes much shorter than the outer ones (fig. 101, *b*) ..... *neonana* group (p. 679)

9. Elytra very coarsely scabrous; eighth male tergite as in figure 105, *b*. *sculptipennis* group (p. 689)
   Elytra at most densely asperate; eighth male tergite not as above 10

10. Eighth male tergite with four slender processes, the medial pair almost as long as the outer ones (fig. 102, *b*) 11
    Eighth male tergite not as above 12

11. Antennal segments 5–10 transverse ..... *keeni* group (p. 680)
    Antennal segments 5–10 subquadrate to elongate ..... *fasciata* group (p. 690)

12. Pronotum and elytra densely, asperately punctate and strongly reticulate; coloration dark brown to black ..... *strictula* group (p. 724)
    Pronotum and elytra not asperately punctate (or very feebly so); coloration, as a rule, flavate to light brown 13

13. Ninth male tergite truncate (fig. 113, *b*) ..... *fuscicollis* group (p. 712)
    Ninth male tergite rounded 14

14. Eighth male tergite (fig. 107, *b*) produced medially as a short, broad, evenly rounded lobe (lobe sometimes incised medially); the seventh tergite usually with a medial tubercle ..... *lobata* group (p. 693)
    Eighth tergite not as above 15

15. Seventh male tergite with a smooth, semicircular elevation medially; eighth male tergite (fig. 111, *b*) emarginate, usually with short, blunt, incurved processes; fifth and sixth antennomeres elongated (except in *criddlei*). *pulchella* group (p. 703)
    Seventh male tergite without a semicircular elevation (a small tubercle may be present); eighth male tergite not as above; antennae variable 16

16. Fifth antennomere distinctly transverse[1] 17
    Fifth antennomere doubtfully transverse, quadrate, or elongated 20

17. Seventh male tergite with a pair of erect spines; eighth male tergite with a median lobe flanked by acute processes (fig. 118, *b*) ..... *compacta* group (p. 728)
    Seventh and eighth male tergites not as above 18

18. Pronotum not reticulate; length of body less than 1.3 mm. *egena* group (p. 692)
    Pronotum reticulate; length of body greater than 1.3 mm 19

19. Pronotum short, 1.6 times as wide as long, its length less than sutural length of elytra ..... *illiana* group (p. 688)
    Pronotum longer, 1.4 times as wide as long, its length greater than sutural length of elytra ..... *laetula* group (p. 685)

20. Larger species, more than 2 mm. in length 21
    Smaller species, less than 2 mm. in length 22

21. Pronotum not reticulate ..... *vitrina* Casey (p. 714)
    Pronotum reticulate ..... *flavicornis* Melsh. (p. 722)

[1] *indiana* sp. nov. of the *vitrina* group keys out here.

22. Eighth male tergite with two slender, widely separated processes, not or very feebly incurved (fig. 116, *b*); seventh tergite without tubercle; ninth tergite unmodified..... *bihamata* group (p. 717)

Eighth male tergite with two long, incurved processes (fig. 109, *b*) or with shorter processes (fig. 110, *b*); seventh tergite usually with a small median tubercle; ninth tergite often modified (fig. 109, *b*).
coniciventris group (p. 697)

Genus **GYROPHAENA** Mannerheim

Gyrophaena Mannerheim, 1830, Mem. Savans Etrang. Acad. Sci. St. Petersb., **1**: 488; Erichson, 1837, Käfer Mark Brandenburg, **1**: 365; Erichson, 1840, Gen. Spec. Staph., p. 182; Kraatz, 1858, Naturg. Ins. Deutschl., Coleopt., **2**: 352; Mulsant and Rey, 1871, Hist. Nat. Coleopt. France, Aleoch., **5**: 17; Fauvel, 1875, Faune Gallo-rhen, Coleopt., **3**: 631; Ganglbauer, 1895, Käfer Mitteleuropa, **2**: 297; Casey, 1906, Trans. Acad. Sci. St. Louis, **6**: 289; Fenyes, 1918, Gen. Insect., **173A**: 95; Wüsthoff, 1937, Decheniana, **95B**: 137; Cameron, 1939, Fauna Br. India, Coleopt., Staph., **4**, pt. 1: 56; Scheerpeltz and Höfler, 1948, Käfer und Pilze.

Phaenogyra Mulsant and Rey, 1871, Hist. Nat. Coleopt. France, Aleoch., **5**: 76—type, *Gyrophaena strictula* Erichson.

Type of the genus.—*Gyrophaena nana* Paykull (designated by Thomson, 1859).

Eyes finely faceted, moderate in size, the distance between them equal to three-fourths the width of the head. Infra-orbital carina present. Pronotal hypomera visible from the side. Mesosternal process equal in length to metasternal process or much longer. Spermatheca of female simple (fig. 99, *j*).

Subgenus **Gyrophaena** Mannerheim

Size small (1.3–3.5 mm.); coloration flavate to brown, usually not uniformly colored; mesosternal process longer than metasternal process (fig. 99, *c–f*), its apex not margined; pronotum never more than two-thirds wider than long; antennae with fifth segment not conspicuously broader than the fourth, segments 4–10 usually incrassate; male tergites and aedeagi extremely variable.

NANA Group

A Holarctic group containing six species: one Holarctic, two European, and three North American.

The following combination of characters distinguishes the *nana* group: Head coarsely, umbilicately punctate; elytra densely punctate, the punctures deep and moderately coarse; reticulation of head, pronotum, and elytra obsolete or faint (distinct in *gentilis*); antennomeres 5–10 transverse; eighth male tergite (fig. 100, *b*) with four slender processes; aedeagus (fig. 100, *a*) simple.

The species of this group do not exhibit much morphological diversity; even the aedeagus is conservatively constructed. *G. nana*

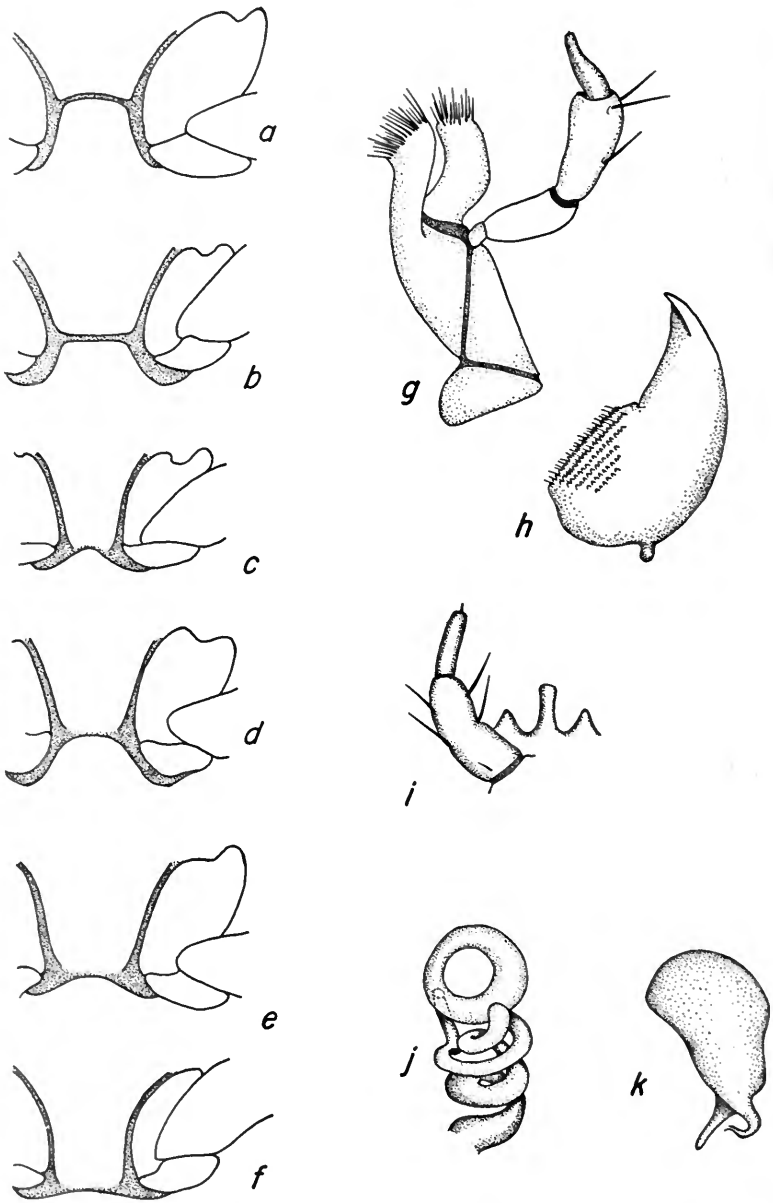

FIG. 99. *a–f.* Meso- and metasternal processes between middle coxae: *a. Phanerota dissimilis* Erichson. *b. Gyrophaena* (*Eumicrota*) *corruscula* Erichson. *c. G. compacta* Casey. *d. G. modesta* Casey. *e. G. affinis* Sahlberg. *f. G. longispinosa* sp. nov. *g.* Maxilla, *Phanerota fasciata* Say. *h.* Mandible, *P. fasciata* Say. *i.* Labium, *P. fasciata* Say. *j.* Spermatheca, *P. fasciata* Say. *k.* Spermatheca, *Gyrophaena corruscula* Erichson.

is a very widespread species, apparently occurring throughout the northern Holarctic region, from England to New England. In western North America, there seem to be several species in the mountainous areas south of the *nana* range; *sierrae* sp. nov. in California, *franciscana* sp. nov. in the San Francisco Mountains of Arizona, and *tenebrosa* Casey in Colorado and New Mexico. This species complex cannot be well analyzed without more material than was available.

Key to North American Species

1. Elytra punctured to the suture; its sculpture relatively rough. *franciscana* sp. nov. (p. 678)
   Elytra with smooth, sparsely punctate areas along suture 2
2. Antennomeres 6–10 very feebly transverse, relatively robust; tenth segment not longer than ninth ..... *sierrae* sp. nov. (p. 677)
   Antennomeres 6–10 distinctly transverse; tenth segment longer than ninth .. 3
3. Aedeagus as in figure 100, *a* ..... *nana* Paykull (p. 675)
   Aedeagus as in figure 100, *i* ..... *tenebrosa* Casey (p. 677)

Gyrophaena nana Paykull. Figure 100, *a*, *b*.

Staphylinus nanus Paykull, 1800, Fauna Suecica, **3**: 408.

Gyrophaena nana Mannerheim, 1830, Mem. Acad. Sci. St. Petersb., **1**: 74; Erichson, 1840, Gen. Spec. Staph., p. 184; Wüsthoff, 1937, Decheniana, **95B**: 142, pl. iv, figs. 15, 16.

Gyrophaena perpolita Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 301.

Length. 1.7–2 mm. *Coloration.* Head piceus; pronotum reddish-brown, apices darker; abdomen light brown, some tergites darker. *Punctation.* Vertex of head with six or more moderately large, umbilicate punctures on each half; pronotum with two medial rows of several moderately strong punctures, and with a basal cluster of close-set punctures; elytral punctation moderately coarse and deep, and densely arranged except along the suture and near the scutellum. *Sculpture.* Head, pronotum, and elytra shining, without reticulation; elytra with some granulations near apical angles. *Antennae.* Fourth segment moderately large; fifth short, feebly transverse; segments 6–10 transverse, slightly incrassate; segments 6–9 subequal in length, tenth slightly longer. *Male abdomen.* Eighth tergite (fig. 100, *b*) with four slender processes. Median lobe of aedeagus (fig. 100, *a*) simple.

Type localities.—Of *nana*, Europe; of *perpolita*, Bayfield, Wisconsin.

Material examined.—British Columbia: 2 specimens, Emerald Lake (C.A.S.); 1, Peachland, July 13, J. B. Wallis (C.F.). Montana: 13, Bear Paw Mountains, August 26–September 19, Hubbard and Schwarz (U.S.N.M., C.A.S.). Wyoming: 11, Yellowstone National Park, August 9–13, Hubbard and Schwarz (U.S.N.M., C.A.S.).

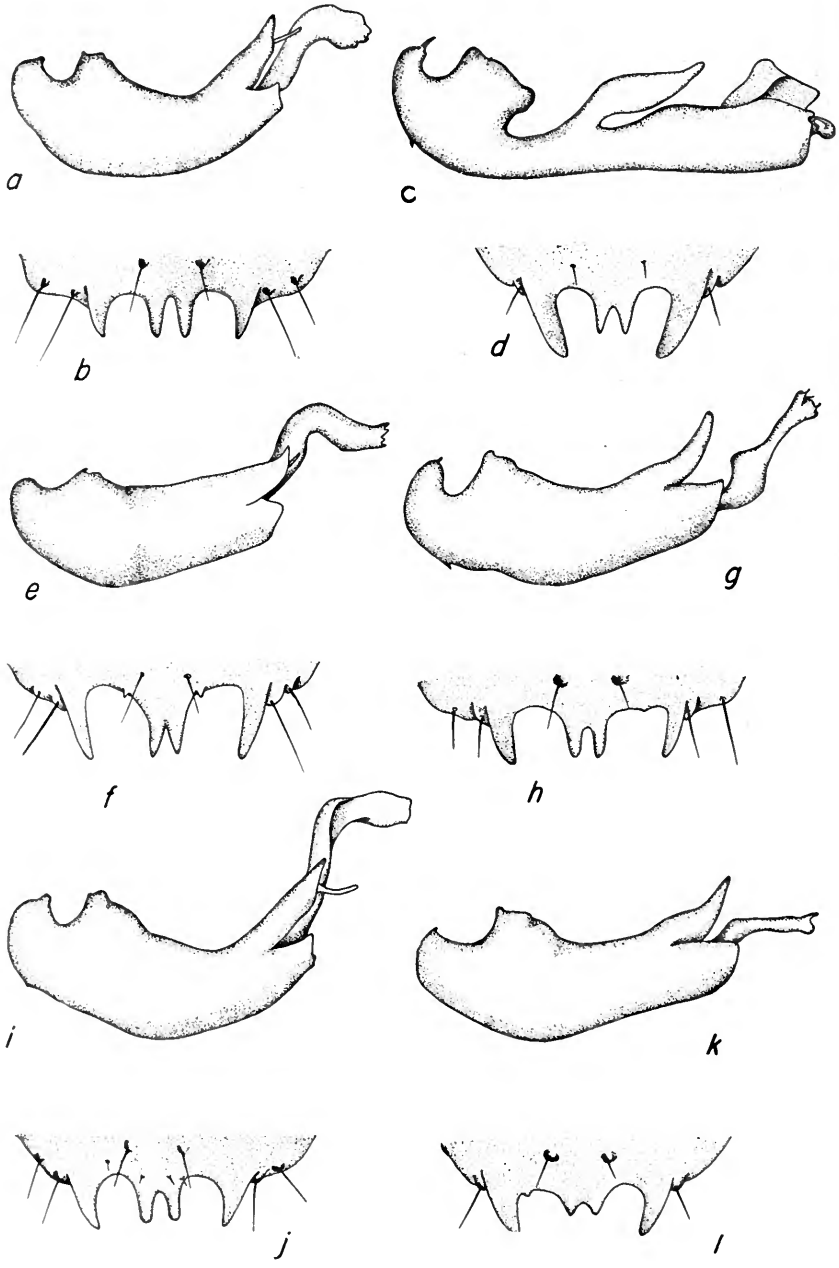

FIG. 100. *Gyrophaena: nana* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena nana* Paykull. *c, d. G. gentilis* Erichson. *e, f. G. sierrae* sp. nov. *g, h. G. franciscana* sp. nov. *i, j. G. tenebrosa* Casey. *k, l. G. rugipennis* Mulsant and Rey.

Manitoba: 1, Winnipeg (C.A.S.). Wisconsin: 5, Bayfield, H. F. Wickham (U.S.N.M., C.A.S.); 4, Chequamegon National Forest, near Mellen, August 19, 1947, C. Seevers. Michigan: 10, Drummond Island, August 22, 1948, T. and J. Hart (C.S.); 1, Midland County, June 22, 1942, R. R. Dreisbach. Ontario: 8, Batchawana Bay, north of Sault Sainte Marie, August, Hubbard and Schwarz (U.S. N.M.). Maine: 4, no locality (C.A.S., C.F.). Massachusetts: 1, Berkeley (C.A.S.); 1, Acton, April 12, 1931, C. A. Frost. Europe: Specimens from Italy, Germany, Silesia, Moravia, and Bohemia (C.A.S.).

Remarks.—This species is widely distributed in Europe and in boreal North America; Asiatic records are not available. Records indicate that its range in the Nearctic region is for the most part north of 44°; the southernmost records are Yellowstone Park in the west, Midland County, Michigan, in the middle west, and Massachusetts in the east. It has not been found in the Chicago area.

The types of Casey's *perpolita* and slide preparations of topotypes were studied, but no means could be detected of separating them from *nana*.

The eighth male tergite is variable and not very reliable for species diagnosis in the *nana* group. In one Wyoming specimen of *nana*, the median processes of the tergite are bifurcated at their tips.

Gyrophaena sierrae sp. nov. Figure 100, *e*, *f*.

Very closely related to *nana*, but apparently distinct on the basis of the antennal differences stated in the key.

Length. 1.8 mm. *Coloration.* As in *nana*. *Punctation.* As in *nana*, except that the elytra are more coarsely and densely punctate. *Antennae.* Segments 6–10 robust, subquadrate to feebly transverse, not appreciably incrassate; tenth subequal to ninth. *Male abdomen.* Eighth male tergite as illustrated (fig. 100, *f*). Aedeagus simple (fig. 100, *e*).

Holotype.—A male from Sugar Pine, Madero County, California; collected by A. Fenyes. In the collection of the California Academy of Sciences.

Paratypes.—California: 7 specimens, same data as the type; 5, Miami, Mariposa County, A. Fenyes; 7, Summerdale, A. Fenyes; 6, Tallac, El Dorado County, A. Fenyes; 2, Tahoe City, Placer County, A. Fenyes. Paratypes in these collections: C.A.S., C.S.

Gyrophaena tenebrosa Casey. Figure 100, *i*, *j*.

Gyrophaena tenebrosa Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 302.

Very close to *nana*, and doubtfully distinct. The median lobe of the aedeagus seems to be slightly different from that of *nana*, but more material may show that this is not outside the range of variation of *nana*. Since the name is available for Colorado and New Mexico specimens of the *nana* complex, it is retained, but with reservations.

Type localities.—Boulder County and Buena Vista, Colorado.

Material examined.—Colorado: Casey types; 2 specimens, Buena Vista, July 1, 1896, H. F. Wickham (U.S.N.M., C.A.S.); 1, Boulder County (C.A.S.); 1, Veta Pass, July 1, Hubbard and Schwarz (U.S.N.M.). New Mexico: 1, El Porvenir, San Miguel County (C.A.S.).

Remarks.—The Colorado specimens in the Fenyes and Wickham collections are doubtless from the same series as the types; they were not, however, studied by Casey.

Gyrophaena rugipennis Mulsant and Rey. Figure 100, *k*, *l*.

Gyrophaena rugipennis Mulsant and Rey, 1861, Opusc. Ent., **12**: 116; Wüsthoff, 1937, Decheniana, **95B**: 142, pl. iv, figs. 17, 18.

A European species near *nana*, but differing in these respects: Elytra punctured to the suture and feebly reticulate; the median processes of the eighth male tergite much shorter than in *nana* (fig. 100, *l*); slightly smaller than *nana* (1.5 mm.).

Material examined.—Switzerland: 1 specimen (C.A.S.).

Gyrophaena franciscana sp. nov. Figure 100, *g*, *h*.

Near *rugipennis* M. & R., from which it differs in being larger, in having more coarsely granulose elytra, and in having the median processes of the eighth male tergite much more elongated.

Length. 2.5 mm. *Coloration.* As in *nana*. *Punctation.* Head and pronotum punctate as in *nana*; elytral punctation dense and coarse, extending medially to the suture. *Sculpture.* Head and pronotum not reticulate; elytra rather coarsely granulose. *Antennae.* Segments 6–10 slightly transverse; tenth slightly longer than ninth. *Male abdomen.* Eighth male tergite (fig. 100, *h*) very similar to *nana*. Aedeagus as in figure 100, *g*.

Holotype.—A male from the San Francisco Mountains, Arizona; collected by W. M. Mann. In the collection of the California Academy of Sciences.

Paratype.—One male, same data as the type (C.A.S.).

Gyrophaena gentilis Erichson. Figure 100, *c*, *d*.

Gyrophaena gentilis Erichson, 1840, Gen. Spec. Staph., p. 185; Wüsthoff, 1937, Decheniana, **95B**: 142, pl. iv, figs. 19, 20.

Widely distributed in Europe, this species is distinguished by its strongly reticulate head, pronotum, and elytra, but especially by its distinctive aedeagus (fig. 100, *c*).

Material examined.—Germany, Switzerland, Moravia, Yugoslavia, Daghestan, U.S.S.R., Kuban District of the Caucasus: 11 specimens (C.A.S.).

NEONANA Group

A North American group containing two new species, *neonana* and *bilobata*. Related to the *nana* group as evidenced by the same characteristic elytral punctation, the umbilicately punctate head, and the structure of the aedeagus. Distinguished from the *nana* group by the longitudinally impressed pronotal disk, and the form of the eighth male tergite, which is distinctive in having the lateral processes relatively broad, blunt and close together, and the medial processes reduced.

Key to Species

Eighth male tergite as in figure 101, *b*.....*neonana* sp. nov.
Eighth male tergite as in figure 101, *d*.....*bilobata* sp. nov.

Gyrophaena neonana sp. nov. Figure 101, *a*, *b*.

Length. 1.4 mm. *Coloration.* Head rufo-piceus, pronotum rufo-flavate, elytra slightly darker, abdomen rufo-flavate, the apical half piceus. *Punctation.* Vertex of head with ten or more large, coarse, umbilicate punctures on each half, the medial rows of pronotal punctures irregular and often more than one puncture wide; pronotal surface near base transversely depressed and densely punctured throughout its width. Elytra densely and moderately coarsely punctured. *Sculpture.* Head and pronotum reticulate, elytra obsoletely so. *Antennae.* Fourth segment relatively large, a trifle longer than wide; fifth slightly transverse; 5–10 moderately incrassate and increasing in length. *Pronotum.* More convex than is usual in the genus, with a pair of slight longitudinal depressions on the disk. *Male abdomen.* Eighth tergite as illustrated (fig. 101, *b*); median lobe of aedeagus as in figure 101, *a*.

Holotype.—A male from Smith Station, LaPorte County, Indiana; collected July 19, 1947, by C. Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Indiana: 1 specimen, same data as the type. Pennsylvania: 1, Corry, September 8, 1946, C. Seevers.

Other material.—Wisconsin: 1, Chequamegon National Forest, 15 miles west of Mellen, August 23, 1947, C. Seevers. North Carolina: 4, Joyce Kilmer Forest, Nantahala National Forest, September 6, 1949, H. Dybas.

Gyrophaena bilobata sp. nov. Figure 101, *c*, *d*.

Related to *neonana*, from which it is distinguished by its larger size, darker coloration, and by the form of the eighth male tergite.

Length. 2 mm. *Coloration.* Head rufo-piceus, pronotum and elytra reddish-brown, abdomen reddish-brown, apical segments dark. *Punctation.* Pronotal punctures unusually numerous; arrangement in rows not apparent; elytral punctures as in *neonana* but slightly smaller and more densely arranged. *Sculpture.* As in *neonana*. *Antennae.* Fourth segment moderate in size; fifth slightly transverse, 6–10 incrassate and increasing slightly in length. *Male abdomen.* Eighth tergite distinctive (fig. 101, *d*), the lateral processes stout and relatively close together, the inner processes much reduced. Aedeagus as in figure 101, *c*.

Holotype.—A male from El Porvenir, San Miguel County, New Mexico (Truchas Mountains). In the collection of the California Academy of Sciences.

Paratypes.—New Mexico: 2 specimens, same data as the type. Arizona: 2, San Francisco Mountains, W. M. Mann (C.A.S.).

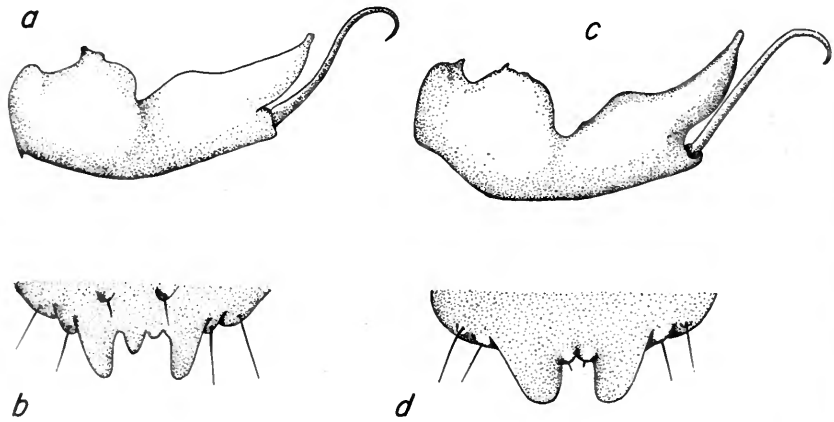

FIG. 101. *Gyrophaena: neonana* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a*, *b*. *Gyrophaena neonana* sp. nov. *c*, *d*. *G. bilobata* sp. nov.

Montana: 4, Bear Paw Mountains, September 3–17, Hubbard and Schwarz (U.S.N.M.). Wisconsin: 3, Bayfield, H. F. Wickham (C.A.S.). Paratypes in these collections: C.A.S., C.S., U.S.N.M.

KEENI Group

Contains five North American species. Related to the *nana* group as evidenced by the structure of the eighth male tergite and

aedeagus; distinguished from the *nana* and *neonana* groups by the finely and sparsely punctate elytra.

Differences in the aedeagi offer the best means of identifying these species; the key may not prove to be very reliable.

Key to Species

1. Punctures of head very small, scarcely perceptible. . *brevicollis* sp. nov. (p. 682)
   Punctures of head distinctly visible 2
2. Tenth antennomere distinctly longer than ninth 3
   Tenth antennomere subequal to ninth 4
3. Head with coarse umbilicate punctures ..... *nanoides* sp. nov. (p. 684)
   Head finely punctured ..... *monticola* Casey (p. 682)
4. Head coarsely punctured ..... *caseyi* sp. nov. (p. 684)
   Head finely punctured ..... *keeni* Casey (p. 681)

Gyrophaena keeni Casey. Figure 102, *a*, *b*.

Gyrophaena keeni Casey, 1911, Mem. Coleopt., 2: 185.

Length. 1.5–1.75 mm. *Coloration.* Head rufo-piceus, pronotum reddish-brown, elytra light reddish-brown, abdomen reddish-brown, apical half piceus. Pronotum and elytra rufo-testaceous in some examples. *Punctation.* Vertex of head with six or more small punctures on each half. Pronotum with medial rows of about three punctures and a very small cluster medially near base. Elytra finely, sparsely and irregularly punctate, punctures feebly asperate near apical angles. *Sculpture.* Reticulation of head and pronotum rather strong, finely meshed; elytral reticulation distinct upon close scrutiny, obsolescent in some cases. *Antennae.* Fourth segment moderately large; fifth feebly transverse; 6–10 slightly incrassate, never more than slightly transverse; tenth segment subequal to ninth. *Pronotum.* 1.45 times as wide as long. *Male abdomen.* Seventh tergite with a pair of smooth, slightly elongated tuberosities medially and two longer, slender carinae more laterally. Eighth tergite as in figure 102, *b*. Aedeagus distinctive (fig. 102, *a*).

Type locality.—Metlakatla, British Columbia.

Material examined.—British Columbia: 5 specimens, Emerald Lake, Yoho National Park (C.A.S.); 1, Peachland, July 13, J. B. Wallis (C.F.). Washington: 25, Washington Territory, Morrison (U.S.N.M.). Montana: 4, Bear Paw Mountains, September 4, Hubbard and Schwarz (U.S.N.M.). Wyoming: 1, National Park, August 9, Hubbard and Schwarz (U.S.N.M.). Maine: 2, no locality (C.A.S.). New Hampshire: 8, Bretton Woods (C.A.S.); 9, Intervale (C.A.S.); 1, Jackson (C.A.S.). Massachusetts: 1, Framingham, C. A. Frost (C.A.S.); 1, no locality, Easton (C.A.S.). New York: 2, Cranberry Lake, June 14, 1922, M. H. Hatch (C.A.S.). Tennessee: 10, Newfound Gap, Great Smoky Mountains National Park, June 24,

1935, C. Seevers. Florida: 4, Monticello, November 6, 1914 (A.M. N.H.).

Remarks.—It is quite evident that Fenyes was not justified in synonymizing *keeni* with *nana*.

Gyrophaena monticola Casey. Figure 102, *c*, *d*.

Gyrophaena monticola Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 293.

Related to *keeni* to which it may be compared as follows: Head punctures small, doubtfully umbilicate; pronotal punctation stronger than in *keeni*, the medial rows with more and stronger punctures, and the cluster near base comprised of many more punctures, which extend laterally for some distance; elytral reticulation deeper and coarser than in *keeni;* antennae as in *keeni* except that the tenth segment is conspicuously longer than the ninth; the eighth tergite (fig. 102, *d*) very similar to that of *keeni* but with the median lobe of aedeagus quite distinctive (fig. 102, *c*).

Type locality.—Boulder County, Colorado.

Material examined.—New Mexico: 49, Las Vegas, August 4, Hubbard and Schwarz (U.S.N.M.); 3, El Porvenir, San Miguel County (C.A.S.); 2, Upper Pecos (C.A.S.). Arizona: 2, San Francisco Mountains, W. M. Mann (C.A.S.). Colorado: 7, Buena Vista, July 1, 1896, H. F. Wickham (U.S.N.M.).

Remarks.—Casey keyed *monticola* so that it appeared to be related to *uteana* Casey. Clearly, however, its real affinities are with the *keeni* group.

Gyrophaena brevicollis sp. nov. Figure 102, *e*, *f*.

Related to *keeni* and *monticola*, but distinguished by the following characters: Antennomeres 5–10 considerably more transverse, coloration paler, reticulation obsolete, punctation of head extremely fine, pronotum relatively short, and aedeagus distinctive.

Length. 1.4–1.6 mm. *Coloration.* Head piceus, pronotum testaceous, the disk cloudy, elytra brown, the apical angles darker, abdomen rufo-testaceous, the apex darker. *Punctation.* Vertex of head with very small punctures, elytral punctation very fine. *Sculpture.* Head, pronotum, and elytra with little trace of reticulation. *Antennae.* Segments 5–10 strongly transverse; 5–8 at least one and one-half times as wide as long. *Pronotum.* 1.6 times as wide as long. Sutural length of elytra slightly longer than pronotum. *Male abdomen.* Eighth tergite as illustrated in figure 102, *f*. Aedeagus distinctive (fig. 102, *e*).

Holotype.—A male from the Indiana Dunes State Park, Indiana; collected September 21, 1944, by C. Seevers. In the collection of Chicago Natural History Museum.

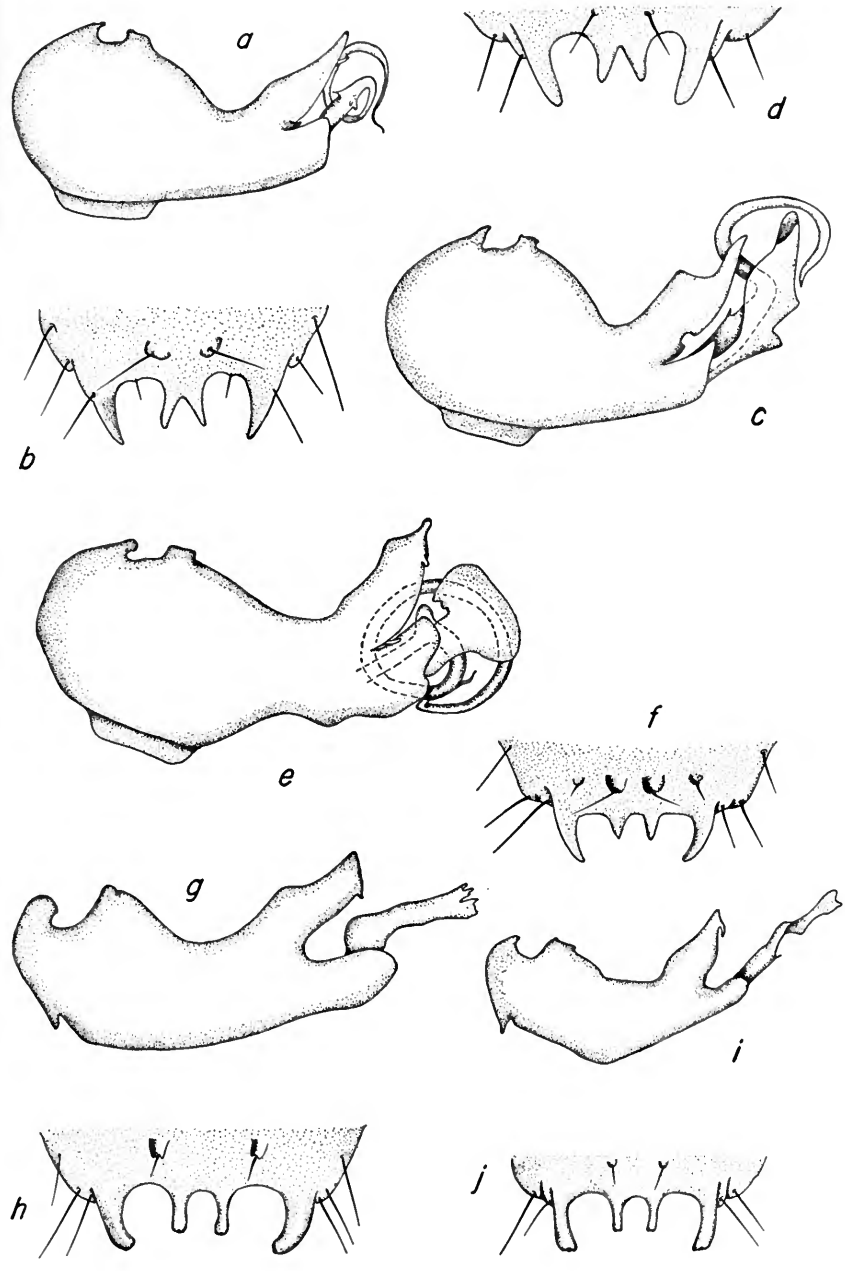

FIG. 102. *Gyrophaena: keeni* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena keeni* Casey. *c, d. G. monticola* Casey. *e, f. G. brevicollis* sp. nov. *g, h. G. nanoides* sp. nov. *i, j. G. caseyi* sp. nov.

Paratypes.—Indiana: 14 specimens, same data as the type; 16, Indiana Dunes State Park, August 22, 1946, H. Dybas; 6, Smith Station, LaPorte County, July 19, 1947, September 1, 1950, C. Seevers; 4, Dune Acres, October 16, 1948, H. Dybas; 1, Evansville, June 19, 1943, H. Dybas. Illinois: 1, Fox, Kendall County, June 19, 1947, C. Seevers. Missouri: 5, Neely's Landing, September 22, 1946, H. Dybas; 1, Friedheim, September 22, 1946, H. Dybas. Paratypes in these collections: C.S., C.A.S., U.S.N.M., A.M.N.H., I.N.H.S., M.C.Z.

Other material.—North Carolina: 3, Van Hook Glade, 25 miles northwest of Highlands, September 2, 1949, H. Dybas.

Gyrophaena nanoides sp. nov. Figure 102, *g*, *h*.

Distinguished from the three preceding species by the coarse umbilicate punctation of the head and by the structure of the aedeagus.

Length. 2 mm. *Coloration.* Head rufo-piceus; pronotum, elytra and abdomen flavo-testaceous, sixth tergite slightly darker. *Punctation.* Vertex of head with six or more coarse umbilicate punctures on each half. Elytra finely, irregularly punctulate. *Sculpture.* Head reticulate; pronotum strongly polished, the reticulation obsolescent; elytra obsoletely reticulate. *Antennae.* Fourth segment moderately large, transverse; segments 5–10 feebly transverse, slightly incrassate, fifth segment about four-fifths as wide as tenth; tenth segment longer than ninth. *Pronotum.* 1.33 times as wide as long, longer than sutural length of elytra. *Male abdomen.* Eighth tergite as illustrated in figure 102, *h*. Aedeagus distinctive (fig. 102, *g*).

Holotype.—A male from Beverly Shores, Porter County, Indiana; collected September 3, 1934, by Henry Dybas. In the collection of Chicago Natural History Museum.

Paratypes.—Indiana: 29 specimens, same data as the type. Wisconsin: 1, Edgerton, Rock County, July 8, 1947, H. Dybas; 1, Minocqua, September 8, 1934, Frank Furry. Iowa: 1, Iowa City, H. F. Wickham (C.A.S.). Ontario: 24, Gargantua Cape (Lake Superior), August, Hubbard and Schwarz (U.S.N.M.); 3, Bachawana Bay, August, Hubbard and Schwarz (U.S.N.M.). District of Columbia: 2, Rock Creek Park, September 26, 1942, E. Chapin and R. Blackwelder (U.S.N.M.). Virginia: 2, Ocean View, Norfolk, September 23, 1928, E. Chapin (U.S.N.M.). Paratypes in these collections: C.S., C.A.S., A.M.N.H., U.S.N.M., I.N.H.S., M.C.Z.

Gyrophaena caseyi sp. nov. Figure 102, *i*, *j*.

Closely related to *nanoides*, from which it may be distinguished by the following characters: Pronotum darker and more closely

punctured; antennomeres 5–10 more transverse, the tenth not longer than the ninth; aedeagus distinctive.

Length. 2 mm. *Coloration.* Head rufo-piceus, pronotum rufo-flavate, elytra and abdomen flavo-testaceous, sixth tergite darker. *Punctation.* Vertex of head with six or more coarse umbilicate punctures, pronotum more densely punctured than in *nanoides*, elytra finely, irregularly punctulate. *Sculpture.* Head and elytra reticulate, pronotal reticulation obsolescent. *Antennae.* Segments 5–10 distinctly transverse, tenth segment subequal to ninth. *Male abdomen.* Eighth tergite (fig. 102, *j*) as in *nanoides*. Aedeagus distinctive (fig. 102, *i*).

Holotype.—A male from Lakeside, Berrien County, Michigan; collected July 4, 1945, by C. Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Michigan: 2 specimens, same data as the type; 24, Lakeside, September 20, 1945, C. Seevers. Pennsylvania: 5, Corry, September 8, 1946, C. Seevers. New York: 1, Catskill Mountains State Park, near Hunter, September 10, 1946, C. Seevers. Paratypes in these collections: C.S., C.A.S., U.S.N.M., A.M.N.H., I.N. H.S., M.C.Z.

Other material.—North Carolina: 5, Joyce Kilmer Forest, Nantahala National Forest, September 6, 1949, H. Dybas.

LAETULA Group

This Holarctic group contains one North American and three European species. The male tergite characters of these species are similar to those of the preceding groups, but the distinctive aedeagus characterizes the group. The fine elytral punctures distinguish these species from the *nana* and *neonana* groups.

Gyrophaena laetula Casey. Figure 103, *a*, *b*.

Gyrophaena laetula Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 300.

Gyrophaena fustifer Casey, ibid., p. 300.

Gyrophaena centralis Casey, ibid., p. 301.

Length. 1.5–1.75 mm. *Coloration.* Head rufo-piceus, pronotum rufo-testaceous, elytra brownish, abdomen rufo-testaceous, sixth tergite darker; some specimens uniformly paler. *Punctation.* Vertex of head with ten or more large umbilicate punctures on each half. Pronotum irregularly punctured; the usual medial rows present but often confused by scattered punctures on disk. Elytra finely and very sparsely punctate. *Sculpture.* Reticulate throughout. *Antennae.* Fifth segment relatively small, two-thirds as long as wide; segments 5–10 distinctly transverse, incrassate and increasing in length, fifth about three-fourths as wide as tenth. *Pronotum.* 1.4–1.5 times as wide as long, its length greater than sutural length of elytra or subequal. *Male abdomen.* Eighth tergite with

two short triangular processes, the intervening space with two medial denticles (fig. 103, *b*). Aedeagus distinctive (fig. 103, *a*).

Type localities.—Of *laetula*, Catskill Mountains, New York, and Philadelphia, Pennsylvania; of *fustifer*, Peekskill, New York; of *centralis*, Catskill Mountains, New York.

Material examined.—Massachusetts: 2 specimens, Framingham, September 27, 1945, C. A. Frost; 6, Fall River, N. S. Easton (C.A.S.); 6, no locality (C.A.S.); 5, Berkeley, N. S. Easton (A.M.N.H., C.A.S.). Pennsylvania: 1, Alleghany (C.A.S.); 2, no locality (C.A.S.). District of Columbia: 1, June 15, Hubbard and Schwarz (U.S.N.M.). Virginia: 13, Ocean View, Norfolk, September 23, 1928, E. Chapin (U.S.N.M.); 3, Warm Springs, November 1, Leng coll. (C.S.). Tennessee: 19, Gatlinburg, June 15, 1942, C. Seevers. Kentucky: 3, Pine Mountain, Harlan County, July, 1946, W. L. and C. K. Necker (C.S.); 2, Crofton, June 15, 1947, C. Seevers. Indiana: 7, Indiana Dunes State Park, June 21, 1947, August 21, 1943, C. Seevers; 28, Smith, LaPorte County, June 20, 1945, C. Seevers; 1, Dune Acres, October 16, 1948, H. Dybas. Illinois: 4, Aurora, June 27, 1947, C. Seevers; 5, Fox, Kendall County, June 27, 1947, C. Seevers. Wisconsin: 7, Edgerton, July 8, 1947, H. Dybas.

Remarks.—Fenyes synonymized *laetula*, *fustifer*, *centralis*, and *rhodeana* with the European species, *fasciata* Marsham. This cannot be true, as *fasciata* belongs to a different species group. I agree with Fenyes, however, that there is some question about the validity of some of these species. *G. fustifer* and *centralis* are probably synonyms of *laetula;* personal examination of the types did not disclose any differences. All three were from the same part of New York state. I have never found more than one species of this group in the material from fifteen widely scattered localities east of the Mississippi River. *G. rhodeana* is probably a valid species of the *illiana* group.

Gyrophaena poweri Crotch. Figure 103, *e*, *f*.

Gyrophaena poweri Crotch, 1865, Trans. Ent. Soc. London, **5**: 439; Wüsthoff, 1937, Decheniana, **95B**: 143, pl. vii, figs. 36–38, pl. viii, figs. 39, 40.

G. poweri occurs in North and Middle Europe; it is apparently related to *laetula* on the basis of similarity in aedeagus structure. Points of dissimilarity are as follows: Non-reticulate pronotum and elytra; antennae not appreciably incrassate, although segments 5–10 are transverse; processes of eighth male tergite much longer (fig. 103, *f*), reminiscent of preceding groups; aedeagus distinctive (fig. 103, *e*).

Material examined.—Finland: 1. Switzerland: 3 (C.A.S.).

Gyrophaena minima Erichson. Figure 103, *c*, *d*.

Gyrophaena minima Erichson, 1837, Käfer Mark Brandbg., **1**: 370; Wüsthoff, 1937, Decheniana, **95B**: 143, pl. viii, figs. 41, 42.

A European species very similar to *poweri* in appearance, but differing as follows: Smaller size (1–1.3 mm.); elytra more finely

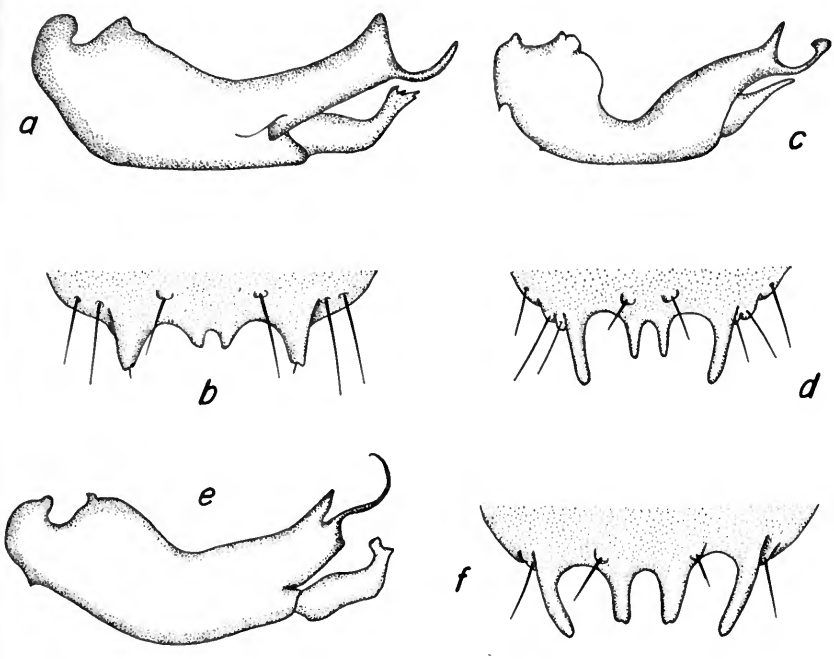

FIG. 103. *Gyrophaena: laetula* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a*, *b*. *Gyrophaena laetula* Casey. *c*, *d*. *G. minima* Erichson. *e*, *f*. *G. poweri* Crotch.

and sparsely punctate; pronotum more distinctly reticulate; aedeagus distinctive (fig. 103, *c*).

Material examined.—Austria: 4. Germany: 6. Moravia: 1 (C.A.S.).

Gyrophaena munsteri Strand

Gyrophaena munsteri Strand, 1935, Norsk. Ent. Tidsskr., **3**: 399; Wüsthoff, 1937, Decheniana, **95B**: 143, pl. v, figs. 26, 27, pl. vi, figs. 28, 29.

No specimens of this recently described European species were available for study. It seems evident from Wüsthoff's figures of the male abdominal characters that this species is closely related to *minima*.

ILLIANA Group

Nearctic in distribution, this group contains two new species and possibly *rhodeana* Casey. It is so closely related to the *laetula* group that the two probably should be combined. The eighth male tergite, which lacks medial processes (small subapical spines may be present), is the chief distinguishing character of the group.

Gyrophaena illiana sp. nov. Figure 104, *a*, *b*.

Distinguished from *laetula* by the eighth male tergite and aedeagus; in addition, the head punctures are smaller, and the

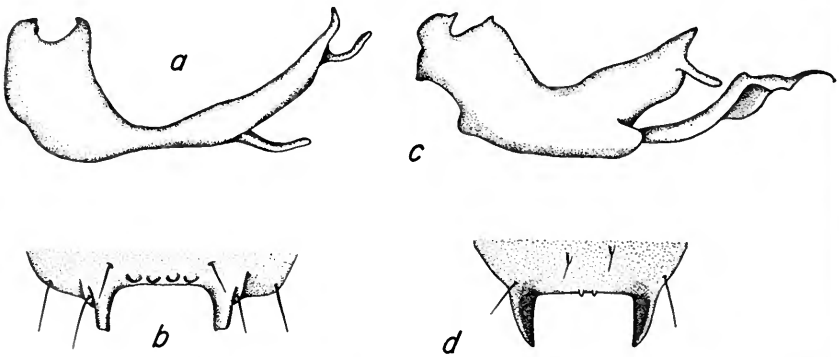

FIG. 104. *Gyrophaena: illiana* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a*, *b*. *Gyrophaena illiana* sp. nov. *c*, *d*. *G. wisconsinica* sp. nov.

pronotum relatively shorter, its length being less than the sutural length of the elytra.

Length. 1.6–1.7 mm. *Coloration.* Head piceus, pronotum and abdomen rufo-piceus, elytra uniformly brownish. *Punctation.* Vertex of head with about eight small, inconspicuous punctures on each half. Pronotum very feebly punctate; medial rows very incomplete (only one conspicuous puncture) and with only a few scattered punctures elsewhere. Elytra very sparsely and finely punctate, the punctures feebly asperate. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment small, much narrower than fifth; segments 5–10 distinctly transverse, incrassate, fifth approximately four-fifths as wide as tenth. *Pronotum.* 1.6 times as wide as long, its length less than sutural length of elytra. *Male abdomen.* Seventh tergite with two rounded, medial setigerous tuberosities and two pairs of setigerous carinae. Eighth tergite with short, blunt, widely separated processes, and with four low, rounded, subapical eminences (fig. 104, *b*). Aedeagus distinctive (fig. 104, *a*).

Holotype.—A male from Oswego, Kendall County, Illinois; collected September 2, 1939, by Henry Dybas. In the collection of Chicago Natural History Museum.

Paratypes.—Illinois: 14 specimens, same data as the type; 11, Fox, Kendall County, June 27, 1947, C. Seevers. Indiana: 22, Indiana Dunes State Park, September 12, 1942, August 22, 1946, H. Dybas; 4, Smith, LaPorte County, July 19, 1947, C. Seevers; 10, Evansville, June 19, 1943, H. Dybas. Wisconsin: 3, Chequamegon National Forest, 15 miles west of Mellen, August 22, 1947, F. and C. Seevers. Paratypes in these collections: C.S., U.S.N.M., C.A.S., A.M.N.H., I.N.H.S., M.C.Z.

Gyrophaena wisconsinica sp. nov. Figure 104, *c*, *d*.

Related to *illiana*, from which it may be distinguished by the umbilicate punctation of the head, the more convex pronotum, stronger elytral asperities, the larger fourth antennomere, and especially by the form of the eighth tergite and the aedeagus.

Length. 1.9 mm. *Coloration.* Uniformly brown. *Punctation.* Vertex of head with about eight umbilicate punctures on each half. Pronotum sparsely punctate, the medial rows of punctures inconspicuous; with a cluster of confluent punctures near base. Elytra with sparse but conspicuously asperate punctation. *Sculpture.* Head feebly reticulate; pronotum obsoletely and finely reticulate; elytra reticulate. *Antennae.* Fourth segment comparatively large, quadrate; segments 5–10 transverse, slightly incrassate; ninth and tenth longer than eighth. *Pronotum.* Strongly convex; 1.7 times as wide as long; length subequal to sutural length of elytra. *Male abdomen.* Seventh tergite with several pairs of setigerous carinae. Eighth tergite (fig. 104, *d*) with two rather long, acute, widely separated processes, and with two small, acute, subapical spinous processes medially. Aedeagus distinctive (fig. 104, *c*).

Holotype.—A male from the Chequamegon National Forest, 15 miles west of Mellen, Wisconsin; collected August 22, 1947, by F. and C. Seevers. In collection of Chicago Natural History Museum.

Paratypes.—Wisconsin: 6, Edgar, Marathon County, July 26, 1949, R. L. Wenzel. Illinois: 4, Wayne, Du Page County, August 29, 1949, Roger Mitchell. Paratypes in these collections: C.S., C.N.H.M., I.N.H.S.

SCULPTIPENNIS Group

The single North American species of this group is certainly related to the foregoing groups, but is so distinctive in several respects that it is placed alone. The elongated, loosely organized antennae, the strongly scabrous elytra, and the distinctive male eighth tergite characterize *sculptipennis*.

Gyrophaena sculptipennis Casey. Figure 105.

Gyrophaena sculptipennis Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 298.

Length. 2.25 mm. *Coloration.* Head rufous to rufo-piceus, pronotum flavate, elytra flavate, its apical half frequently darker, abdomen reddish, the sixth tergite dark. *Punctation.* Vertex of head with eight or more large umbilicate punctures on each half; pronotum with the usual median rows and scattered punctures; elytra moderately densely punctured; eighth tergite densely, asperately punctate. *Sculpture.* Head weakly reticulate, pronotum strongly shining, not reticulate; elytra with the outer half strongly scabrous. *Antennae.* Loosely constructed; fourth segment moderately large, subquadrate; segments 5–8 subquadrate to slightly elongated; ninth and tenth slightly elongated. *Pronotum.* 1.33 times as wide as long. *Male abdomen.* Surface of seventh tergite with six strong, oblique setigerous carinae. Eighth tergite (fig. 105, *b*) and aedeagus (fig. 105, *a*) distinctive.

Type localities.—Catskill Mountains, New York, and Bayfield, Wisconsin.

Material examined.—New Hampshire: 1, Bretton Woods (C.A.S.). Massachusetts: 1, no locality (C.A.S.). New York: 1, Flatbush,

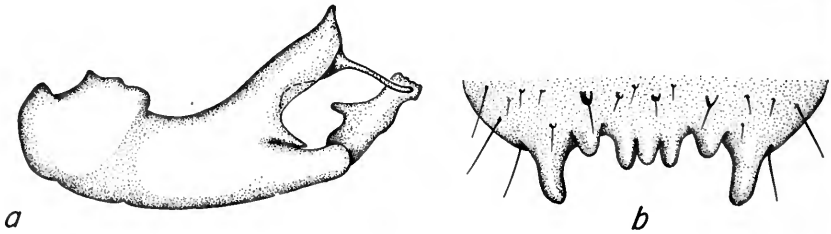

FIG. 105. *Gyrophaena: sculptipennis* group. *G. sculptipennis* Casey. *a.* Aedeagus (median lobe, lateral view). *b.* Male eighth tergite (dorsal view).

Long Island, C. Leng (C.S.). Wisconsin: 5, Bayfield, June, 1895, H. F. Wickham (C.A.S.); 3, Mellen, August 24, 1947, C. Seevers.

FASCIATA Group

This group contains one European and two North American species, characterized by their distinctive aedeagi. The eighth male tergite resembles that of the *nana* and *keeni* groups. Antennal segments 5–10 of the American species are quadrate or slightly elongated, but are transverse in *fasciata*. If Scheerpeltz and Höfler's recently proposed subgenus *Leptarthrophaena* were to be recognized, *fasciata* would belong to *Gyrophaena* s. str. and the American species to their new subgenus. It seems to me that *Leptarthrophaena* serves only to create an unnatural division of the species of *Gyrophaena.*

Key to North American Species

Fifth antennomere subquadrate, not much larger than fourth..... *involuta* Casey
Fifth antennomere elongated, conspicuously larger than fourth.
neomexicana sp. nov.

Gyrophaena involuta Casey. Figure 106, *a*, *b*.

Gyrophaena involuta Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 294.

Length. 2 mm. *Coloration.* Head piceus, pronotum flavate, elytra slightly darker, abdomen rufo-flavate, fifth and sixth tergites darker. *Punctation.* Vertex of head with seven or more small umbilicate punctures on each half; pronotum

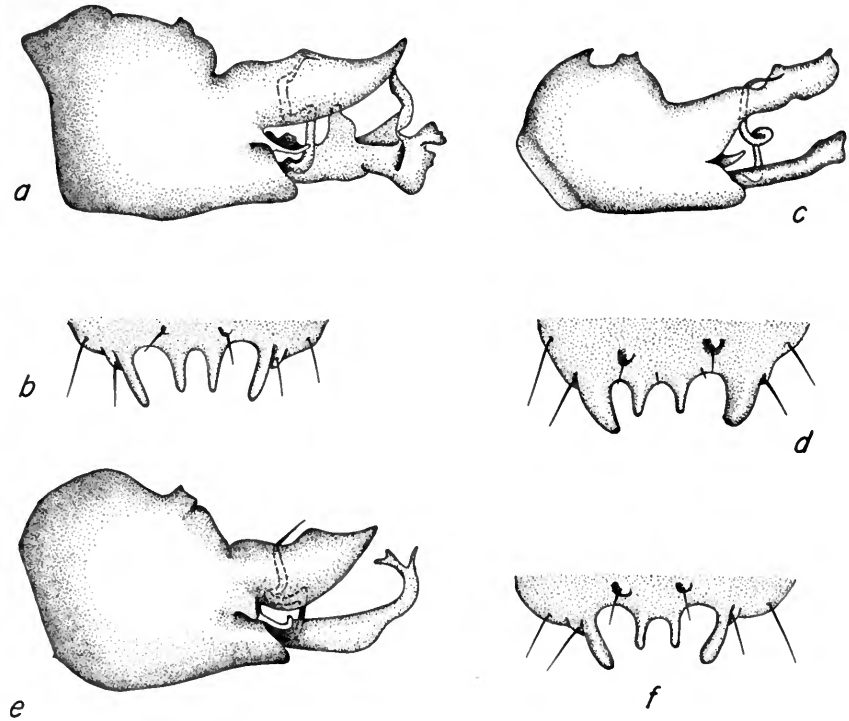

FIG. 106. *Gyrophaena: fasciata* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a*, *b*. *Gyrophaena involuta* Casey. *c*, *d*. *G. fasciata* Marsham. *e*, *f*. *G. neomexicana* sp. nov.

with two weak medial rows; elytra finely and very sparsely punctulate. *Sculpture.* Reticulate throughout, elytral reticulation obsolescent in some. *Antennae.* Long and loosely organized; fourth segment relatively large, elongated; fifth quadrate, not much wider than fourth; segments 6–10 subquadrate to slightly elongated. *Male abdomen.* Seventh tergite with eight strong longitudinal carinae. Eighth tergite (fig. 106, *b*) with four rather stout processes. Aedeagus distinctive (fig. 106, *a*).

Type locality.—Catskill Mountains, New York.

Material examined.—New York: 1 specimen, Catskill Mountains State Park, near Hunter, September 10, 1946, F. and C. Seevers; 2, no locality, J. B. Smith coll. (U.S.N.M.). Massachusetts: 3, no

locality, N. S. Easton (C.A.S.); 1, Bristol County, June 17, 1911, N. S. Easton (C.A.S.); 1, Berkeley, N. S. Easton (C.A.S.). Wisconsin: 2, Bayfield (C.A.S.).

Gyrophaena neomexicana sp. nov. Figure 106, *e, f.*

Closely related to *involuta*, but differing in antennal structure as described below and in minor details of aedeagus structure.

Length. 2 mm. *Coloration.* As in *involuta*. *Punctation.* As in *involuta*. *Sculpture.* As in *involuta*. *Antennae.* Stout; fourth segment small, slender; fifth much larger, elongated; segments 5–10 subquadrate to slightly elongated, approximately the same width, and decreasing slightly in length. *Male abdomen.* Eighth tergite as illustrated in figure 106, *f;* aedeagus (fig. 106, *e*) differing in minor respects from *involuta*.

Holotype.—A male from El Porvenir, San Miguel County, New Mexico. In the collection of the California Academy of Sciences.

Paratypes.—Four specimens, same data as the type (C.A.S., C.S.).

Gyrophaena fasciata Marsham. Figure 106, *c, d.*

Staphylinus fasciata Marsham, 1802, Ent. Britannica, **2**: 514; Wüsthoff, 1937, Decheniana, **95B**: 143, pl. v, figs. 21, 22.

Fenyes listed *fasciata* as a Holarctic species and placed in synonymy with it four of Casey's species: *laetula, rhodeana, fustifer,* and *centralis*. There is no evidence, however, that *fasciata* occurs in North America, and the Casey species have been shown earlier in the paper to belong to other groups.

G. fasciata differs from the North American species of the group in having antennomeres 5–10 transverse, and in its distinctive aedeagus.

Material examined.—Europe: 1 specimen.

EGENA Group

Contains one small North American species, characterized by its male abdominal characters. The affinities of *egena* are not clear, but it is probably related to *laetula*.

Casey's statement in his key that *egena* has the "prothorax but slightly wider than long" is incorrect; by actual measurement, the pronotum is one-third wider than long and not appreciably different from that of most species of *Gyrophaena* s. str. *G. egena* is not as isolated as Casey's key implies.

Gyrophaena egena Casey. Figure 107, *c*, *d*.

Gyrophaena egena Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 303.

Gyrophaena exilis Casey, ibid., p. 304.

Length. 1.1–1.3 mm. *Coloration.* Head and pronotum dusky testaceous; elytra dark piceo-flavate; abdomen flavate, fifth and sixth tergites cloudy. *Punctation.* Vertex of head with eight or more moderate punctures on each half; pronotum with scattered, moderately large umbilicate punctures over entire surface. *Sculpture.* Head shining, feebly reticulate; pronotum shining, reticulation obsolescent. *Antennae.* Fourth segment very short, transverse; segments 5–10 transverse, incrassate. *Pronotum.* 1.33 times as wide as long. *Male abdomen.* Eighth male tergite (fig. 107, *d*) feebly and broadly emarginate, the border within bearing several small denticles. Aedeagus distinctive (fig. 107, *c*).

Type localities.—Of *egena*, Philadelphia, Pennsylvania, and Boston Neck, Rhode Island; of *exilis*, Toronto, Ontario.

Material examined.—Massachusetts: 19 specimens, Framingham, C. A. Frost (C.A.S.). North Carolina: 6, Joyce Kilmer Forest, Nantahala National Forest, September 6, 1949, H. Dybas.

Remarks.—I agree with Fenyes that *exilis* is a synonym of *egena;* personal examination of the types of the two did not disclose any differences of importance.

LOBATA Group

The one North American species has a very distinctive eighth male tergite, but its aedeagus suggests relationship to the *nana* group.

Gyrophaena lobata Casey. Figure 107, *a*, *b*.

Gyrophaena lobata Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 294.

Resembles *vitrina* Casey in appearance, especially in its large size, pale coloration, and smooth, shining pronotum; it may be distinguished easily, however, by its antennal structure and male abdominal characters.

Length. 2.25 mm. *Coloration.* Head rufo-piceus; pronotum flavate, its disk usually cloudy; elytra very pale, with a silvery sheen, their external angles feebly darkened; abdomen pale rufo-flavate, the sixth segment darker. *Punctation.* Vertex of head with several large umbilicate punctures; pronotum almost impunctate; elytra with outer half moderately densely punctate, the inner half more finely and sparsely so. *Sculpture.* Head reticulate; pronotum strongly polished, reticulation obsolescent; elytra feebly reticulate. *Antennae.* Long and loosely organized; segments 4–10 incrassate, with no abrupt change in size; fourth segment exceptionally large, subquadrate to feebly elongated; segments 5–7 feebly transverse, 8–10 as a rule slightly elongated. *Pronotum.* 1.45 times as wide as long. *Male abdomen.* Seventh tergite with a smooth, subapical carina medially; the

carina strong in most cases but greatly reduced in others. Eighth tergite (fig. 107, *b*) broadly produced as a large rectangular lobe, its angles rounded; incised medially in some cases. Aedeagus distinctive (fig. 107, *a*).

Type locality.—Catskill Mountains, New York.

Material examined.—New York: 1, Catskill Mountains, near Hunter, September 10, 1946, F. and C. Seevers. District of Columbia: 1, Washington, June 15, Hubbard and Schwarz (U.S.N.M.).

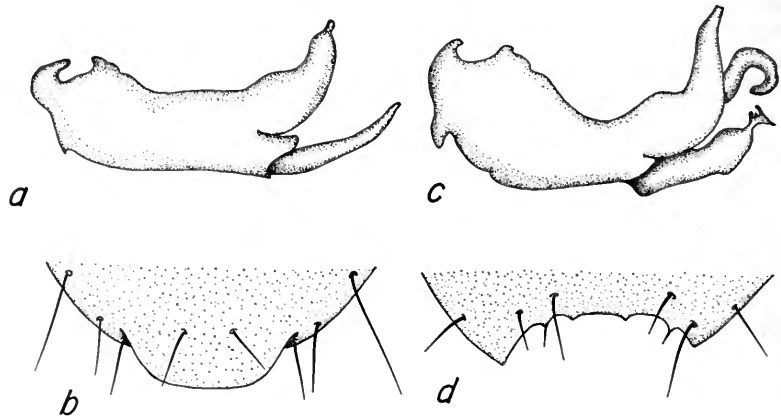

FIG. 107. *Gyrophaena: lobata* and *egena* groups. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena lobata* Casey. *c, d. G. egena* Casey.

Michigan: 9, Lakeside, September 20, 1945, C. Seevers; 1, Grand Ledge, July 23, Hubbard and Schwarz (U.S.N.M.). Indiana: 12, Smith, LaPorte County, July 20, 1945, September 1, 1950, C. Seevers; 3, Indiana Dunes State Park, June 14, 1944, June 21, 1947, August 22, 1946, H. Dybas, C. Seevers. Illinois: 1, Aurora, June 27, 1947, C. Seevers; 3, Yorkville, June 27, 1947, C. Seevers; 1, Fox, June 27, 1947, C. Seevers. Wisconsin: 2, Edgerton, July 8, 1947, H. Dybas. Kansas: 1, Topeka, September 7, 1942, F. and C. Seevers.

AFFINIS Group

This Holarctic group contains one Holarctic, one European, and one North American species.

The male characters of the *affinis* group are different from those of the preceding groups. These species may be distinguished from those of the *coniciventris* group, which they most closely resemble, by their broad, shallow elytral punctures.

Key to North American Species

Aedeagus as in figure 108, *a;* flavate to brown.....*affinis* Sahlberg
Aedeagus as in figure 108, *c;* dark testaceous to piceus....*dybasi* sp. nov. (p. 697)

Gyrophaena affinis Sahlberg. Figure 108, *a, b.*

Gyrophaena affinis C. R. Sahlberg, 1834, Insecta Fennica, **1**: 383; Wüsthoff, 1937, Decheniana, **95B**: 141, pl. i, figs. 3, 4.

Gyrophaena subpunctata Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 299.

Gyrophaena lacustris Casey, ibid., p. 299.

(?)*Gyrophaena lacustris inconspicua* Casey, ibid., p. 299.

Length. 1.75–2.1 mm. *Coloration.* Head rufo-piceus to black; pronotum flavate to brown, the disk sometimes cloudy; elytra testaceous to brown; abdomen rufo-flavate to brown; fifth and sixth tergites dark. *Punctation.* Vertex of head with about ten large umbilicate punctures on each half; elytra with numerous broad, very shallow punctures. *Sculpture.* Reticulate throughout. *Antennae.* Fifth segment quadrate to slightly elongated; segments 6–10 subquadrate, feebly incrassate. *Pronotum.* 1.4 to 1.5 times as wide as long. *Male abdomen.* Seventh tergite with a low, polished subapical elevation medially (absent in some cases). Eighth tergite (fig. 108, *b*) with two long, slightly incurved, acute processes. Aedeagus as in figure 108, *a.*

Type localities.—Of *affinis,* Europe; *subpunctata,* Catskill Mountains, New York; *lacustris,* Bayfield, Wisconsin, Iowa, and Canada; *inconspicua,* Philadelphia, Pennsylvania.

Material examined.—Europe: 16, Burgess Hill, Sussex, England, July 16, 1937 (C.S.); 9, Germany (C.A.S.); 1, Hungary (C.A.S.); 1, Banat, Rumania (C.A.S.); 1, Caucasus (C.A.S.). Maine: 1, East Machias (C.A.S.); 1, no locality (C.F.). New Hampshire: 4, Intervale, A. Fenyes (C.A.S.). Massachusetts: 1, no locality (C.A.S.); 6, Natick, June 5, 1910, C. A. Frost (C.A.S.); 4, Framingham, C. A. Frost (C.A.S., C.F.); 1, Fall River, N. S. Easton (C.A.S.). New York: 2, Catskill Mountains State Park, September 10, 1946, C. Seevers; 18, West Point, May 30, 1915, W. Robinson (U.S.N.M.). New Jersey: 3, no locality (A.M.N.H.); 3, no locality, J. B. Smith (U.S.N.M.). Pennsylvania: 3, no locality (C.A.S.); 3, Jeannette, August, Klages (C.A.S.); 1, Alleghany, J. B. Smith (U.S.N.M.). District of Columbia: 1, Washington, May 22, Hubbard and Schwarz (U.S.N.M.). West Virginia: 9, Gormania, June 6, 1948, C. Seevers. North Carolina: Wayah Bald, September 2, 1949, H. Dybas. Tennessee: 3, Gatlinburg, June 16, 1942, C. Seevers; 16, Great Smoky Mountains National Park, June 11, 1947, C. Seevers. Kentucky: 9, Crofton, Christian County, June 15, 1947, C. Seevers. Indiana: 10, Turkey Run State Park, June 15, 1935, C. Seevers; 250, Indiana Dunes State Park, June 21, 1947, C. Seevers; 58, Smith, LaPorte

County, July 19, 1947, C. Seevers. Michigan: 7, Midland County, June 18, 1945, R. R. Dreisbach; 5, Roscommon County, R. R. Dreisbach; 1, Bay County, R. R. Dreisbach; 23, Wetmore, August 26, 1947, John Retondo (C.S.). Wisconsin: 2, Bayfield, H. F. Wickham (C.A.S.); 60, Chequamegon National Forest, west of Mellen, August 22, 1947, F. and C. Seevers; 95, Edgerton, July 8, 1947, H. Dybas. Illinois: 17, Rockford, June 13, 1944, H. Dybas;

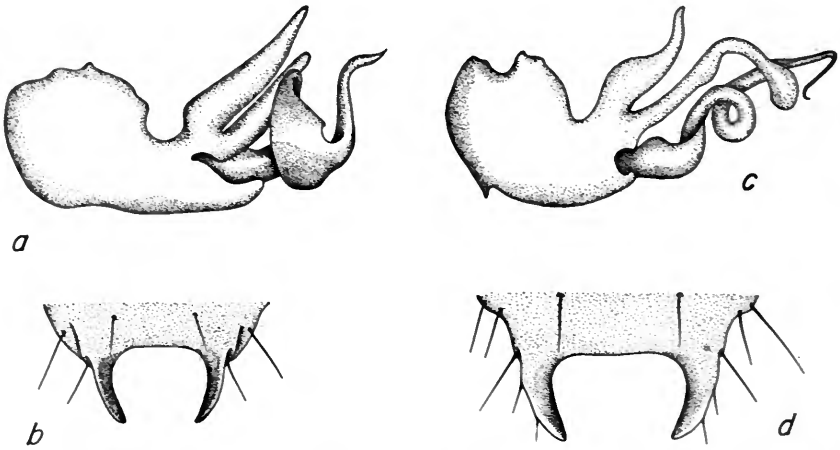

FIG. 108. *Gyrophaena: affinis* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena affinis* Sahlberg. *c, d. G. dybasi*, sp. nov.

98, Volo, May 25, 1946, C. Seevers; 19, Oswego, September 2, 1939, H. Dybas; 94, Fox Ridge State Park, June 15, 1947, C. Seevers; 52, Aurora, June 27, 1947, C. Seevers; 28, Fox, Kendall County, June 27, 1947, C. Seevers. Missouri: 98, Friedheim, September 21, 1946, H. Dybas; 6, Arbor, September 22, 1946, H. Dybas; 1, Paris, June 14, 1946, C. Seevers. Iowa: 7, Iowa City, H. F. Wickham (C.A.S., U.S.N.M.). Minnesota: 2, Little Winnebegosish, June 10, 1935, K. Cooper (U.S.N.M.). New Mexico: 23, Las Vegas, August 4, Hubbard and Schwarz (U.S.N.M.). Washington: 1, Baring (C.A.S.). British Columbia: 4, Wynndel, June 23, 1946, G. S. Smith (C.S.); 2, Creston, June 11, 1946, G. S. Smith (C.S.); 9, Shangan Lake (C.A.S.).

Remarks.—This is one of the most abundant of the North American species, occurring in large numbers from late spring until early fall.

Gyrophaena dybasi sp. nov. Figure 108, *c*, *d*.

Distinguished from *affinis* by its distinctive aedeagus and darker coloration. As a rule, most of the specimens of a series are appreciably darker than *affinis*, but too much reliance cannot be placed on this fact.

Length. 1.75 mm. *Coloration.* Head piceus, pronotum and elytra dark testaceous, abdomen rufo-testaceous to uniform piceus, fifth and sixth tergites darker. *Punctation.* Vertex of head with about ten moderately large punctures on each half. Pronotum with two complete medial rows, the rows often double. Elytra rather densely punctured, the punctures broad and shallow. *Sculpture.* Reticulation strong throughout. *Antennae.* Fifth segment slightly elongated to feebly transverse; segments 6–10 quadrate to slightly elongated. *Pronotum.* 1.4 times as wide as long. *Male abdomen.* Seventh tergite with a small, smooth subapical elevation medially (absent in some). Eighth tergite (fig. 108, *d*) very similar to *affinis*. Aedeagus distinctive (fig. 108, *c*).

Holotype.—A male from Smith, LaPorte County, Indiana, collected June 20, 1945, by Charles Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Indiana: 28 specimens, same data as type; 8, Smith, LaPorte County, July 19, 1947, C. Seevers. Illinois: 26, Aurora, June 27, 1947, C. Seevers. Missouri: 7, Brookfield, August 31, 1942, C. Seevers; 15, Friedheim, September 21, 1946, H. Dybas. Wisconsin: 75, Edgerton, July 8, 1947, H. Dybas; 7, Chequamegon National Forest, west of Mellen, August 22, 1947, F. and C. Seevers. Paratypes in these collections: C.S., C.A.S., U.S.N.M., A.M.N.H., I.N.H.M., C.N.H.M., M.C.Z.

Other material.—North Carolina: 1, Wayah Bald (5,400 ft.), Macon County, September 2, 1949, H. Dybas.

Gyrophaena rosskotheni Wüsthoff

Gyrophaena rosskotheni Wüsthoff, 1937, Decheniana, **95B**: 145, pl. ii, figs. 5, 6, 7.

This recently described European species was not available for study. Wüsthoff's figures of the male abdominal characters show it to be related to *affinis*, but unlike any American species.

CONICIVENTRIS Group

This Holarctic group contains six American species and one European species. These species are associated because of a certain pattern of characters of the male abdomen involving the eighth tergite, the ninth tergite and lateral plates, and the aedeagus. This pattern is not easy to define, for there is considerable variation in

the structures mentioned. The eighth tergite, in general like that of the *affinis* group, varies in the length of its processes (figs. 109, *b, h;* 110, *b, d*). The ninth tergite shows modifications (fig. 109, *b, d, f*) not noted in other species groups, and the lateral plates of the ninth segment are most unusual in several species (fig. 110, *b, f*). The aedeagi, too, conform to a pattern, but in the European species, *manca,* this is not obvious at first.

Species of this group do not have broad, shallow elytral punctures as in the *affinis* group. This fact is of practical importance in the difficult separation of mixed lots of *affinis* and *coniciventris;* these species are very abundant throughout many of the eastern states and commonly occur together. The species seem to be most numerous in the southwestern states; four are known from New Mexico and Arizona.

Key to North American Species

1. Fifth antennomere distinctly elongated 2
   Fifth antennomere subquadrate or feebly elongated 3

2. Eighth male tergite with two long, widely separated processes. *arizonae* sp. nov. (p. 701)
   Eighth male tergite with two short, widely separated processes, ninth tergite deeply incised; lateral plates of ninth segment produced as spatulate processes ..... *spatulata* sp. nov. (p. 702)

3. Head, pronotum, and elytra not reticulate ..... *huachucae* sp. nov. (p. 703)
   Head, pronotum, and elytra reticulate 4

4. Ninth tergite modified as in figure 109, *d;* aedeagus as in figure 109, *c;* coloration throughout relatively dark ..... *blatchleyi* sp. nov. (p. 700)
   Ninth tergite not as above, aedeagi otherwise 5

5. Pronotum 1.35 to 1.4 times as wide as long; aedeagus as in figure 110, *c.* *barberi* sp. nov. (p. 701)
   Pronotum 1.45 to 1.6 times as wide as long; aedeagus as in figure 109, *a.* *coniciventris* Casey (p. 698)

Gyrophaena coniciventris Casey. Figure 109, *a, b.*

Gyrophaena coniciventris Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 297.
Gyrophaena genitiva Casey, ibid., p. 298.

Length. 1.4–1.75 mm. *Coloration.* Variable, but in general pale. Head rufo-piceus to black; pronotum and elytra flavate to testaceous; abdomen flavate to testaceous, the fifth and sixth tergites darker. *Punctation.* Vertex of head with eight or so umbilicate punctures; pronotum very sparsely punctured, with a few large punctures; elytra sparsely and finely punctate. *Sculpture.* Shining, reticulated throughout but not strongly. *Antennae.* Fourth segment moderate in size, quadrate to distinctly elongated; fifth segment variable, slightly transverse to feebly elongated; segments 5–10 feebly incrassate. *Pronotum.* 1.45–1.6 times as wide as long. *Male abdomen.* Seventh tergite with a row of about ten small

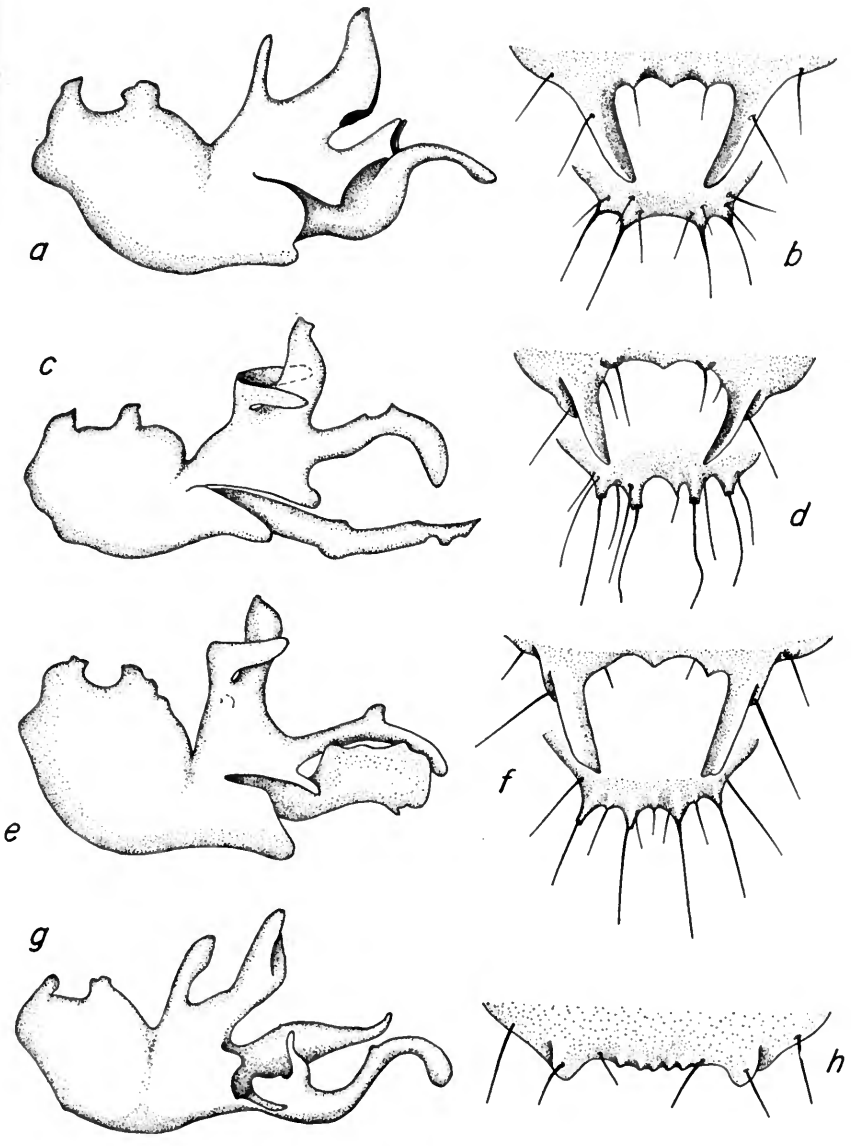

FIG. 109. *Gyrophaena: coniciventris* group. Aedeagi (median lobes, lateral view) and male eighth and ninth tergites (dorsal view). *a, b. Gyrophaena coniciventris* Casey. *c, d. G. blatchleyi* sp. nov. *e, f. G. arizonae* sp. nov. *g, h. G. huachucae* sp. nov.

setigerous carinae, the median one replaced by a large smooth carina (absent in some). Eighth tergite (fig. 109, *b*) and aedeagus (fig. 109, *a*) distinctive.

Type localities.—Of both *coniciventris* and *genitiva*, St. Louis, Missouri.

Material examined.—Maryland: 2, Plummer's Island, July 4, 1909, J. L. Viereck (U.S.N.M.). District of Columbia: 1, June 6, Hubbard and Schwarz (U.S.N.M.); 1, Rock Creek Park, September 26, 1942, E. Chapin and R. Blackwelder (U.S.N.M.). South Carolina: 8, Spartanburg, September 30, 1943, R. L. Wenzel (C.S.). Tennessee; 8, Gatlinburg, June 17, 1942, H. Dybas; 45, Great Smoky Mountains National Park, June 10, 1947, C. Seevers. Kentucky: 33, Pine Mountain, Harlan County, June 14, 1946, W. L. and C. K. Necker (C.S.). Indiana: 35, Indiana Dunes State Park, June 14, 1944, August 22, 1946, H. Dybas, C. Seevers; 18, Dune Acres, July 21, 1945, H. Dybas; 42, Smith, LaPorte County, July 19, 1947, C. Seevers. Michigan: 289, Lakeside, July 4, 1945, September 20, 1945, C. Seevers. Wisconsin: 61, Edgerton, July 8, 1947, H. Dybas. Illinois: 34, Fox Ridge State Park, June 15, 1947, C. Seevers; 2, White Pines State Park, August 24, 1948, C. Seevers. Missouri: 1, Monroe City, June 14, 1946, C. Seevers; 9, Friedheim, September 21, 1946, H. Dybas; 12, Arbor, September 22, 1946, H. Dybas; 5, Neely's Landing, September 22, 1946, H. Dybas. Kansas: 52, Topeka, June 24, 1946, September 7, 1942, C. Seevers; 3, Bonner Springs, August 22, 1945, C. Seevers.

Remarks.—Both *coniciventris* and *genitiva* were based on female specimens, examination of which did not reveal any species differences.

Gyrophaena blatchleyi sp. nov. Figure 109, *c*, *d*.

Very similar to *coniciventris* in appearance; distinguished by larger size and darker coloration, and especially by the ninth male tergite and the aedeagus.

Length. 1.5–1.75 mm. *Coloration.* Head dark, pronotum flavo-testaceous, elytra and abdomen uniformly rufo-testaceous. *Punctation.* As in *coniciventris*. *Sculpture.* Moderately strongly reticulate throughout. *Antennae.* Fourth segment quadrate to slightly transverse; fifth slightly transverse to slightly elongated; segments 6–10 transverse. *Male abdomen.* Seventh and eighth tergites as in *coniciventris*, the smooth carina of seventh tergite very small. Ninth tergite (fig. 109, *d*) and aedeagus (fig. 109, *c*) distinctive.

Holotype.—A male from Smith Station, LaPorte County, Indiana; collected June 20, 1945, by Charles Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Indiana: 5 specimens, same data as the type. Michigan: 31, Lakeside, Berrien County, July 4, 1945, C. Seevers. Paratypes in these collections: C.S., C.A.S., U.S.N.M., A.M.N.H., I.N.H.S., C.N.H.M., M.C.Z.

Gyrophaena barberi sp. nov. Figure 110, *c*, *d*.

Closely allied to *coniciventris*, from which it may be distinguished by its narrower pronotum, more strongly incrassate antennae and particularly by its distinctive aedeagus.

Length. 1.5 mm. *Coloration.* Head reddish-brown, pronotum flavo-testaceous to rufo-testaceous; elytra brownish; abdomen flavo-testaceous to reddish-brown, the fifth and sixth tergites darker. *Punctation.* Vertex of head with eight or more moderately large, umbilicate punctures on each half; pronotum more densely punctate than in *coniciventris*, the disk with a moderate number of punctures between the two customary rows; elytra finely and moderately densely punctate. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment moderately large, quadrate; fifth obtrapezoidal, no wider at base than fourth, apical width subequal to length; segments 6–10 transverse, incrassate. *Pronotum.* 1.35 to 1.4 times as wide as long. *Male abdomen.* Eighth tergite (fig. 110, *d*) similar to *coniciventris*. Aedeagus distinctive (fig. 110, *c*).

Holotype.—A male from Las Vegas, New Mexico; collected between August 4 and 14, by H. S. Barber and E. A. Schwarz. In the collection of the United States National Museum.

Paratypes.—Sixteen specimens, same data as the type. Paratypes in these collections: U.S.N.M., C.S.

Gyrophaena arizonae sp. nov. Figure 109, *e*, *f*.

Related to *blatchleyi*, from which it differs in antennal characters and in the aedeagus.

Length. 1.5 mm. *Coloration.* Piceus, the pronotum brown. *Punctation.* Vertex of head with eight umbilicate punctures on each half; pronotum almost impunctate, with only one conspicuous pair of punctures, the others very small; elytra finely and sparsely punctulate. *Sculpture.* Reticulation of head and pronotum obsolescent; elytra reticulate. *Antennae.* Segments 4–10 incrassate; fifth and sixth longer than wide; seventh and eighth subquadrate; ninth and tenth feebly transverse. *Male abdomen.* Eighth tergite (fig. 109, *f*) similar to that of *blatchleyi*. Aedeagus distinctive (fig. 109, *e*).

Holotype.—A male from Williams, Arizona, collected by A. Fenyes. In the collection of the California Academy of Sciences.

Paratypes.—Eleven specimens, same data as type (C.A.S., C.S.).

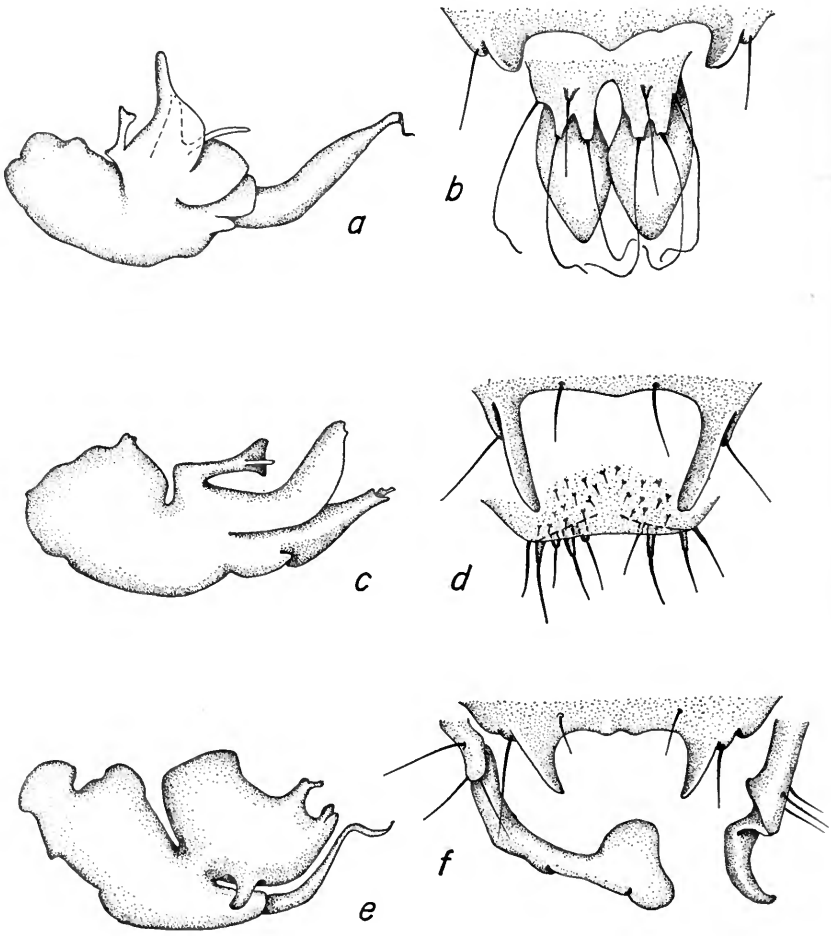

FIG. 110. *Gyrophaena: coniciventris* group. Aedeagi (median lobes, dorsal view) and male abdominal characters (dorsal view). *a, b. Gyrophaena spatulata* sp. nov., eighth and ninth tergites and lateral plates of ninth segment. *c, d. G. barberi* sp. nov. *e, f. G. manca* Erichson, eighth tergite and lateral plates of ninth segment.

Gyrophaena spatulata sp. nov. Figure 110, *a, b.*

This species is distinguished from the other members of the group by the structure of the eighth and ninth tergites, the spatulate lateral plates of the ninth segment, and the aedeagus.

Length. 1.75–2 mm. *Coloration.* Flavo-testaceous, head and elytra a bit darker. *Punctation.* Medial rows of punctures of pronotum rather strong; pronotum also with a number of finer, irregularly arranged, umbilicate punctures.

Elytra sparsely and finely punctate, asperately so in the outer half. *Sculpture.* Reticulate throughout. *Antennae.* Fifth segment much elongated; sixth elongated but shorter; 7–10 subquadrate to feebly elongated, decreasing in length very slightly. *Pronotum.* 1.3 times as wide as long. *Male abdomen.* Seventh tergite with a small median carina. Eighth and ninth tergites distinctive (fig. 110, *b*). Lateral plates of ninth segment projecting caudally behind the ninth tergite as spatulate processes (fig. 110, *b*). Aedeagus distinctive (fig. 110, *a*).

Holotype.—A male from the Huachuca Mountains, Arizona, collected by W. M. Mann. In the collection of the California Academy of Sciences.

Paratypes.—Sixteen specimens, same data as type (C.A.S., C.S.).

Gyrophaena huachucae sp. nov. Figure 109, *g*, *h*.

This species is characterized by the distinctive eighth male tergite, the median lobe of the aedeagus, and the peculiarly modified lateral lobes of the aedeagus.

Length. 1.7 mm. *Coloration.* Flavo-testaceous. *Punctation.* Vertex of head with about eight small punctures on each half. Pronotum weakly punctate. Elytra finely and sparsely punctulate. *Sculpture.* Head, pronotum, and elytra smooth, without reticulation. *Antennae.* Segments 4–10 incrassate, with no abrupt increase in width; fourth segment quadrate; fifth and sixth subquadrate to feebly elongated, 7–10 subquadrate to feebly transverse. *Male abdomen.* Eighth tergite (fig. 109, *h*) and aedeagus (fig. 109, *g*) distinctive. The lateral lobes of the aedeagus are also peculiarly modified.

Holotype.—A male from the Huachuca Mountains, Arizona, collected by W. M. Mann. In the collection of the California Academy of Sciences.

Paratype.—One, same data as the type (C.A.S.).

Gyrophaena manca Erichson. Figure 110, *e*, *f*.

Gyrophaena manca Erichson, 1840, Gen. Spec. Staph., p. 190; Wüsthoff, 1937, Decheniana, **95B**: 144, pl. viii, figs. 43, 44.

The singular modifications of the male abdomen seem to associate this European species with the *coniciventris* group; the lateral plates of the ninth segment are asymmetrically modified (fig. 110, *f*) and the aedeagus (fig. 110, *e*) is very remarkable. It seems to conform to the pattern found in this group.

Material examined.—Germany, Austria, and Bohemia: 7 specimens (C.A.S.).

PULCHELLA Group

This Holarctic group contains two European and at least nine North American species characterized as follows: seventh male

tergite with a subapical, semicircular elevation; eighth male tergite with a deep emargination; eighth sternite feebly incised or otherwise modified. Most of the species have antennal segments 5–10 distinctly elongated or subquadrate.

Fenyes (1918, p. 97) synonymized four of Casey's species—*antennalis, insolens, laurana,* and *criddlei*—with *pulchella* Heer of Europe. There is no evidence, however, that *pulchella* occurs in North America; the aedeagi of all American specimens examined are clearly different from that of *pulchella.*

The North American species bear such a close superficial resemblance to one another that it is difficult to write a satisfactory key for their identification. After several attempts to do so, I have concluded that the differences which are detectable—relative proportions of the antennal segments, ground sculpture, coloration, and form of the eighth male tergite—are subject to intraspecific variation and are unreliable for diagnostic purposes, at least, until the extent of variation has been determined.

Each species has a distinctive aedeagus, and may easily be identified by it. Examination of the aedeagi is imperative, even after one has considerable acquaintance with the group. Identification of these species may be quite tedious if several are collected together. A large series of specimens collected in the same locality, even the same forest, may consist of three or more members of this group. Careful study of a mixed series usually reveals slight differences in the antennae, sculpture, coloration, etc., which greatly facilitate separation without examination of the aedeagi of all the specimens. I am no longer surprised to find one or a few specimens of an uncommon species among hundreds of an abundant one.

The species of the *pulchella* group belong primarily to the North Temperate zone; all of the American species have been collected north of 40°, and they do not seem to range far south, except in mountainous areas. Three of the species—*antennalis, chippewa,* and *stroheckeri*—were recently collected in the southern Appalachian Mountains (Wayah Bald, North Carolina) by Henry Dybas.

Gyrophaena antennalis Casey. Figure 111, *c, d.*

Gyrophaena antennalis Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 295.

Length. 2.3–2.8 mm. *Coloration.* Rufo-testaceous, the outer apical angles of elytra and fifth and sixth tergites darker; some examples uniform rufo-testaceous. *Punctation.* Vertex of head with about ten medium-sized umbilicate punctures on each half; pronotum with two irregular rows and with other scattered

punctures; elytra very finely and very sparsely punctulate, except more densely along outer margin. *Sculpture.* Shining, reticulate throughout. *Antennae.* Fourth segment small, transverse; fifth elongated, one-half longer than wide; sixth and seventh subequal, slightly elongated; 8–10 subquadrate, decreasing slightly in length; segments 5–10 not increasing in width. *Pronotum.* 1.25–1.3 times as wide as long. *Male abdomen.* Seventh tergite with a feebly elevated semicircle near apex, the opening of the arc anterior. Eighth tergite (fig. 111, *d*) with two short, blunt, strongly inflexed processes; the inclosed sinus with several small denticles. Eighth sternite incised medially. Aedeagus distinctive (fig. 111, *c*).

Type locality.—Catskill Mountains, New York.

Material examined.—New York: 36 specimens, Catskill Mountains, near Hunter, September 10, 1946, F. and C. Seevers. Massachusetts: 1, Sherborn, September 22, 1912 (C.F.); 1, Framingham (C.F.). North Carolina: 35, Wayah Bald (5,400 ft. alt.), Macon County, September 2, 1949, H. Dybas.

Gyrophaena chippewa sp. nov. Figure 112, *c*, *d*.

Allied to *antennalis* to which it bears a strong resemblance, but differing markedly in the structure of the aedeagus. The aedeagus seems to resemble most closely that of *obsoleta* but other characters show considerable differences. The antennae are not as robust as those of *antennalis* and the antennomeres are not as elongated.

Length. 2–2.6 mm. *Coloration.* Head piceus; pronotum and abdomen testaceous, elytra silvery-testaceous. *Punctation.* Vertex of head with about eight large umbilicate punctures on each side. Elytra finely and densely punctate, less densely so near suture. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment moderately large, subquadrate; fifth elongated, sixth very slightly elongated, seventh subquadrate, 8–10 slightly transverse, decreasing feebly in length. *Pronotum.* 1.3 times as wide as long. *Male abdomen.* Seventh and eighth tergites (fig. 112, *d*) as in *antennalis*. Eighth sternite very feebly incised or unmodified. Aedeagus very distinctive (fig. 112, *c*).

Holotype.—A male from Chequamegon National Forest, 15 miles west of Mellen, Wisconsin; collected August 22, 1947, by Charles Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Wisconsin: 34, same data as the type. Michigan: 2, Wetmore, Alger County, August 26, 1947, John Retondo (C.S.). Paratypes in these collections: C.S., C.A.S., U.S.N.M., C.N.H.M., I.N.H.S., M.C.Z.

Other material.—North Carolina: 6, Wayah Bald (5,400 ft. alt.), Macon County, September 2, 1949, H. Dybas.

Gyrophaena insolens Casey. Figure 111, *e*, *f*.

Gyrophaena insolens Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 295.

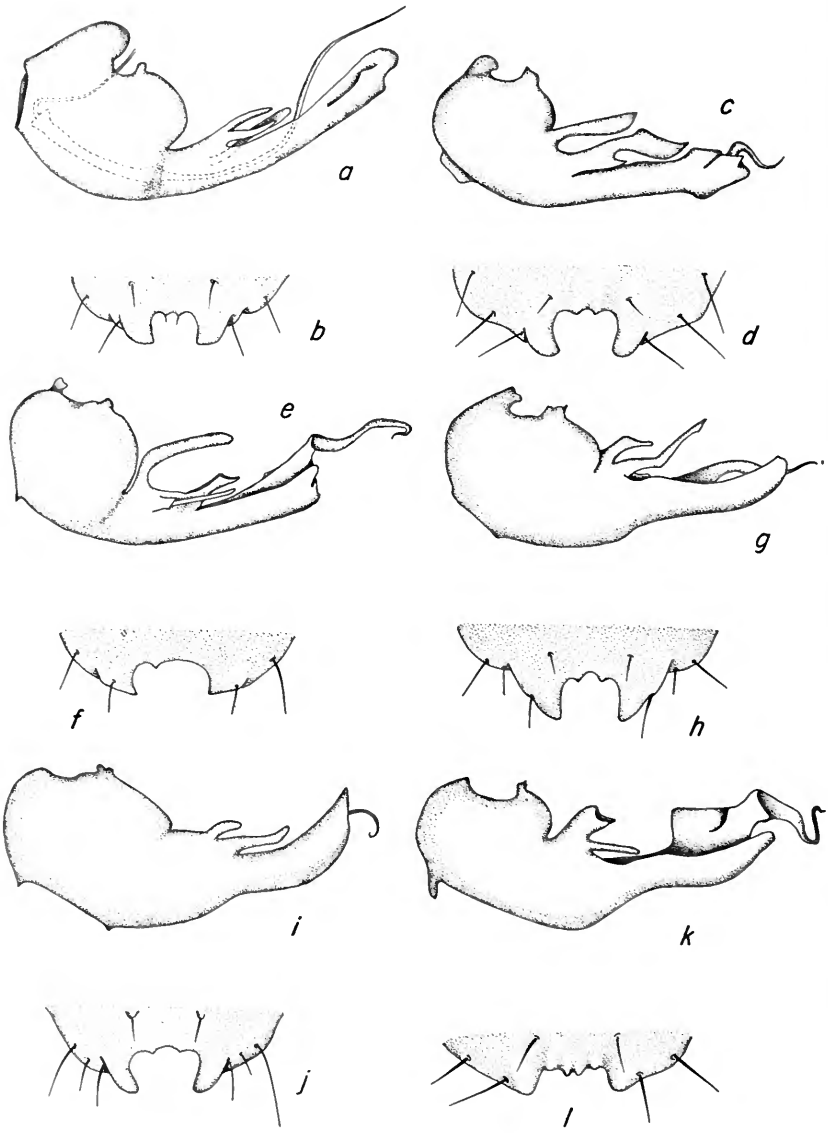

FIG. 111. *Gyrophaena: pulchella* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena pulchella* Heer. *c, d. G. antennalis* Casey. *e, f. G. insolens* Casey. *g, h. G. criddlei* Casey. *i, j. G. stroheckeri* sp. nov. *k, l. G. gilvicollis* Casey.

Very close to *antennalis* and extremely difficult to distinguish from it by external characters, but possessing a very distinctive aedeagus (fig. 111, *e*).

Type locality.—Isle Royale, Michigan.

Material examined.—Michigan: 3 specimens, Isle Royale National Park, H. F. Wickham (C.A.S.). Canada: 3, labeled "British America," Crotch (U.S.N.M.).

Remarks.—The specimens in the Fenyes collection from Isle Royale are doubtless from the type series. The genitalia were extracted from a male of this series and mounted for study.

Gyrophaena laurana Casey

Gyrophaena laurana Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 297.

I have not had an opportunity to study the aedeagus of this species. Examination of the types of *laurana* and *criddlei* did not disclose any basis for separating the two, but that fact does not mean much in this group.

Type locality.—Boulder County, Colorado.

Gyrophaena criddlei Casey. Figure 111, *g*, *h*.

Gyrophaena criddlei Casey, Mem. Coleopt., **2**: 184.

Very similar to *laurana* Casey, and possibly a synonym of it. A decision on the validity of *criddlei* depends upon a more detailed study of *laurana*.

Length. 2.3 mm. *Coloration.* Head rufo-piceus; pronotum flavo-testaceous; elytra silvery-flavate, outer angles darker; abdomen flavate, fifth and sixth tergites slightly darker. *Punctation.* As in *antennalis*. *Sculpture.* Head and elytra reticulate, pronotal reticulation obsolescent. *Antennae.* Fourth segment short, transverse; fifth and sixth slightly elongated, subequal; seventh and eighth subquadrate; ninth and tenth feebly transverse. *Pronotum.* 1.3 times as wide as long. *Male abdomen.* Eighth tergite as illustrated in figure 111, *h*. Aedeagus distinctive (fig. 111, *g*).

Type locality.—Awene, Manitoba.

Material examined.—Manitoba: 5, Winnipeg, August 27, 1918, J. B. Wallis (C.F.); 1, Stonewall, J. B. Wallis (C.A.S.).

Gyrophaena simulans sp. nov. Figure 112, *i*.

Closely related to *criddlei*, from which it may be distinguished by its distinctive aedeagus (fig. 112, *i*). It is questionable whether the two species can be distinguished by external characters, but this cannot be decided until a larger series of *criddlei* is available for study.

Length. 2–2.4 mm. *Coloration.* Head rufo-piceus, pronotum flavate to rufo-flavate, elytra silvery-flavate, their apices darker. *Punctation.* As in *antennalis*. *Sculpture.* Head and elytra reticulate, pronotum distinctly reticulate. *Antennae.* Segments 5–8 subquadrate (the fifth and sixth may be feebly elongated); 9–10 slightly transverse. *Male abdomen.* Eighth tergite as in *criddlei*. Aedeagus distinctive (fig. 112, *i*).

Holotype.—A male from Joliet (Pilcher Park), Illinois; collected September 22, 1950, by Henry Dybas and Charles Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Illinois: 10 specimens, same data as type; 50, Mokena, Will County, September 29, 1950, H. Dybas and C. Seevers. Maryland: 12, Takoma Park, November 5, 1949, G. H. Nelson. Paratypes in the following collections: C.S., C.N.H.M., C.F., I.N.H.S.

Gyrophaena stroheckeri sp. nov. Figure 111, *i*, *j*.

Distinguished from other species by the eighth male tergite and aedeagus. Antennal segments 5–10 are not elongated as in most species of the group.

Length. 2–2.5 mm. *Coloration.* Head rufo-piceus; pronotum rufo-testaceous. *Punctation.* As in *antennalis*. *Sculpture.* Head and pronotum strongly reticulate; elytra considerably less so. *Antennae.* Fourth segment short, transverse; fifth subquadrate; 6–10 transverse, moderately incrassate. *Pronotum.* 1.35 times as wide as long. *Male abdomen.* Seventh tergite with a low, smooth, medial elevation, its posterior margin arcuate, and gradually declivous anteriorly. Eighth tergite with two moderately long, incurved processes, the sinus between with two small denticles (fig. 111, *j*). Aedeagus as in figure 111, *i*.

Holotype.—A male from Smith Station, LaPorte County, Indiana, collected by Charles Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Indiana: 22, same locality as the type, collected July 19, 1947, August 22, 1942, September 20, 1947, September 1, 1950, C. Seevers. Wisconsin: 56, Chequamegon National Forest, 15 miles west of Mellen, August 23, 1947, C. Seevers. Paratypes in the following collections: C.S., C.N.H.M., C.A.S., U.S.N.M., I.N.H.S., M.C.Z.

Other material.—North Carolina: 6, Wayah Bald (5,400 ft. alt.), Macon County, September 2, 1949, H. Dybas.

Remarks.—Named for my friend Dr. H. F. Strohecker, with whom I frequently collected at the type locality of the species, a beach-maple forest in Indiana.

Gyrophaena gilvicollis Casey. Figure 111, *k*, *l*.

Gyrophaena gilvicollis Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 296.

A rather pale member of the group, differing chiefly in its eighth male tergite and aedeagus.

Length. 1.8–2 mm. *Coloration.* Head rufo-piceus; pronotum and abdomen flavate; elytra flavo-testaceous; outer apices of elytra and sixth tergite slightly darker. *Punctation.* Elytra very minutely granulate and very sparsely punctulate, but not asperate. *Sculpture.* Reticulate throughout. *Antennae.* Fifth segment rather elongated; sixth elongated but shorter; 7–9 subquadrate, tenth slightly transverse, 7–10 subequal in length. *Pronotum.* 1.25–1.35 times as wide as long. *Male abdomen.* Seventh tergite with a subapical semicircular elevation medially (not sharply delimited from surface). Eighth tergite (fig. 111, *l*) with a moderately deep, rectangular emargination; the border of the emargination feebly bisinuate and with one or two short, blunt, contiguous denticles, or lacking them entirely. Eighth sternite feebly and obtusely incised. Aedeagus as in figure 111, *k*.

Type locality.—Catskill Mountains, New York.

Material examined.—New York: 1, West Hebron, C. Leng (C.S.); 1, no locality, Luetgens (C.S.). Pennsylvania: 2, Mount Pocono, September 16, 1914, A. Nicolay (C.A.S.). District of Columbia: 6, Rock Creek Park, September 6, 1942, E. Chapin and R. Blackwelder (U.S.N.M.); 1, Mount Hamilton, L. L. Buchanan (U.S.N.M.). Virginia: 4, Warm Springs, C. Leng (C.S.). West Virginia: 5, no locality, Hubbard and Schwarz (U.S.N.M.); 5, Grafton, Hubbard and Schwarz (U.S.N.M.). Indiana: 21, Beverly Shores, Porter County, October 8, 1933, H. Dybas. Michigan: 2, Detroit, Schwarz (U.S.N.M.); 1, Midland County, May 13, 1941, R. R. Dreisbach. Illinois: 50, Joliet, September 29, 1950, H. Dybas and C. Seevers; 20, Mokena, September 29, 1950, H. Dybas and C. Seevers.

Gyrophaena simpliciformis sp. nov. Figure 112, *g*, *h*.

Distinguished from the other species by its aedeagus. The relatively pale coloration and the form of the eighth male tergite may indicate that this species is closest to *gilvicollis*.

Length. 2.2–3 mm. *Coloration.* Head rufo-piceus; pronotum and abdomen flavo-testaceous, elytra light brownish; sixth tergite slightly darker. *Punctation.* Vertex of head with about eight moderately large umbilicate punctures on each half; pronotum punctured as in *antennalis;* elytra with moderately dense, feebly asperate punctation. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment small, transverse; fifth segment distinctly elongated; sixth and seventh segments feebly elongated; 8–10 subquadrate. *Pronotum.* 1.3 times as wide as long. *Male abdomen.* Seventh tergite with a subapical, semicircular elevation medially. Eighth tergite (fig. 112, *h*) with a relatively deep rectangular emargination; the stout processes flanking the emargination very feebly incurved; the border within

the emargination with a pair of denticles medially. Eighth sternite feebly and obtusely incised. Aedeagus (fig. 112, *g*) of simple form, distinctive.

Holotype.—A male from Dune Acres, Porter County, Indiana; collected October 16, 1948, by Henry Dybas. In the collection of Chicago Natural History Museum.

Paratypes.—Indiana: 1, same data as type. Illinois: 1, Joliet (Pilcher Park), September 29, 1950, H. Dybas and C. Seevers.

Gyrophaena modesta Casey. Figure 112, *a*, *b*.

Gyrophaena modesta Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 296.

This species may be distinguished by the eighth male tergite and aedeagus.

Length. 1.8–2 mm. *Coloration.* Head rufo-piceus; pronotum flavate; elytra silvery, darker along lateral margin and at outer apices; abdomen rufo-flavate, sixth tergite darker. *Punctation.* Elytra very finely, asperately punctate. *Sculpture.* Head and pronotum reticulate, elytra feebly so. *Antennae.* Fifth and sixth segments longer than broad; 7–10 subquadrate to feebly transverse. *Pronotum.* 1.3 times as wide as long. *Male abdomen.* Seventh tergite with a semicircular, smooth elevation medially. Eighth tergite (fig. 112, *b*) with a rather deep, semicircular emargination; the emargination as a rule simple, but occasionally with a denticle. Aedeagus as in figure 112, *a*.

Type locality.—Catskill Mountains, New York.

Material examined.—New Hampshire: 4 specimens, September 18, 1909 (A.M.N.H., C.S.). New York: 100, Catskill Mountains State Park, near Hunter, September 10, 1946, C. Seevers. Michigan: 3, Lakeside, Berrien County, September 20, 1945, C. Seevers. Indiana: 54, Indiana Dunes State Park, September 21, 1944, C. Seevers; 14, Smith Station, LaPorte County, September 20, 1945, C. Seevers. Minnesota: 4, no locality, E. Chope coll. (C.N.H.M.). Illinois: 50, Joliet, September 29, 1950, H. Dybas and C. Seevers; 4, Palos Park, September 24, 1949, H. Dybas.

Gyrophaena pulchella Heer. Figure 111, *a*, *b*.

Gyrophaena pulchella Heer, 1841, Fauna Coleopt. Helv., **1**: 310; Wüsthoff, 1937, Decheniana, **95B**: 141, pl. ii, figs. 8, 9.

This species apparently does not occur in North America. The Nearctic species bear a very close resemblance to *pulchella*, but all have distinctive aedeagi. The eighth tergite and aedeagi are shown in figure 111, *a*, *b*.

Material examined.—Switzerland, Austria, Styria, Daghestan, Germany: 11 specimens (C.A.S.).

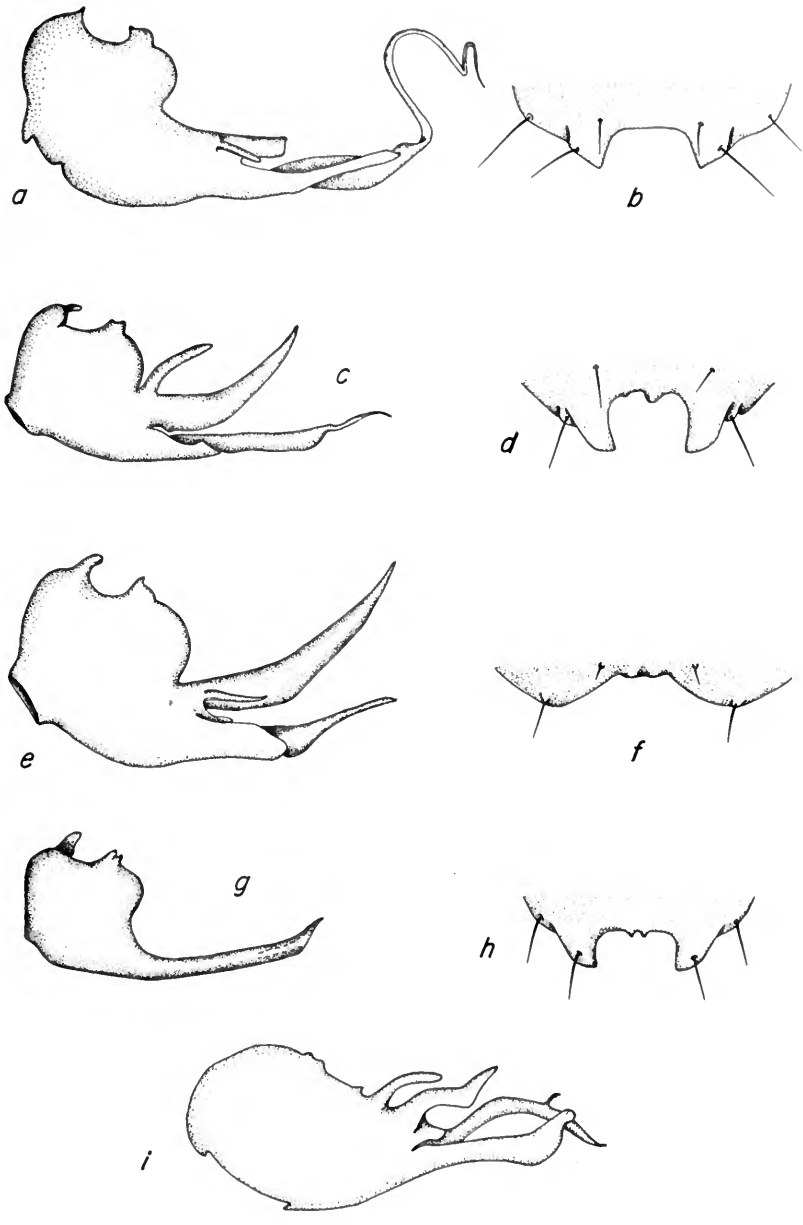

FIG. 112. *Gyrophaena: pulchella* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena modesta* Casey. *c, d. G. chippewa* sp. nov. *e, f. G. obsoleta* Ganglbauer. *g, h. G. simpliciformis* sp. nov. *i. G. simulans* sp. nov.

Gyrophaena obsoleta Ganglbauer. Figure 112, *e*, *f*.

Gyrophaena obsoleta Ganglbauer, 1895, Käfer Mitteleuropa, **2**: 300; Wüsthoff, 1937, Decheniana, **95B**: 142, pl. iii, figs. 10–14.

Very similar to *pulchella* but distinguished by the eighth male tergite and aedeagus (fig. 112, *e*, *f*).

Material examined.—Austria: 6 specimens.

FUSCICOLLIS Group

Nearctic in distribution, containing two species in the northern United States. Related to the *pulchella* group, but differing appreciably in the male abdominal characters. The form of the eighth male tergite, the truncate ninth tergite, and the distinctive aedeagi characterize the group.

Key to Species

Eighth male tergite as in figure 113, *b*.....*fuscicollis* Casey (p. 712)
Eighth male tergite as in figure 113, *d*.....*blackwelderi* sp. nov. (p. 713)

Gyrophaena fuscicollis Casey. Figure 113, *a*, *b*.

Gyrophaena fuscicollis Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 296.

Length. 1.75–2.4 mm. *Coloration.* Head black, pronotum fuscous, elytra pale silvery-flavate, abdomen silvery to rufo-testaceous, sixth and seventh tergites dark. *Punctation.* Vertex of head with a few small to moderate punctures. Pronotum with the two medial rows somewhat confused and with a few additional punctures. Punctures of elytra fine and sparse. *Sculpture.* Head and elytra reticulate; pronotum smooth and shining, obsoletely reticulate. *Antennae.* Fourth segment moderately large, trapezoidal, its broad distal margin exceeding its length; fifth and sixth subquadrate to slightly elongated; 5–10 subequal in length, increasing in width, tenth about one-third wider than fifth. *Pronotum.* 1.3 times as wide as long. *Male abdomen.* Seventh tergite with a smooth subapical elevation medially, its posterior margin arcuate, its anterior face declivous. Eighth tergite (fig. 113, *b*) with two long, blunt, incurved processes, the inclosed sinus with several small processes. Ninth tergite with its apical margin truncate. Eighth sternite not incised. Aedeagus distinctive (fig. 113, *a*).

Type locality.—Catskill Mountains, New York.

Material examined.—New York: 3 specimens, Catskill Mountains State Park, near Hunter, September 10, 1946, C. Seevers. Pennsylvania: 3, Alleghany, J. B. Smith (U.S.N.M.). District of Columbia: 1, Rock Creek Park, September 26, 1942, E. A. Chapin and R. E. Blackwelder (U.S.N.M.). Illinois: 15, White Pines State Park, August 24, 1948, R. Wenzel and C. Seevers. Wisconsin: 95, Chequamegon National Forest, 15 miles west of Mellen, August 22, 1947, F. and C. Seevers.

Remarks.—Fenyes synonymized *fuscicollis* with *affinis*, but this is so obviously incorrect as to require no comment.

Gyrophaena blackwelderi sp. nov. Figure 113, *c*, *d*.

Distinguished from *fuscicollis* by its paler, more strongly reticulate pronotum, its longer fifth and sixth antennomeres, and especially by its different eighth male tergite and aedeagus.

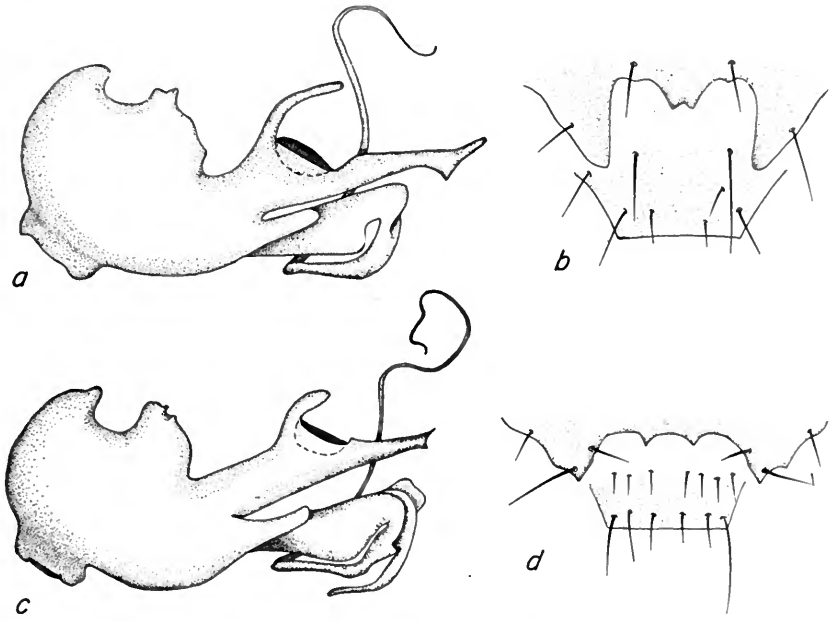

FIG. 113. *Gyrophaena: fuscicollis* group. Aedeagi (median lobes, lateral view) and male eighth and ninth tergites (dorsal view). *a*, *b*. *Gyrophaena fuscicollis* Casey. *c*, *d*. *G. blackwelderi* sp. nov.

Length. 2 mm. *Coloration.* Similar to *fuscicollis*, except that the pronotum is rufous. *Punctation.* As in *fuscicollis*. *Sculpture.* As in *fuscicollis*, except that the pronotal reticulation is often stronger. *Antennae.* Fourth segment moderate in size, trapezoidal; fifth and sixth distinctly elongated, subequal (about three-fourths as wide as long), seventh subquadrate to slightly elongated, 8–10 subquadrate, decreasing slightly in length. *Pronotum.* 1.35 times as wide as long. *Male abdomen.* Eighth tergite as illustrated in figure 113, *d*, ninth tergite truncate. Aedeagus distinctive (fig. 113, *c*).

Holotype.—A male from Rock Creek Park, Washington, D.C.; collected September 26, 1942, by E. A. Chapin and R. E. Blackwelder. In the collection of the United States National Museum.

Paratypes.—District of Columbia: 18 specimens, same data as the type; 1, Mount Hamilton, September 21, L. L. Buchanan (U.S.N.M.). Virginia: 1, Glencarlyn, October 12, 1928, J. C. Bridwell (U.S.N.M.). West Virginia: 15, Grafton, Hubbard and Schwarz (U.S.N.M.); 17, no locality, Hubbard and Schwarz (U.S.N.M.). Indiana: 1, Beverly Shores, Porter County, October 8, 1933, H. Dybas; 7, Smith Station, LaPorte County, September 1, 1950, C. Seevers. Kentucky: 46, Pine Mountain State Park, September 7, 1949, H. Dybas. North Carolina: 4, Wayah Bald, Macon County, September 2, 1949, H. Dybas; 19, Joyce Kilmer Forest, Nantahala National Forest, September 6, 1949, H. Dybas. Missouri: 1, Arbor, September 22, 1946, H. Dybas.

VITRINA Group

Contains two North American species; probably allied to the *pulchella* and *fuscicollis* groups.

The two species may be recognized by their shining, non-reticular integuments and distinctive eighth male tergites. *G. vitrina*, due to its relatively large size, is not likely to be confused with any species except *lobata* and *flavicornis*.

Key to Species

Length somewhat greater than 2 mm.; antennae with fifth segment slightly elongated and segments 6–10 subquadrate; eighth male sternite acutely angulate medially; aedeagus distinctive ..... *vitrina* Casey (p. 714)

Length less than 2 mm.; antennae with segments 5–10 transverse; eighth male sternite arcuate, very slightly incised medially; aedeagus distinctive. *indiana* sp. nov. (p. 716)

Gyrophaena vitrina Casey. Figure 114, *a*, *b*.

Gyrophaena vitrina Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 291.

Gyrophaena attonsa Casey, 1911, Mem. Coleopt., **2**: 184.

Length. 2.4–3.5 mm. *Coloration.* Head rufo-piceus; pronotum flavate, usually with a dark median band; elytra pale silvery, the apical angles faintly clouded; abdomen flavate, the sixth tergite cloudy. *Punctation.* Vertex of head with about six medium-sized umbilicate punctures on each half; pronotum with two rows of rather weak punctures; elytra irregularly and finely punctured. *Sculpture.* Head, pronotum, and elytra shining, without reticulation. *Antennae.* Long and slender; fourth segment moderately large, slightly elongated; fifth stouter, a trifle longer than wide; 6–10 quadrate, slender. *Pronotum.* 1.5 times as wide as long. *Male abdomen.* Seventh tergite with a row of eight small, setigerous tubercles. Eighth tergite as in figure 114, *b*, but subject to considerable variation. Eighth sternite produced, and acutely angulate medially. Aedeagus distinctive (fig. 114, *a*).

Type locality.—Of *vitrina*, Catskill Mountains, New York; of *attonsa*, Catskill Mountains, New York.

Material examined.—Maine: 1 specimen, Wales, June 25, 1910, C. A. Frost (C.F.). New York: 1, Peekskill (C.A.S.). Pennsylvania:

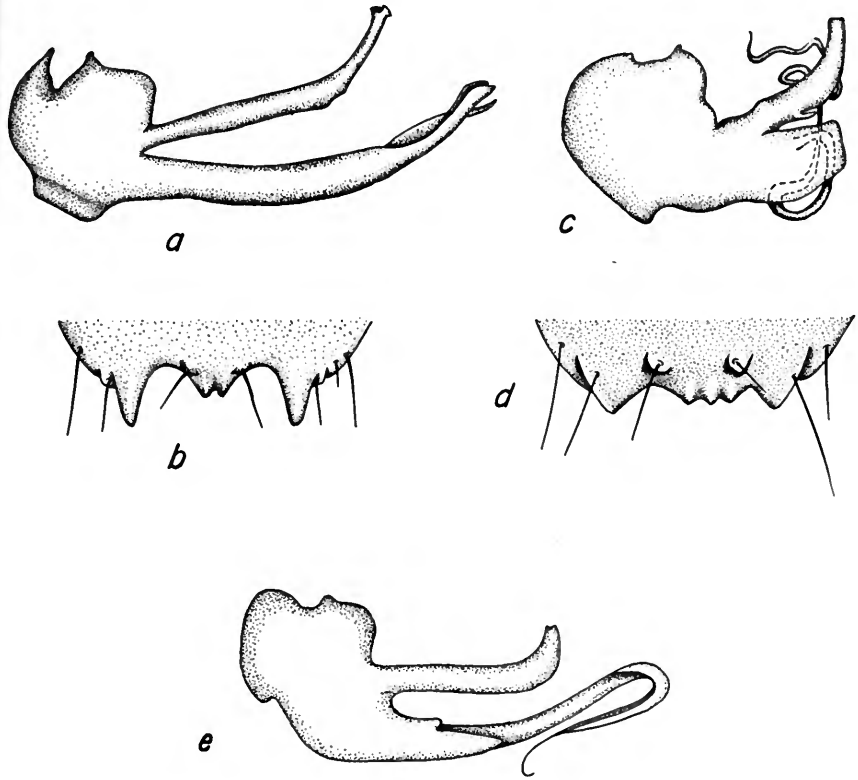

FIG. 114. *Gyrophaena: vitrina* and *frosti* groups. Aedeagi (median lobes, lateral view) and eighth tergites of male. *a, b. Gyrophaena vitrina* Casey. *c, d. G. frosti* sp. nov. *e. G. indiana* sp. nov.

5, Corry, September 8, 1946, C. Seevers; 10, Jeannette (C.A.S.). West Virginia: 1, Fort Pendleton, July 9, Hubbard and Schwarz (U.S.N.M.); 9, Gormania, June 5, 1948, C. Seevers. North Carolina: 4, Black Mountains, September 14, 1906, Beutenmuller (A.M.N.H.). Tennessee: 3, Gatlinburg, June 14, 1942, C. Seevers; 2, Elkmont, June 12, 1947, C. Seevers. Kentucky: 1, Pine Mountain, June 14, 1946, W. L. and C. K. Necker (C.S.). Indiana: 42, Indiana Dunes State Park, June 11, 1945, August 21, 1943, August 22, 1946, H.

Dybas and C. Seevers; 50, Smith Station, LaPorte County, August 19, 1947, C. Seevers. Michigan: 26, Lakeside, August 3, 1934, July 3, 1943, July 4, 1945, September 20, 1945, C. Seevers; 2, Detroit, Hubbard and Schwarz (U.S.N.M.). Ontario: 2, Bachawana Bay, Lake Superior, August, Hubbard and Schwarz (U.S.N.M.). Wisconsin: 17, Edgerton, July 8, 1947, H. Dybas; 235, Chequamegon National Forest, near Mellen, August 19 to 26, 1947, C. Seevers. Illinois: 11, Deer Park State Park, September 22, 1950, C. Seevers.

Remarks.—Inasmuch as I was unable to detect significant differences in the types of *vitrina* and *attonsa*, I am regarding the latter as a synonym.

Gyrophaena indiana sp. nov. Figure 114, *e*.

Length. 1.75 mm. *Coloration.* Head rufo-testaceous, pronotum flavate, with a darker median band; elytra flavo-testaceous; abdomen dark rufo-flavate. *Punctation.* Much as in *vitrina*. *Sculpture.* Head, pronotum, and elytra shining, without reticulation. *Antennae.* Moderate in length; fourth segment moderately large, a trifle elongated; fifth distinctly transverse; 6–10 transverse. *Pronotum.* 1.45 times as wide as long. *Male abdomen.* Seventh and eighth tergites similar to *vitrina*. Eighth sternite not produced, its arcuate margin very feebly incised at middle. Aedeagus distinctive (fig. 114, *e*).

Holotype.—A male from Smith Station, La Porte County, Indiana; collected September 1, 1950, by Charles Seevers. In the collection of Chicago Natural History Museum.

Paratype.—One male, same data as type.

FROSTI Group

The one North American species of this group is probably most closely related to *vitrina* and *indiana;* the male abdominal characters are somewhat similar and the integuments are not reticulated. The elytral punctation is very similar to that of *affinis* and allies.

Gyrophaena frosti sp. nov. Figure 114, *c, d*.

Length. 2 mm. *Coloration.* Head piceus; pronotum, elytra and abdomen silvery-flavate to reddish-brown. *Punctation.* Head with about eight large, umbilicate punctures. Elytra sparsely, yet conspicuously, punctate, the punctures large, shallow, and rather regularly arranged, almost in rows. *Sculpture.* Head, pronotum, and elytra shining to dull, not reticulate. Pronotal reticulation at times faintly apparent, traces of the network appearing as fine punctules. *Antennae.* Fourth segment subquadrate or slightly transverse; fifth distinctly transverse, 6–10 incrassate and increasing slightly in length; tenth two-fifths wider than fifth. *Pronotum.* 1.45 times as wide as long. *Male abdomen.* Eighth tergite as in figure 114, *d;* aedeagus distinctive (fig. 114, *c*). Eighth sternite not modified.

Holotype.—A male from Framingham, Massachusetts; collected September 27, 1945, by C. A. Frost. In the collection of Chicago Natural History Museum.

Paratypes.—Massachusetts: 3 specimens, same data as the type; 2, Framingham (C.A.S.). New Jersey: 1, no locality, C. Leng coll. (C.S.). Indiana: 5, Smith Station, LaPorte County, September 1, 1950, C. Seevers. Paratypes in the following collections: C.S., C.A.S.

BIHAMATA Group

This Holarctic group contains one Palearctic and six Nearctic species. The group is characterized by a distinctive pattern of male abdominal characters: the eighth tergite bears two slender, widely separated processes, which are rather long except in *flavicornis;* the aedeagus has one apparently unique feature—the flagellum protrudes from the middle of three apical processes rather than from one of the two processes present in other groups. It was possible to associate *flavicornis* with this group on the basis of the latter character.

The antennae are variable; in general, segments 5–10 are transverse, although feebly so at times. The pronotum is moderately transverse and at least one and one-half times as wide as long.

There is no assurance that the following key will prove to be satisfactory but it is the best that could be prepared at this time.

Key to North American Species

1. Fourth antennomere relatively large, subquadrate or feebly elongated.... 2
   Fourth antennomere small, transverse..... 3

2. Processes of eighth male tergite very short, stout; a larger species, more than 2 mm. in length; eastern United States.....*flavicornis* Melsh. (p. 722)
   Processes of eighth male tergite long, slender; less than 2 mm. in length; western United States.....*uteana* Casey (p. 718)

3. Antennomeres 5–10 transverse but scarcely incrassate; pronotum approximately two-thirds wider than long; aedeagus as in figure 116, *g.*
   kansana sp. nov. (p. 721)
   Antennomeres 5–10 transverse and more or less incrassate; pronotum approximately one-half wider than long..... 4

4. Processes of eighth male tergite very long; aedeagus as in figure 115, *c.*
   longispinosa sp. nov. (p. 718)
   Processes of eighth male tergite moderate in length..... 5

5. Flavate to flavo-testaceous; aedeagus as in figure 116, *e.*
   michigana sp. nov. (p. 720)
   Reddish-brown to brown; aedeagus as in figure 116, *a*..*gaudens* Casey (p. 719)

Gyrophaena uteana Casey. Figure 116, *c*, *d*.

Gyrophaena uteana Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 292.

Gyrophaena pacifica Casey, ibid., p. 293.

Length. 1.4–1.7 mm. *Coloration.* Head piceus, pronotum reddish-brown, elytra reddish, outer apices piceus; abdomen reddish, apex black. *Sculpture.* Reticulate throughout. *Punctation.* Vertex of head with six or more medium-sized punctures. Elytra very finely and sparsely punctate medially, feebly asperately so near outer apical angles. *Antennae.* Fourth segment relatively large, almost as long as wide; fifth feebly transverse, 6–10 transverse, incrassate, tenth almost one-half wider than fifth. *Pronotum.* Approximately 1.5 times as wide as long. *Male abdomen.* Seventh tergite with a subapical row of eight or more slender setigerous carinae and an apical row of many, very small, setigerous granules. Eighth tergite (fig. 116, *d*) with two slender, widely separated processes. Aedeagus distinctive (fig. 116, *c*).

Type localities.—Of *uteana*, Provo, Utah; of *pacifica*, Glenora and Kamloops, British Columbia.

Material examined.—Utah: 17 specimens, Provo, June, H. F. Wickham (C.A.S., U.S.N.M.). Colorado: 15, Buena Vista, July 8, H. F. Wickham (C.A.S., U.S.N.M.); 7, no locality, H. F. Wickham (C.A.S.). California: 8, Bishop, June 16, 1905 (C.A.S.); 19, Tallac (C.A.S.). British Columbia: 5, Kamloops, H. F. Wickham (C.A.S., C.N.H.M.); 2, Glenora, H. F. Wickham (C.A.S., C.N.H.M.); 14, Wynndel, June 23, 1946, G. S. Smith (C.S.).

Remarks.—I believe that *pacifica* is a synonym of *uteana* and not of *bihamata* as stated by Fenyes (1918). This opinion is based on examination of topotypes of *uteana* and *pacifica* collected by H. F. Wickham; these specimens were not seen by Casey but were almost certainly from the same series as his type. They were evidently distributed by Wickham and were not studied by Casey.

Gyrophaena longispinosa sp. nov. Figure 115, *c*, *d*.

Distinguished chiefly by its male abdominal characters, this species is darker than some species and differs in antennal structure from others.

Length. 1.5–1.75 mm. *Coloration.* Head dark rufo-piceus; pronotum brown; elytra translucent brown, abdomen rufo-testaceous, the sixth and seventh tergites dark (Louisiana specimens uniformly dark brown). *Punctation.* As in *uteana*. *Sculpture.* Strongly reticulate throughout. *Antennae.* Fourth segment small, slightly transverse; segments 5–10 feebly transverse, moderately incrassate, the fifth about three-fourths as wide as the tenth. *Pronotum.* Approximately 1.5 times as wide as long. *Male abdomen.* Eighth tergite (fig. 115, *d*) with two widely separated processes that are very long and slender. Aedeagus distinctive (fig. 115, *c*).

Holotype.—A male from Topeka, Kansas, collected September 7, 1943, by C. Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Kansas: 6 specimens, same data as the type. Louisiana: 491, Harahan, Jefferson Parish, August 24 to September 20,

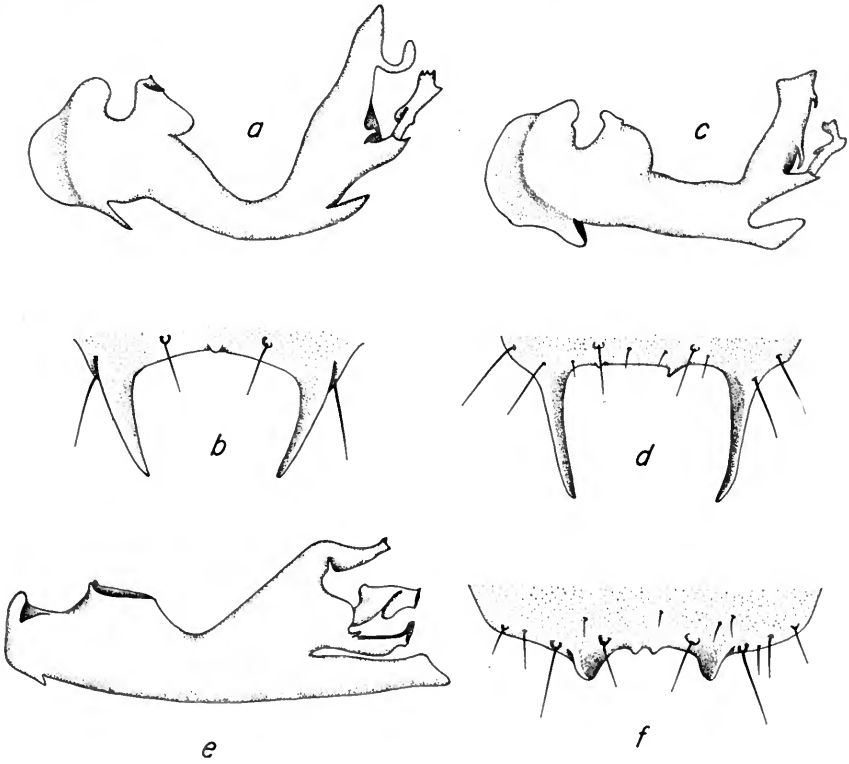

FIG. 115. *Gyrophaena: bihamata* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena bihamata* Thomson. *c, d. G. longispinosa* sp. nov. *e, f. G. flavicornis* Melsheimer.

1944, H. Dybas. Missouri: 29, Neely's Landing, Cape Girardeau County, September 22, 1946, H. Dybas. Texas: 9, Columbus, June 10, Hubbard and Schwarz (U.S.N.M.). Paratypes in these collections: C.S., C.N.H.M., A.M.N.H., U.S.N.M., C.A.S., I.N.H.S., M.C.Z.

Gyrophaena gaudens Casey. Figure 116, *a, b.*

Gyrophaena gaudens Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 292.

Closely related to *longispinosa*, but differing in the male abdominal characters and in antennal structure.

Length. 1.4–1.75 mm. *Coloration.* Head piceus; pronotum dark rufo-testaceous; elytra brownish; abdomen reddish, the apex black. *Punctation.* As in *uteana*. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment moderately large, transverse; fifth segment unusually small, feebly transverse; segments 5–10 conspicuously incrassate, tenth one-half wider than fifth. *Pronotum.* 1.55 times as wide as long. *Male abdomen.* Eighth tergite as in figure 116, *b*. Aedeagus distinctive (fig. 116, *a*).

Type locality.—Bayfield, Wisconsin.

Material examined.—Wisconsin: 20 specimens, Chequamegon National Forest, west of Mellen, August 20, 1947, C. Seevers; 20, Edgerton, July 8, 1947, H. Dybas. Illinois: 3, Antioch, October 8, 1929, F. Psota coll. (C.N.H.M.). Indiana: 11, Indiana Dunes State Park, August 21, 1943, August 22, 1946, June 21, 1947, H. Dybas, C. Seevers. Michigan: 1, Beaver Island, Charlevoix County, May 5, 1922, M. H. Hatch (C.A.S.); 15, Midland County, June 18, 1945, R. R. Dreisbach; 5, Bay County, R. R. Dreisbach; 73, Drummond Island, August 22, 1948, T. and J. Hart. Ontario: 1, Batchawana Bay (Lake Superior), August, Hubbard and Schwarz (U.S.N.M.). Pennsylvania: 1, Pittsburgh, July, Klages (C.A.S.); 2, Jeannette, July, Klages (C.A.S.). Massachusetts: 1, Cambridge, Hubbard and Schwarz (U.S.N.M.).

Gyrophaena michigana sp. nov. Figure 116, *e*, *f*.

Distinguished from *gaudens* by its paler coloration and distinctive aedeagus.

Length. 1.4–1.6 mm. *Coloration.* Head rufo-piceus, pronotum flavate to flavo-testaceous; elytra pale, with a silvery appearance, their lateral margins cloudy; abdomen flavate, the sixth and seventh tergites darker. *Punctation.* As in *uteana*. *Sculpture.* Head and pronotum reticulate; elytra indistinctly so. *Antennae.* Fourth segment very small, almost quadrate; fifth considerably larger than fourth but still small; segments 5–10 transverse, moderately incrassate. *Pronotum.* 1.5 times as wide as long. *Male abdomen.* Eighth tergite (fig. 116, *f*) with relatively short and stout processes. Aedeagus distinctive (fig. 116, *e*).

Holotype.—A male from Lakeside, Berrien County, Michigan; collected September 20, 1945, by C. Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Michigan: 7 specimens, same data as the type; 4, Lakeside, June 4, 1945, C. Seevers. Illinois: 16, Joliet, September 29, 1950, H. Dybas, C. Seevers; 12, Wayne, Du Page County, August 29, 1949, Roger Mitchell. Wisconsin: 8, Delavan, August 1, 1940, H. Dybas; 3, Edgerton, July 8, 1947, H. Dybas. Paratypes in the

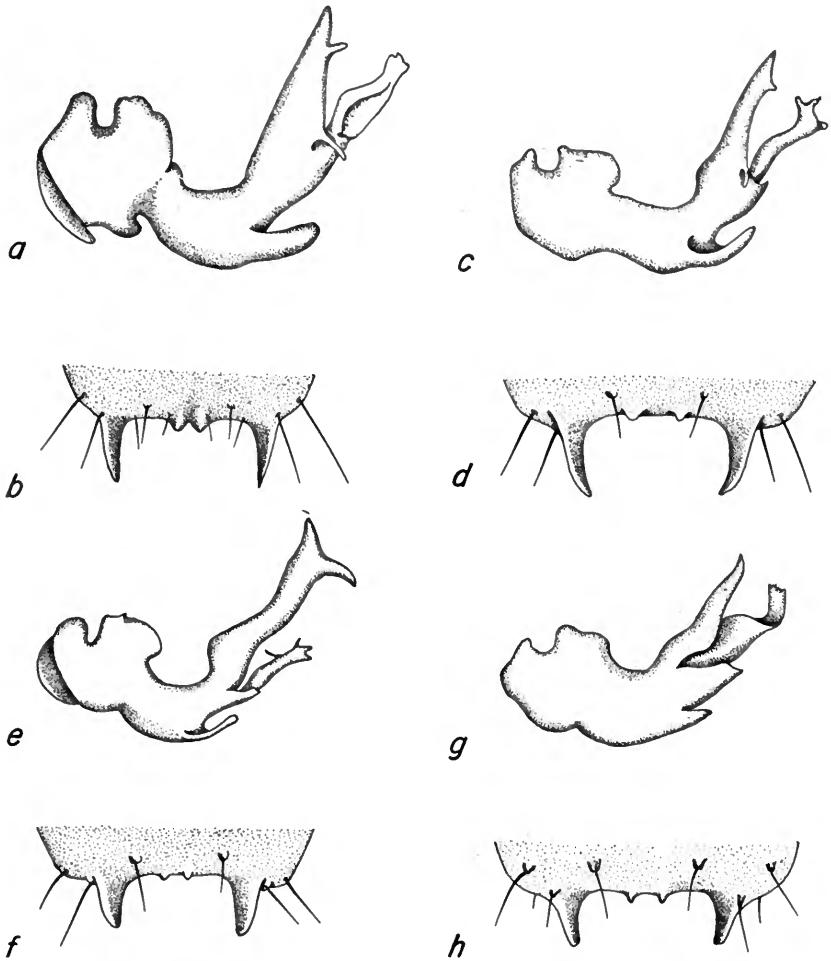

FIG. 116. *Gyrophaena: bihamata* group. Aedeagi (median lobes, lateral view) and eighth tergites of male (dorsal view). *a, b. Gyrophaena gaudens* Casey. *c, d. G. uteana* Casey. *e, f. G. michigana* sp. nov. *g, h. G. kansana* sp. nov.

following collections: C.S., C.N.H.M., C.A.S., U.S.N.M., A.M.N.H., I.N.H.S.

Gyrophaena kansana sp. nov. Figure 116, *g, h.*

Distinguished from the other species by its broader pronotum, antennal structure, and distinctive aedeagus.

Length. 1.3–1.5 mm. *Coloration.* Head piceus to black; pronotum dark brown; elytra brown; abdomen rufo-testaceous, apical half black. *Punctation.*

Head punctures very sparse and shallow. Pronotum almost impunctate, the medial rows reduced to one puncture before the middle and one behind. Elytra finely and very sparsely punctulate, without asperations. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment small, transverse; fifth much larger than fourth; segments 5–10 strongly transverse but not appreciably incrassate. *Pronotum.* Approximately two-thirds wider than long. *Male abdomen.* Eighth tergite as in figure 116, *h.* Aedeagus distinctive (fig. 116, *g*).

Holotype.—A male from Bonner Springs, Wyandotte County, Kansas; collected August 22, 1945, by C. Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Kansas: 34, same data as the type. Illinois: 6, Mokena, Will County, September 29, 1950, H. Dybas, C. Seevers. Paratypes in these collections: C.S., C.N.H.M., C.A.S., U.S.N.M., A.M.N.H., I.N.H.S., M.C.Z.

Gyrophaena flavicornis Melsheimer. Figure 115, *e*, *f*.

Gyrophaena flavicornis Melsheimer, 1846, Proc. Acad. Nat. Sci. Philadelphia, **2**: 31; Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 291.

This is probably the most distinctive species in the *bihamata* group; it may be recognized by its larger size, the short processes of the eighth male tergite, and its peculiar aedeagus. These characteristics tend to obscure its relationship to this group, and some may doubt that it belongs here. The aedeagus provides the best clue to its affinities; the three apical processes, with the flagellum protruding from the middle one, are found in no other group that I have seen. *G. flavicornis* conforms to the other group characters as well.

Within its range in the eastern United States, *flavicornis* is not likely to be confused with any species except *vitrina*, from which it is distinguished by its darker color, reticulate head and pronotum, transverse antennal segments 5–10, and different eighth tergite.

Length. 2–2.75 mm. *Coloration.* Head piceus to black; pronotum dark reddish-brown; elytra flavo-testaceous; abdomen reddish, the sixth and seventh tergites darker. On the whole a dark species, although some individuals are uniformly lighter. *Punctation.* Vertex of head with ten or more coarse, umbilicate punctures. Pronotum with two median rows of moderately coarse punctures and a few others scattered elsewhere. Punctulation of elytra irregular and feebly asperate. *Sculpture.* Head and pronotum strongly reticulate, elytra much more feebly so. *Antennae.* Fourth segment relatively large, slightly elongated or subquadrate; fifth very slightly transverse; 5–10 transverse, moderately incrassate. *Pronotum.* 1.5 times as wide as long. *Male abdomen.* Seventh tergite with 4–6 setigerous, cariniform tuberosities near apex. Eighth tergite (fig. 115, *f*) with two short, blunt processes and two minute median denticles (as a rule). Aedeagus as in figure 115, *e*.

Type locality.—Pennsylvania.

Material examined.—Maine: 8 specimens, Paris, June 26, 1944, June 12, 1945, C. A. Frost (C.F.); 2, Wales, June 25, 1910 (C.F., C.A.S.); 1, Cumberland County, July 5, 1916, Nicolay (A.M.N.H.). New Hampshire: 3, Randolph, September 18, 1909, C. Leng (C.S.). Vermont: 5, Bennington County, C. Leng (C.S.). Rhode Island: 1, Tiverton (C.A.S.). Massachusetts: 2, Bristol County, C. Leng (C.S.); 1, North Attleboro, September 14 (C.F.); 3, Swansea, N. S. Easton (C.N.H.M., C.A.S.); 5, Framingham, August 26, 1925, September 27, 1945, C. A. Frost (C.F., C.A.S.); 1, Sherborn (C.F.); 1, Fall River (C.A.S.). New York: 573, Catskill Mountains State Park, near Hunter, September 10, 1946, F. and C. Seevers; 3, East Aurora, July 25, 1926 (Cornell); 4, Olcott, August 8, 1926, H. Dietrich (Cornell); 6, West Hebron, June 20, C. Leng (C.S.); 2, New York City, C. Leng (C.S.); 2, Peekskill (C.A.S.); 3, Cranberry Lake (C.A.S.); 1, Ithaca (C.A.S.). New Jersey: 11, no locality (C.A.S.); 1, Middlesex County, May 30 (C.F.). Pennsylvania: 12, Corry, September 8, 1946, C. Seevers; 7, Jeannette (C.S., C.A.S., A.M.N.H.); 1, Pittsburgh (A.M.N.H.); 1, Henryville (A.M.N.H.). Maryland: 9, Baltimore, August 3, 1909, F. E. Blaisdell (C.A.S.). District of Columbia: 2, September 26, 1942, Chapin and Blackwelder (U.S.N.M.). Virginia: 8, Warm Springs, October 1, C. Leng (C.S.). West Virginia: 157, Gormania, June 5, 1948, C. Seevers; 2, Aurora, August 20, 1904, O. Heidemann (U.S.N.M.); 3, Grafton, Hubbard and Schwarz (U.S.N.M.). North Carolina: 19, Andrew's Bald, Great Smoky Mountain National Park, June 18, 1942, C. Seevers; 7, Black Mountain, June, 1902, E. C. Van Dyke (C.A.S., A.M.N.H.). Tennessee: 51, Greenbrier Cove, Great Smoky Mountain National Park, June 10, 1940, C. Seevers. Kentucky: 24, Kentucky Ridge State Park, June 10, 1947, E. C. Williams (C.S.). Indiana: 215, Smith Station, LaPorte County, June 20, 1945, C. Seevers; 56, Indiana Dunes State Park, June 11, 1945, June 14, 1944, July 3, 1946, June 21, 1947, C. Seevers; 21, Brown County State Park, June 7, 1947, C. Seevers. Michigan: 139, Lakeside, July 4, 1945, September 20, 1945, C. Seevers. Ontario: 1, Batchawana Bay, August, Hubbard and Schwarz (U.S.N.M.). Wisconsin: 11, Chequamegon National Forest, west of Mellen, August 23, 1947, C. Seevers; 250, Edgerton, July 8, 1947, H. Dybas. Illinois: 2, Aurora, June 27, 1947, C. Seevers; 17, White Pines State Park, August 24, 1948, R. Wenzel, C. Seevers.

Remarks.—Melsheimer's description of *flavicornis* was quite inadequate, and Casey's interpretation has been generally accepted. At my request, Dr. Floyd Werner compared the two specimens in

the Melsheimer collection (M.C.Z.) labeled *flavicornis* with various species of *Gyrophaena*. One specimen lacks head and thorax; the other, a male, is evidently not *flavicornis* as interpreted by Casey and recognized in this paper. Its smooth, non-reticulated pronotum, characteristically punctured elytra, and male tergite characters indicate that it is a specimen of *nana* Paykull. If it could be established beyond doubt that the specimens in the Melsheimer collection are types, *flavicornis* would seem to be a synonym of *nana*, and the species currently recognized as such would be without a name. However, the specimens in the Museum of Comparative Zoology do not agree in all respects with the original description, so there is reason to believe that Melsheimer may have had other specimens for his studies. Melsheimer's description has very few significant facts, but the statement that the antennae are flavate may be important. It is difficult to believe that Melsheimer would have given the inappropriate name of *flavicornis* to specimens of *nana*, which has dark antennae.

Inasmuch as the specimens labeled *flavicornis* in the Melsheimer collection do not precisely fit the description of that species, and since they do not bear type designation, there is doubt that they represent Melsheimer's concept of *flavicornis*.

Gyrophaena bihamata Thomson. Figure 115, *a*, *b*.

Gyrophaena bihamata Thomson, 1867, Ofv. Svensk Vet.-Akad. Forh., **1867**: 46; Wüsthoff, 1937, Decheniana, **95B**: 144, pl. ix, figs. 47, 48.

This Palearctic species closely resembles *uteana* Casey, but differs in its slightly lighter coloration, less pronounced reticulation, less incrassate antennae, and different male abdominal characters; the aedeagus (fig. 115, *a*) in particular is distinctive.

Material examined.—Daghestan, Lenkoran, and Transcaucasus: 4 specimens.

STRICTULA Group

This Holarctic group contains two European and three North American species.

These species have usually been considered the genus *Phaenogyra*, or as a subgenus of *Gyrophaena*. In Wüsthoff's (1937) revision of the European species he did not regard this category as being worthy of recognition. I do not believe that these species merit subgeneric ranking more than any other species group. The weakness of *Phaenogyra* is probably emphasized by the fact that Casey placed

californica in *Phaenogyra* and *subnitens* in *Gyrophaena* in the same paper.

The principal group characters are as follows: uniformly dark color; strong reticulation throughout; punctation of head and pronotum weak; elytra densely asperate; antennae short, compact, segments 5–10 transverse; head relatively long (actually longer than wide in *gracilis*); male eighth tergite and aedeagus distinctive.

Key to North American Species

1. Head, exclusive of labrum, longer than broad.....*gracilis* sp. nov. (p. 727)
   Head, exclusive of labrum, wider than long..... 2
2. Pronotum three-fifths wider than long; color reddish-brown; east of the Rocky Mountains.....*subnitens* Casey (p. 725)
   Pronotum two-fifths wider than long; color black; west of the Rocky Mountains.....*californica* Casey (p. 725)

Gyrophaena californica Casey

Phaenogyra californica Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 353.

Length. 1.5–1.75 mm. *Coloration.* Black, elytra with reddish tinge. *Punctation.* Punctures of head shallow and weak. Pronotum very sparsely punctate and pubescent, the medial rows represented, as a rule, by only one subbasal pair. Elytral asperities rather dense, becoming more so near outer apical angles. *Sculpture.* Strongly reticulate throughout. *Antennae.* Rather compact; fourth segment small, fifth much larger; segments 5–10 transverse, feebly incrassate. *Head.* Moderately long and slender, about four-fifths as long as wide (0.85), and only about four-fifths as wide as pronotum. *Pronotum.* 1.4 times as wide as long. *Male abdomen.* Seventh tergite with a row of inconspicuous setigerous tubercles. Eighth tergite and aedeagus similar to those figured for *subnitens*.

Type locality.—Ojai, California.

Material examined.—California: 1 specimen, Ojai (C.A.S.); 4, Lakeside, San Diego County (C.A.S.); 1, Nordhoff (C.A.S.). British Columbia: 15, Creston, June 9, 1946, G. Stace Smith (C.S.). Colorado: 5, Buena Vista, H. F. Wickham (C.A.S., U.S.N.M.).

Gyrophaena subnitens Casey. Figure 117, *a*, *b*.

Gyrophaena subnitens Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 302.

Very closely allied to *californica* and not distinguishable by male abdominal characters. The pronotal proportions and the distribution of elytral asperities are the best distinguishing features.

Length. 1.4–1.9 mm. *Coloration.* Uniform dark red-brown; some examples almost entirely black. *Punctation.* Pronotal punctation almost obsolete, only a few small punctures remaining. Elytral asperities not uniformly distributed; a line between the humerus and the inner apical angle roughly divides the elytron

into an outer densely asperate area and an inner zone with very few asperities. *Sculpture.* Reticulate throughout. *Antennae.* As in *californica*. *Head.* Broader than in *californica*, three-fourths as long as wide; three-fourths as wide as pronotum. *Pronotum.* 1.6 times as wide as long. *Male abdomen.* Eighth tergite and aedeagus as in figure 117, *a*, *b*.

Type locality.—Sudbury, Ontario.

Material examined.—Maine: 3, East Machias, Washington County (C.A.S.); 2, no locality (C.A.S.). New York: 2, Catskill

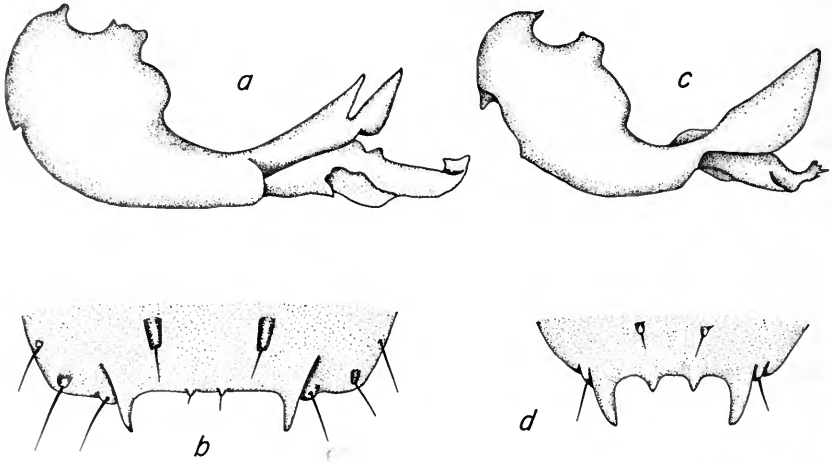

FIG. 117. *Gyrophaena: strictula* group. Aedeagi (median lobes, lateral view) and eighth tergites of male (dorsal view). *a*, *b*. *Gyrophaena subnitens* Casey. *c*, *d*. *G. strictula* Erichson.

Mountains State Park, near Hunter, September 10, 1946, F. and C. Seevers. Michigan: 202, Detroit, Hubbard and Schwarz (U.S.N.M.); 1, Eagle Harbor, June 27, Hubbard and Schwarz (U.S.N.M.). Wisconsin: 2, Bayfield (C.A.S.); 10, Edgerton, July 8, 1947, H. Dybas. Minnesota: 13, Little Winnibigoshish, June 10, 1935, K. Cooper (U.S.N.M.). Manitoba: 1, Husavick (A.F.). Illinois: 14, Volo, May 25, 1946, C. Seevers; 36, Yorkville, June 27, 1947, C. Seevers; 64, Fox, Kendall County, June 27, 1947, C. Seevers. Missouri: 1, Paris, June 14, 1946, C. Seevers. Kansas: 105, Topeka, June 21, 1946, C. Seevers.

Gyrophaena strictula Erichson. Figure 117, *c*, *d*.

Gyrophaena strictula Erichson, 1840, Gen. Spec. Staphyl., p. 191; Wüsthoff, 1937, Decheniana, **95B**: 144, pl. x, figs. 51, 52.

A European species very similar in appearance to the American species. It agrees with *subnitens* in the distribution of elytral

asperities. The distinctive aedeagus (fig. 117, *c*) clearly distinguishes *strictula* from the Nearctic species. Although *strictula* has appeared on American lists occasionally, there is no evidence that it occurs in our fauna.

Material examined.—Croatia, Herzegovina, and Germany: 8 specimens.

Gyrophaena polita Gravenhorst

Aleochara polita Gravenhorst, 1802, Col. Micr. Brunsv., p. 99.

Gyrophaena polita Wüsthoff, 1937, Decheniana, **95B**: 144, pl. x, figs. 53, 54.

Very similar to *strictula*, but smaller and more shining; elytral asperities very feeble and restricted to a small area near outer apical angle. No males were available for study but Wüsthoff's figure shows that the aedeagus is distinctive.

Material examined.—Austria, Hungary, Silesia, and Moravia: 8 specimens.

Gyrophaena gracilis sp. nov.

Because of its unusual facies, this is one of the most interesting species in the North American fauna. As a rule, species of *Gyrophaena* are easily recognized by their facies, but the generic position of *gracilis* is scarcely obvious from superficial examination.

The male characters definitely link this species with the *strictula* group. It is distinguished from them by its very slender form, the elongated head, the very narrow pronotum with its arcuate anterior margin (straight in the other species), the asperate head and pronotum, and the short, compact, incrassate antennae.

Length. 1.3–1.5 mm. *Coloration.* Head black, pronotum light brown, elytra and abdomen dark brown. *Punctation.* Head sparsely, asperately punctulate; pronotum more densely, asperately punctulate; elytra densely asperate. *Sculpture.* Reticulate throughout. *Antennae.* Short, compact; fourth and fifth segments very small, fifth slightly transverse; segments 5–10 very strongly incrassate, the tenth about two and one-half times as broad as the fifth; terminal segment very little longer than tenth. *Head.* Unique within the genus in being longer (×1.2) than wide. *Pronotum.* Only a trifle wider than long; anterior margin arcuate, the sides straight. *Male abdomen.* Eighth tergite with two slender, acute, widely separated processes. Aedeagus similar to that of *subnitens*.

Holotype.—A male from Chequamegon National Forest, 15 miles west of Mellen, Wisconsin, collected August 22, 1947, by F. and C. Seevers. In the collection of Chicago Natural History Museum.

Paratypes.—Twenty specimens, same data as the type; in the following collections: C.S., C.N.H.M., U.S.N.M., C.A.S., I.N.H.S., M.C.Z.

COMPACTA Group

This group contains several species in eastern North America; they are characterized by their small size, distinctive seventh and eighth male tergites and aedeagi, and relatively long metasternal process.

Key to Species

Pronotum reticulate; aedeagus as in figure 118, *a*.....*compacta* Casey (p. 728)
Pronotum smooth; aedeagus as in figure 118, *c*.....*gerhardi* sp. nov. (p. 728)

Gyrophaena compacta Casey. Figure 118, *a*, *b*.

Gyrophaena compacta Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 302.

Gyrophaena micans Casey, ibid., p. 303.

Length. 1.3–1.7 mm. *Coloration.* Head testaceous; pronotum flavate; elytra flavate, its apical angles testaceous; abdomen flavate, the sixth tergite testaceous. *Punctation.* Vertex of head with a few medium-sized punctures; pronotum with only a few scattered punctures; elytra very sparsely and finely punctulate. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment moderate in size, transverse; segments 5–10 moderately transverse, feebly incrassate and increasing in length. *Pronotum.* 1.65 times as wide as long. *Male abdomen.* Seventh tergite with two posteriorly inclined, acute processes midway between base and apex. Eighth tergite (fig. 118, *b*) with an arcuate median lobe flanked by acute processes. Aedeagus distinctive (fig. 118, *a*).

Type localities.—Of *compacta*, Boston Neck, Rhode Island, and St. Louis, Missouri; of *micans*, Vicksburg, Mississippi.

Material examined.—Rhode Island: 1 specimen, state record. Indiana: 2, Indiana Dunes State Park, June 24, 1950, C. Seevers. Missouri: 10, Neely's Landing, September 22, 1946, H. Dybas; 7, Arbor, September 22, 1946, H. Dybas. Louisiana: 18, Harahan, August 23, 1944, H. Dybas; 1, Norco, September 1, 1944, H. Dybas.

Remarks.—Examination of the type of Casey's *micans* did not disclose any basis for separating it from *compacta*.

Gyrophaena gerhardi sp. nov. Figure 118, *c*, *d*.

Distinguished from *compacta* by the non-reticulate pronotum, the male eighth tergite, and the aedeagus.

Length. 1.5 mm. *Coloration.* Head rufo-piceus, pronotum rufo-flavate, elytra piceo-flavate, abdomen rufous, the sixth and seventh tergites darker. *Punctation.* Pronotum almost impunctate; elytra sparsely and asperately punctulate.

Sculpture. Head feebly reticulate; pronotum shining, without reticulation; elytral reticulation obsolescent. *Antennae.* As in *compacta*. *Pronotum.* 1.66 times as wide as long. *Male abdomen.* Seventh tergite as in *compacta*. Eighth tergite and aedeagus distinctive (fig. 118, *c*, *d*).

Holotype.—A male from Oswego, Kendall County, Illinois; collected September 2, 1939, by Henry Dybas. In the collection of Chicago Natural History Museum.

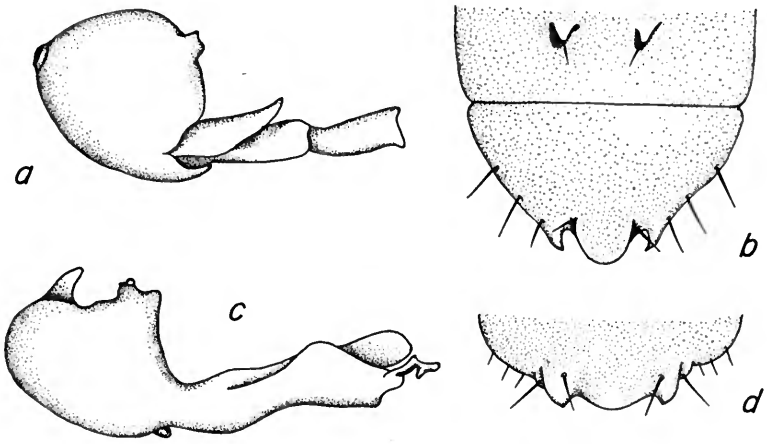

FIG. 118. *Gyrophaena: compacta* group. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a*, *b*. *Gyrophaena compacta* Casey. *c*, *d*. *G. gerhardi* sp. nov.

Paratypes.—Kansas: 15 specimens, Topeka, August 22, 1950, by C. Seevers.

Remarks.—Named for Mr. W. J. Gerhard, Curator Emeritus of Insects, to whom I am indebted for many privileges in the Division of Insects.

Gyrophaena obesula Casey

Gyrophaena obesula Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 303.

I am not certain that *obesula* belongs to the *compacta* group. The single type specimen in the Casey collection is a female, and without the male characters for guidance it is difficult to place. In its punctation, reticulation, antennal structure, and broad pronotum (two-thirds wider than long), *obesula* resembles *compacta;* yet the metasternal process is very short and the coloration a uniform reddish-brown.

Type locality.—Westmoreland County, Pennsylvania.

MISCELLANEOUS EUROPEAN SPECIES

Five European species of the subgenus *Gyrophaena* are not assigned to groups because I am uncertain of their affinities. A tentative arrangement would be a *lucidula* group (*lucidula, joyi,* and *joyioides*), a *nitidula* group, and a *laevipennis* group. None of these species seems to have close relatives in North America. These species are all characterized by distinctive aedeagi and male tergites.

Gyrophaena nitidula Gyllenhal. Figure 119, *e, f.*

Aleochara nitidula Gyllenhal, 1810, Ins. Suecica, **1**, pt. 2: 413; Wüsthoff, 1937, Decheniana, **95B**: 141, pl. i, figs. 1, 2.

A large species (2.5–3 mm. in length), of robust build, with a smooth, non-reticulate pronotum; elytra coarsely, asperately punctate; antennae long, with an elongated fifth segment and subquadrate segments 6–10.

Material examined.—Bohemia and Nevesinje: 7 specimens (C.A.S.).

Gyrophaena laevipennis Kraatz. Figure 119, *a, b.*

Gyrophaena laevipennis Kraatz, 1858, Naturg. Ins. Deutschl., Coleopt., **2**: 358; Wüsthoff, Decheniana, **95B**: 144, pl. ix, figs. 49, 50.

This species is notable for its large and heavily sclerotized aedeagus. It is similar in appearance to *lucidula* and *bihamata.*

Material examined.—Finland, Germany, Hungary, Austria: 10 specimens.

Gyrophaena lucidula Erichson. Figure 119, *c, d.*

Gyrophaena lucidula Erichson, 1837, Käfer Mark Brand., **1**: 369; Wüsthoff, 1937, Decheniana, **95B**: 144, pl. viii, figs. 45, 46.

A dark species, with very weak punctation and reticulation, and with transverse intermediate antennomeres.

Material examined.—Europe: 9 specimens.

Gyrophaena joyi Wendeler. Figure 119, *g, h.*

Gyrophaena convexicollis Joy, 1912, Ent. Month. Mag., (2), **23**: 148.

Gyrophaena joyi Wendeler, 1924, Deutsch. Ent. Zeitschr., **1924**: 344; Wüsthoff, 1937, Decheniana, **95B**: 143, pl. vi, figs. 30–33.

Material examined.—Europe: 1 specimen.

Gyrophaena joyioides Wüsthoff. Figure 119, *i, j.*

Gyrophaena joyioides Wüsthoff, 1937, Decheniana, **95B**: 145, pl. v, figs. 23–25.

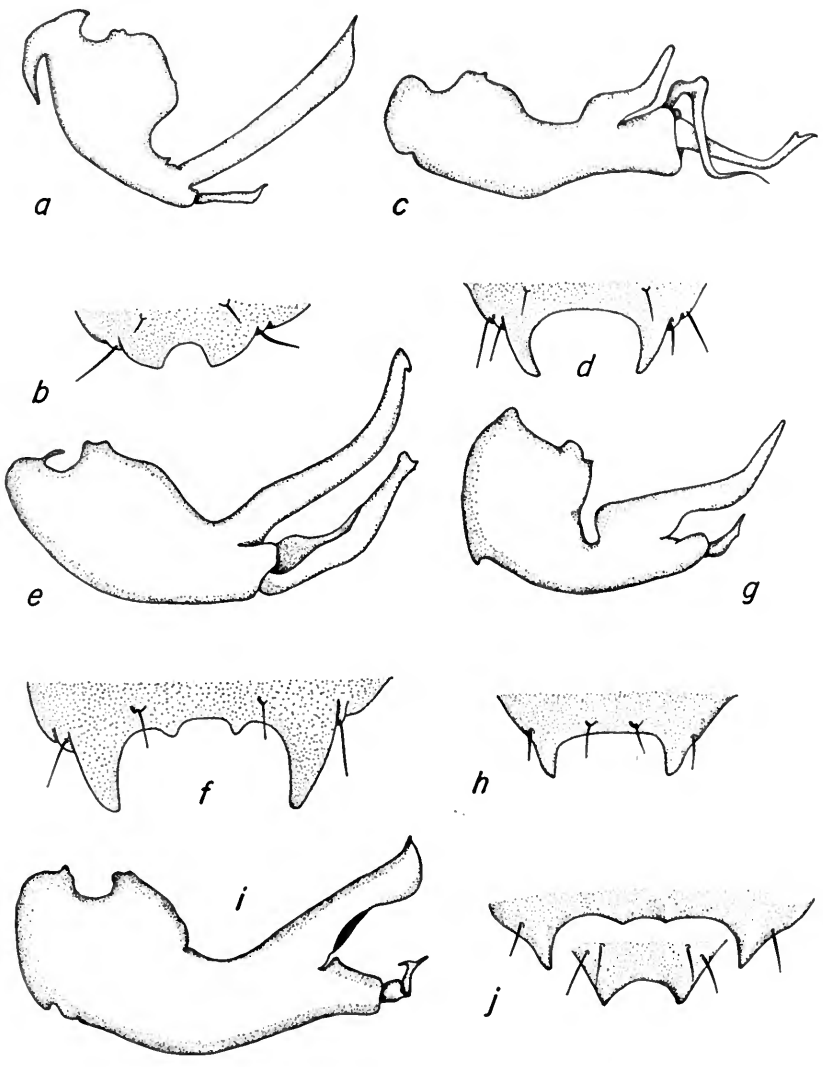

FIG. 119. Miscellaneous European species of *Gyrophaena* s. str. Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena laevipennis* Kraatz. *c, d. G. lucidula* Erichson. *e, f. G. nitidula* Gyllenhal. *g, h. G. joyi* Wendeler. *i, j. G. joyioides* Wüsthoff.

The triangularly emarginate ninth tergite is distinctive.

Material examined.—Croatia and the Caucasus: 5 specimens (C.A.S.).

Subgenus **Eumicrota** Casey

Eumicrota Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 280.

Type: *Gyrophaena corruscula* Erichson (designated by Fenyes, 1918).

Widely distributed in the Western Hemisphere, this subgenus contains seven species north of Mexico, and many more in Latin America.

Size minute (0.6–1.5 mm.); coloration uniform piceus or brownish-black; pronotum twice as wide as long or nearly so; mesosternal and metasternal processes approximately equal in length; antennae short, compact, and with the fifth segment conspicuously broader than the small fourth, so that the last seven segments form a loose, parallel club; aedeagi as in figure 120.

Casey proposed *Eumicrota* as a genus differing from *Gyrophaena* in the more minute size of the species, the broader pronotum, the subequal meso- and metasternal processes, the darker, denser integuments, and distinctive facies. Fenyes and Bernhauer considered *Eumicrota* to be a subgenus of *Gyrophaena*.

I am tentatively regarding *Eumicrota* as a subgenus. *Eumicrota* and the subgenus *Agaricochara* seem to have much in common and may eventually be combined as the genus *Agaricochara*, but it seems unwise to do so now, as it is impossible to anticipate what effect studies on the numerous Neotropical species will have on the classification. The relative lengths of the meso- and metasternal processes are not as important in generic diagnosis as Casey suggested. A large majority of species of the subgenus *Gyrophaena* have very short metasternal processes, but in some species the metasternal process is almost as long as in *Eumicrota*. Figure 99 (*b–f*) illustrates the variability within the genus.

The members of the subgenus occur almost exclusively on polypore fungi of the bracket type.

Key to Species North of Mexico

1. Eighth tergite emarginate in both sexes 2
   Eighth tergite not emarginate 4

2. Apical angles of fifth male sternite prolonged as spines; pronotal punctures rather large and numerous ..... *spinosa* sp. nov. (p. 737)
   Fifth male sternite without spines; pronotal punctures fine to moderate in size 3

3. Pronotal punctures sparse, irregular, and fine; third sternite of male unmodified ..... *pinalica* Casey (p. 737)
   Pronotal punctures moderately large; third male sternite modified. *socia* Erichson (p. 734)

4. A larger species (1–1.5 mm.); seventh and eighth male tergites modified as in figure 120, *b* ..... *corruscula* Erichson (p. 733)
   Smaller species (1 mm. or less); eighth male tergite as in figure 120, *j*, *l*, *n* ... 5

5. Strongly shining; pronotum without asperities, its reticulation obsolescent and with scarcely any pubescence ..... *sayi* sp. nov. (p. 739)
   Integuments duller; pronotum asperately punctate, reticulate and moderately pubescent 6

6. Third tergite of male with two small triangular processes; seventh tergite with two erect spines; eighth tergite as in figure 120, *n*. *minutissima* Casey (p. 739)
   Third tergite unmodified; seventh tergite with two smooth setigerous tubercles; eighth tergite as in figure 120, *j* ..... *atoma* Casey (p. 738)

Gyrophaena corruscula Erichson. Figure 120, *a*, *b*.

Gyrophaena corruscula Erichson, 1840, Gen. Spec. Staph., p. 189.

Eumicrota corruscula Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 281.

Length. 1–1.5 mm. *Coloration.* Head, pronotum, and elytra black to dark brown, abdomen darker. *Punctation.* Head finely and sparsely punctate; pronotum minutely, very sparsely punctate; elytra sparsely, finely, and asperately punctate. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment small; segments 5–10 much larger, transverse, feebly incrassate, forming a loose parallel club. *Pronotum.* Slightly less than twice as wide as long. *Male abdomen.* Posterior margin of third tergite with an erect, median process, flanked on each side by a small angulation; sixth tergite with two small, suberect, spiniform processes; seventh tergite with two moderately long, oblique carinae; eighth tergite with a median triangular lobe (fig. 120, *b*). (Some, or rarely all, of these modifications may be absent; the eighth tergite is the one most frequently modified. Unmodified males are indistinguishable from females unless dissected.) Aedeagus distinctive (fig. 120, *a*). *Female abdomen.* Unmodified.

Type locality.—The Carolinas.

Material examined.—Massachusetts: 4 specimens, Framingham, October 10, 1909, September 27, 1945, C. A. Frost; 7, Northboro, August 29, 1945, C. A. Frost; 1, Sherborn, September 17, 1928, C. A. Frost; 2, Natick, August 20, 1944, C. A. Frost. New York: 9, New York City, August 20, 1891, C. Leng coll. (C.S.); 3, Skaneateles, September 12, 1946, C. Seevers; 1, Peekskill, J. Sherman (C.A.S.). New Jersey: 1, Monmouth, May 20 (C.F.); 3, no locality, J. B. Smith (U.S.N.M.). Pennsylvania: 2, Jeannette, Klages (C.A.S.); 1, Pittsburgh, Klages (C.A.S.). District of Columbia: 1, Knaus (C.A.S.); 1, Pinay Br., August 15, 1905, D. H. Clemons (C.N.H.M.). Virginia: 5, Great Falls, September 7, 1919, H. F. Wickham (U.S.N.M.); 5, Pennington Gap, June 30–July 29, Hub-

bard and Schwarz (U.S.N.M.); 2, Barcroft, July 9, 1928, J. V. Bridwell (U.S.N.M.). West Virginia: 2, Pineville, C. Leng (C.S.). South Carolina: 5, Spartanburg, September 30, 1943, R. Wenzel (C.S.). Georgia: 2, Rabun County, July, 1910, W. T. Davis (C.S.). Florida: 9, Starke, November, 1943, H. Dybas; 26, Enterprise, May 19–June 7, Hubbard and Schwarz (U.S.N.M.). Alabama: 3, Selma, Hubbard and Schwarz (U.S.N.M.). Tennessee: 2, Cades Cove, June 16, 1942, H. Dybas. Kentucky: 8, Pine Mountain, Harlan County, June 14, 1946, W. L. and C. K. Necker (C.S.); Crofton, June 15, 1947, C. Seevers. Ohio: 3, Napoleon, September 7, 1946, C. Seevers. Indiana: 2, Dune Acres, July 25, 1943, H. Dybas; 22, Indiana Dunes State Park, July 3, 1946, June 21, 1947, July 23, 1943, H. Dybas, C. Seevers; 14, Ogden Dunes, September 13, 1942, H. Dybas; 171, Smith Station, LaPorte County, June 20, 1945, July 19, 1947, C. Seevers; 35, Evansville, June 19, 1943, H. Dybas. Michigan: 32, Lakeside, August 3, 1934, September 20, 1945, C. Seevers; 16, Detroit, August, September, Hubbard and Schwarz (U.S.N.M.). Wisconsin: 8, Delavan, August 1, 1940, H. Dybas; 4, Edgerton, July 8, 1947, H. Dybas; 1, Chequamegon National Forest, west of Mellen, July 21, 1947, C. Seevers. Illinois: 32, Willow Springs, Cook County, May 30, 1942, H. Dybas; 7, Chicago Heights, July 1, 1945, C. Seevers; 4, Riverside, August 9, 1942, H. Dybas; 4, Rockford, May 25, 1944, H. Dybas; 11, Yorkville, June 27, 1947, C. Seevers; 10, Fox, June 27, 1947, C. Seevers; 12, Apple River Canyon State Park, August 15, 1946, H. Dybas. Iowa: 13, Fort Defiance State Park, August 3, 1948, V. H. Dropkin; 2, Iowa City, October 12, H. F. Wickham (C.A.S.). Missouri: 95, Neely's Landing, September 22, 1946, H. Dybas; 9, Friedheim, September 21, 1946, H. Dybas. Kansas: 15, Topeka, August 25, 1945, C. Seevers; 1, Onaga, July 24, Knaus (C.A.S.); 3, Benedict, Knaus (C.A.S.). Louisiana: 12, Vowell's Mill, C. Leng (C.S.); 1, Forest Hill, Rapides Parish, October 21, 1945, R. L. Wenzel (C.S.). Texas: 1, Casey coll. (U.S.N.M.).

Gyrophaena socia Erichson. Figure 120, *c*, *d*.

Gyrophaena socia Erichson, 1840, Gen. Spec. Staph., p. 189.

Eumicrota socia Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 282.

Eumicrota humeralis Casey, ibid., p. 282.

Eumicrota texanella Casey, ibid., p. 282.

Eumicrota melania Casey, ibid., p. 283.

Eumicrota pallidula Casey, ibid., p. 283.

Eumicrota insolita Notman, 1920, Bull. Amer. Mus. Nat. Hist., **42**: 719.

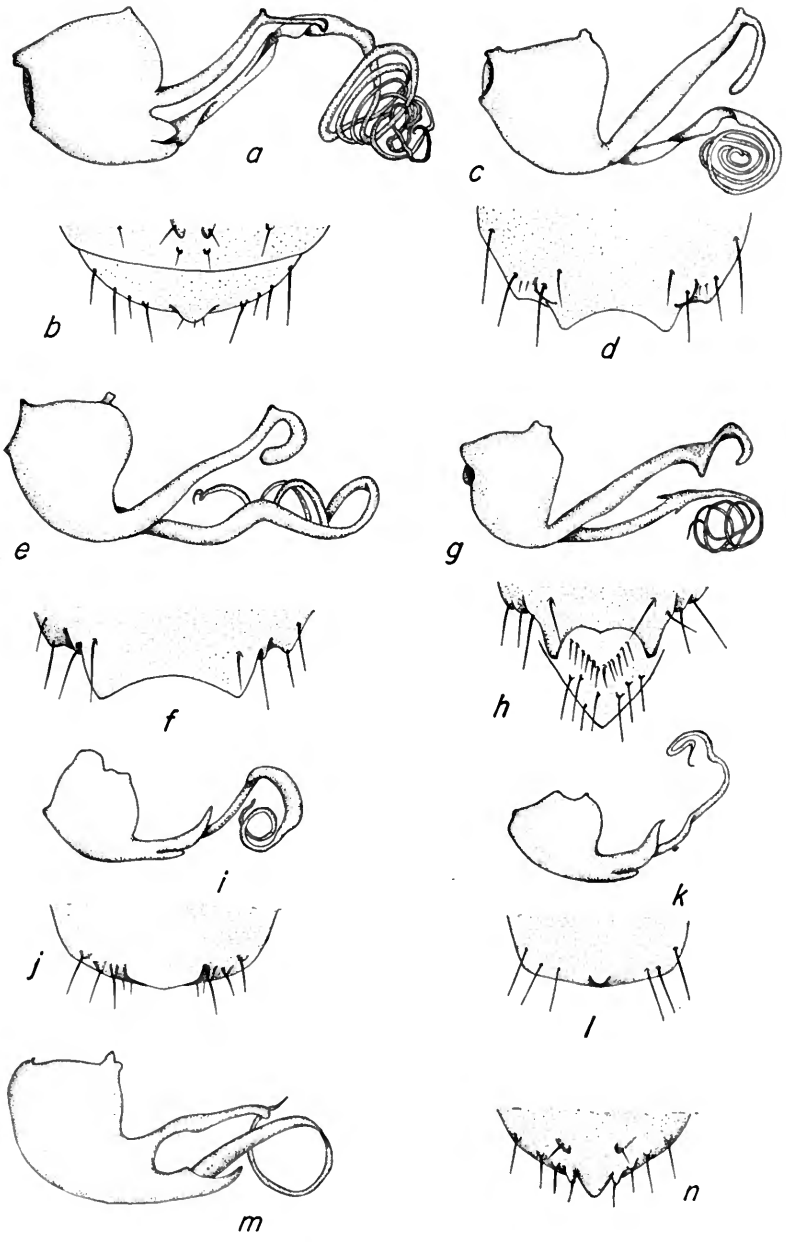

FIG. 120. *Gyrophaena:* Subgenus *Eumicrota* Casey. Aedeagi (median lobes, lateral view) and male tergites (dorsal view). *a, b. Gyrophaena corruscula* Erichson. *c, d. G. socia* Erichson. *e, f. G. spinosa* sp. nov. *g, h. G. pinalica* Casey. *i, j. G. atoma* Casey. *k, l. G. sayi* sp. nov. *m, n. G. minutissima* Casey.

Gyrophaena socia resembles *corruscula* very closely, but both sexes may be distinguished by their emarginate eighth tergites, as well as by several characters described below.

Length. 1–1.3 mm. *Coloration.* Black or brownish-black, elytra frequently paler, especially near the humeri. *Punctation.* Pronotum much more densely punctured than in *corruscula*, the punctures moderate-sized and irregularly placed. Elytral asperities rather dense. *Sculpture.* Reticulate throughout. *Antennae.* As in *corruscula*. *Pronotum.* As in *corruscula*. *Male abdomen.* Posterior angle of third sternite produced into a broad process the posterior margin of third sternite as a result broadly emarginate. This character absent in some males. Eighth tergite (fig. 120, *d*) broadly and shallowly emarginate. Aedeagus distinctive (fig. 120, *c*). *Female abdomen.* Eighth tergite shallowly emarginate.

Type localities.—Of *socia*, the Carolinas; of *pallidula*, Catskill Mountains, New York; of *humeralis*, Philadelphia, Pennsylvania; of *melania*, St. Louis, Missouri; of *texanella*, Dallas, Texas; of *insolita*, Monticello and Enterprise, Florida.

Material examined.—Maine: 2, Paris, June 29, 1945, C. A. Frost; 2, Cumberland County (A.M.N.H.). New York: 1, no locality, H. F. Wickham, det. *pallidula* by Casey (C.A.S.). Pennsylvania: 12, Jeannette, Klages (C.A.S.); 1, Pittsburgh, Klages (C.A.S.); 1, no locality, det. *humeralis* by Casey (C.A.S.). Maryland: 1, Plummer's Island, May 30, 1909, F. E. Blaisdell (C.A.S.). District of Columbia: 4, Washington, Hubbard and Schwarz (U.S.N.M.). Virginia: 2, Barcroft, September 7, 1928, J. C. Bridwell (U.S.N.M.); 1, W. Falls Church, July 4, 1928, E. A. Chapin (U.S.N.M.); 2, Pennington, July 7, Hubbard and Schwarz (U.S.N.M.). West Virginia: 1, Pineville, C. Leng (C.S.). South Carolina: 2, Spartanburg, September 30, 1943, R. L. Wenzel (C.S.). Florida: 6 paratypes of *insolita* (A.M.N.H.), 8 specimens, September 6, 1894, Brownell (C.A.S.), 11 specimens, May 11–25, Hubbard and Schwarz (U.S. N.M.), all from Enterprise; 3 paratypes of *insolita*, Monticello, October 4–8, 1914 (A.M.N.H.); 5, Tampa, April 24, Hubbard and Schwarz (U.S.N.M.); type and 3 paratypes of *insolita*, no locality (A.M.N.H.). Tennessee: 70, Greenbrier Cove, Great Smoky Mountain National Park, June 13, 1942, C. Seevers; 3, Gatlinburg, June 17, 1942, H. Dybas. Kentucky: 12, Crofton, June 15, 1947, C. Seevers; 2, Pine Mountain, Harlan County, June 14, 1946, W. L. and C. K. Necker (C.S.); 1, Laurel County, Hubbard and Schwarz (U.S.N.M.). Ohio: 6, Napoleon, September 7, 1946, C. Seevers. Indiana: 120, Dune Acres, Porter County, July 25, 1942, October 16, 1948, H. Dybas; 6, Indiana Dunes State Park, June 21, 1947, C. Seevers; 188, Evansville, June 19, 1943, H. Dybas. Michigan: 115, Lakeside, July 4, 1945, September 20, 1945, C. Seevers; 3, Detroit,

Hubbard and Schwarz (U.S.N.M.). Wisconsin: 2, Chequamegon National Forest, west of Mellen, August 21, 1947, C. Seevers. Illinois: 1, no locality, Belfrage (U.S.N.M.). Missouri: Neely's Landing, September 22, 1946, H. Dybas. Kansas: 24, Topeka, August 25, 1945, C. Seevers. Arkansas: 1, Fort Smith, July 8, H. S. Barber (U.S.N.M.). Louisiana: 446, Harahan, July 28, 1944, August 4, 1944, August 19, 1944, September 20, 1944, H. Dybas; 17, Forest Hill, Rapides Parish, August 27, 1945, October 21, 1945, R. L. Wenzel. Texas: 2, Columbus, June 8, Hubbard and Schwarz (U.S. N.M.).

Remarks.—Casey proposed a series of species that were said to differ from *socia* in minor ways—slight differences in color and in male tergite characters. Personal examination of the types of these species confirms Fenyes' opinion (1918) that all of these names, except *pinalica*, are synonyms. A large series of specimens from one locality, even from one fungus, may show as much variation in color and in the emargination of the eighth tergite as all of Casey's species show.

I believe, also, that *insolita* Notman is a synonym of *socia*, a decision based on study of the types lent by Dr. Mont A. Cazier of the American Museum of Natural History. When Notman described *insolita* he compared it with *anomala* Notman, inferring that its antennal structure and abdominal characters were similar. If this were true, *insolita* would have to be placed in *Agaricochara* with *anomala*, but the types clearly show that *insolita* has the antennal structure and emarginate eighth tergite of *socia*.

Gyrophaena pinalica Casey. Figure 120, *g*, *h*.

Eumicrota pinalica Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 283.

Length. 1–1.3 mm. Very similar to *socia* but differing in the following respects: Pronotum sparsely, irregularly and finely punctulate; aedeagus distinctive (fig. 120, *g*).

Type locality.—Pinal Mountains, Arizona.

Material examined.—Arizona: 1 specimen, Pinal Mountains, H. F. Wickham (C.N.H.M.); 4, Huachuca Mountains (C.A.S.). New Mexico: 2, Cloudcroft (C.A.S.); 3, no locality (C.A.S.); 1, Las Vegas, August 7, Hubbard and Schwarz (U.S.N.M.).

Gyrophaena spinosa sp. nov. Figure 120, *e*, *f*.

Related to *socia* and *pinalica*, but distinguished from them by the aedeagus and by the long apical spines of the male fifth sternite. Its pronotal punctation differs considerably from that of *pinalica*.

Length. 1.25 mm. *Coloration.* As in *socia*. *Punctation.* Pronotum with about sixteen large punctures on the disk and with others scattered to the sides. Asperate punctation of elytra dense. *Sculpture.* Reticulate throughout. *Antennae.* As in *socia*. *Pronotum.* As in *socia*. *Male abdomen.* Posterior angle of third sternite produced somewhat as in *socia* but in a more pronounced fashion. Apical angles of fifth sternite prolonged into rather long spines directed dorsad and caudad. Eighth tergite (fig. 120, *f*) broadly and shallowly emarginate. Aedeagus distinctive (fig. 120, *e*). *Female abdomen.* Eighth tergite emarginate.

Holotype.—A male from Huachuca Mountains, Arizona. In the collection of the California Academy of Sciences.

Paratypes.—Ten specimens, same data as the type.

Gyrophaena atoma Casey. Figure 120, *i, j*.

Eumicrota atoma Casey, 1906, Trans. Acad. Sci. St. Louis, **6**: 284.

Eumicrota oligotina Casey, 1911, Mem. Coleopt., **2**: 183.

This species and the following two are somewhat smaller than the preceding members of the subgenus; they may be distinguished among themselves by their different tergite characters and aedeagi.

Length. 0.7 mm. *Coloration.* Testaceous to piceus; the head and terminal abdominal segments usually darker. *Punctation.* Pronotum sparsely, asperately punctate; elytral asperities stronger, more dense, especially near apices. Pubescence relatively long, sparse on pronotum, somewhat denser on elytra. *Sculpture.* Dull to moderately shining; strongly reticulate throughout. *Antennae.* Third segment small, slender, about twice as long as wide; fourth very short, about twice as wide as long; fifth twice as wide as fourth and more than twice as long; segments 5–10 large, transverse, slightly incrassate. *Pronotum.* Twice as wide as long. *Male abdomen.* Seventh tergite with two setigerous tubercles; eighth tergite (fig. 120, *j*) with a relatively large medial lobe and several setigerous tubercles. Aedeagus simple (fig. 120, *i*). *Female abdomen.* Unmodified.

Type localities.—Of *atoma*, Asheville, North Carolina; of *oligotina*, St. Louis, Missouri.

Material examined.—Florida: 12, Enterprise, November 20 (A.M.N.H.), May 25, Hubbard and Schwarz (U.S.N.M.). Tennessee: 2, Cades Cove, Great Smoky Mountain National Park, June 16, 1942, H. Dybas. Illinois: 2, Fox, Kendall County, June 27, 1947, C. Seevers; 4, Wayne, Du Page County, October 31, 1948, R. Mitchell. Wisconsin: 2, Chequamegon National Forest, west of Mellen, August 26, 1947, C. Seevers. Kansas: 53, Topeka, August 25, 1945, C. Seevers. Nebraska: 1, Lincoln (U.S.N.M.). Texas: 1, Columbus, July 27, Hubbard and Schwarz (U.S.N.M.).

Remarks.—Fenyes (1918) listed *atoma* and *oligotina* as synonyms of *minutissima* Casey. I agree with Fenyes that *oligotina* and *atoma* are the same, but must differ with regard to the status of *atoma* and *minutissima*.

Gyrophaena minutissima Casey. Figure 120, *m*, *n*.

Eumicrota minutissima Casey, 1906, Trans. Acad. Sci. St. Louis, **6**: 284.

The male secondary abdominal characters and aedeagus distinguish this species from *atoma* and *sayi*.

Length. 0.7 mm. *Coloration.* Piceus to piceo-castaneous; apical half of abdomen and head often darker. *Punctation.* Pronotum moderately densely, asperately punctate; elytra more densely so. Pubescence of pronotum moderately long and dense; elytral pubescence somewhat more dense. *Sculpture.* Integuments rather dull, reticulate throughout. *Antennae.* As in *atoma* but not quite as robust. *Pronotum.* Twice as wide as long; base strongly arcuate, slightly sinuate laterally. *Male abdomen.* Apical margin of third tergite with a pair of small triangular processes medially; seventh tergite with a pair of erect spines; eighth tergite (fig. 120, *n*) strongly angulate at middle and with a series of setigerous tubercles. Some or all of these modifications may be absent. Aedeagus distinctive (fig. 120, *m*). *Female abdomen.* Unmodified.

Type locality.—Vicksburg, Mississippi.

Material examined.—Louisiana: 600 specimens, Harahan, Jefferson Parish, July 25, 1944, to September 20, 1944, H. Dybas. Indiana: 5, New Harmony, June 23, 1943, H. Dybas; 5, Evansville, June 19, 1943, H. Dybas. Florida: 9, Enterprise, Hubbard and Schwarz (U.S.N.M.).

Gyrophaena sayi sp. nov. Figure 120, *k*, *l*.

Allied to *atoma* and *minutissima*, but distinguished from them by its strongly shining, almost glabrous pronotum, which lacks asperities and bears only a trace of reticulation. The male eighth tergite and aedeagus are also distinctive.

Length. 0.7 mm. *Coloration.* Piceus, with basal abdominal segments and humeri paler. *Punctation.* Head minutely and sparsely punctulate; pronotum sparsely punctulate, without asperities; elytra with a few scattered asperities. *Sculpture.* Integuments strongly shining, obsoletely reticulate. *Antennae.* Third segment small, very slender; fourth segment one and one-half times as wide as long; segments 5–10 moderately larger, obtrapezoidal, approximately twice as broad as long. *Pronotum.* Slightly less than twice as wide as long. *Male abdomen.* Seventh tergite with a pair of small setigerous carinae similar to those of *atoma* but smaller. Eighth tergite (fig. 120, *l*) with a small subapical lobe. Aedeagus as in figure 120, *k*. *Female abdomen.* Unmodified.

Holotype.—A male from Harahan, Jefferson Parish, Louisiana; collected July 25, 1944, by Henry Dybas. In the collection of Chicago Natural History Museum.

Paratypes.—Louisiana: 21 specimens, same data as the type; 550, Norco, September 8, 1944, Charles Remington (I.N.H.S.); 85, Norco, August 29, 1944, H. Dybas; 16, New Orleans, July 30, 1944, C. Remington (I.N.H.S.). Paratypes in the following collec-

tions: C.S., C.N.H.M., U.S.N.M., C.A.S., I.N.H.S., A.M.N.H., M.C.Z.

Subgenus **Agaricochara** Kraatz

Agaricochara Kraatz, 1858, Naturg. Insect. Deutschl., Coleopt., **2**: 361.

Agaricophaena Reitter, 1909, Fauna Germanica, **2**: 85.

Type.—*Gyrophaena laevicollis* Kraatz (monobasic).

Holarctic and Neotropical in distribution.

Size minute (0.8–1.5 mm.); coloration brown to black, usually uniformly colored; pronotum almost twice as wide as long (except in *simplex* and *boleti*); mesosternal and metasternal processes approximately equal in length; antennae incrassate from fourth to tenth segments.

Agaricochara is more closely related to *Eumicrota* than to *Gyrophaena* s. str. as evidenced by similarity in pronotal structure, mesosternal and metasternal processes, male abdominal characters, and general facies. The *Agaricochara* antennae, on the other hand, resemble those of *Gyrophaena* s. str. in their incrassate character. The species of *Agaricochara* can only be detected from those of *Eumicrota* by this antennal difference (which is not always clear-cut) and by the fact that they are often asperately punctate and rather pubescent. The distinction between *Agaricochara* and *Eumicrota* may break down completely when more tropical species have been studied.

Only three species have been previously assigned to *Agaricochara*, two from Europe and one from Alaska. On the basis of material I have studied, it is evident that this subgenus is widespread in the New World. Six species (one doubtful) are herein recorded from the United States; one of these, *anomala* Notman, had been originally assigned to *Eumicrota*. There are probably numerous species of *Agaricochara* in the Neotropical region. Several Mexican species that I have examined belong here, and a number of Sharp's species of *Gyrophaena* seem to fall in this category.

Considering the broadened scope of *Agaricochara*, it seems to me that the European species, *boleti* L., belongs in this subgenus. It is true that its pronotum is somewhat less than twice as wide as long, but this is scarcely reason enough to assign it to the separate category, *Agaricophaena*.

Key to North American Species

1. Asperities of pronotum very fine or absent 2
   Asperities of pronotum dense and conspicuous 4

2. Male abdomen not modified 3
   Seventh male tergite with a pair of erect, medial spines; eighth tergite emarginate ..... *hubbardi* sp. nov. (p. 741)
3. Head, pronotum, and elytra without asperities, and with scarcely a trace of reticulation, punctation or pubescence ..... *simplex* sp. nov. (p. 745)
   Head, pronotum, and elytra reticulate; pronotum feebly asperate, elytra distinctly so; pronotum and elytra pubescent .... *anomala* Notman (p. 741)
4. Fourth antennomere very slender, no broader than the third; fifth segment also very narrow at base ..... *ojibway* sp. nov. (p. 743)
   Fourth antennomere larger than the third segment; fifth moderately large .. 5
5. Posterior pronotal angles distinct, basal margin of pronotum sinuate; abdomen conspicuously pubescent ..... *apacheana* sp. nov. (p. 743)
   Posterior pronotal angles obsolete; basal margin of pronotum not sinuate; abdomen very sparsely pubescent ..... *sonorae* sp. nov. (p. 743)

Gyrophaena anomala Notman. Figure 121, *c*.

Eumicrota anomala Notman, 1920, Bull. Amer. Mus. Nat. Hist., **42**: 718, 1 fig.

Length. 0.8–1 mm. *Coloration.* Rufo-piceus, abdomen darker; individuals are frequently lighter. *Punctation.* Punctures of head fine, not umbilicate. Pronotal asperities very minute, moderately dense. Pubescence of pronotum moderately dense, rather long and conspicuous. Elytra more densely punctate and pubescent, the asperities distinct. *Sculpture.* Reticulate throughout. *Antennae.* Segments 4–10 evenly incrassate; fourth segment moderately large; fifth segment larger than fourth but not conspicuously so; segments 5 and 6 subquadrate, 7–10 feebly transverse. *Pronotum.* Twice as wide as long. *Male abdomen.* Not modified. Aedeagus distinctive (fig. 121, *c*).

Type locality.—Monticello, Jefferson County, Florida.

Material examined.—Florida: Type, nine paratypes, and three other specimens, Monticello, October 4–8, 1914 (A.M.N.H.). Indiana: 46, Indiana Dunes State Park, June 21, 1947, C. Seevers, August 21, 1943, H. Dybas; 4, Ogden Dunes, Porter County, September 13, 1942, H. Dybas.

Remarks.—The males of *anomala* are not distinguishable from the females, unless the aedeagus is observed. Notman believed that his type series of sixteen specimens consisted of females, but my slide preparations of several paratypes showed that this is not true.

Gyrophaena hubbardi sp. nov. Figure 121, *e, f*.

Close to *anomala* from which it is distinguished by the modifications of the male abdomen.

Length. 1 mm. or less. *Coloration.* Head and elytra brown, pronotum dark testaceous, apical half of abdomen piceus; the Missouri examples shining black. *Punctation.* Vertex of head with twelve or so small umbilicate punctures; pronotum sparsely, asperately punctate and sparsely pubescent; elytra more densely, asper-

ately punctate. *Sculpture.* Reticulate throughout. *Antennae.* As in *anomala. Pronotum.* Approximately twice as wide as long. *Male abdomen.* Seventh tergite with a pair of medial, erect spines; eighth tergite (fig. 121, *f*) emarginate. Aedeagus as in figure 121, *e*.

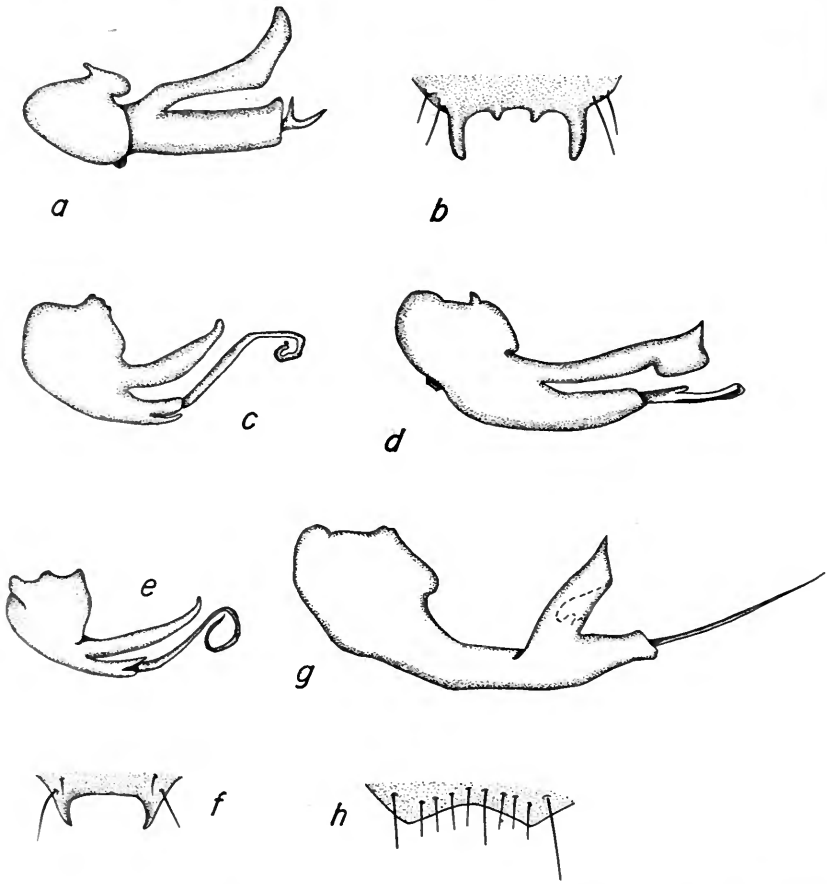

FIG. 121. *Gyrophaena:* Subgenus *Agaricochara.* Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena laevicollis* Kraatz. *c. G. anomala* Notman. *d. G. aspera* Fauvel. *e, f. G. hubbardi* sp. nov. *g, h. G. ojibway* sp. nov.

Holotype.—A male from Apple River Canyon State Park, Illinois; collected August 15, 1946, by Henry Dybas. In the collection of Chicago Natural History Museum.

Paratypes.—Illinois: 2 specimens, same data as type. Missouri: 2, Neely's Landing, September 22, 1946, H. Dybas. Michigan: 1, Detroit, Hubbard and Schwarz (U.S.N.M.). District of Columbia: 1,

Washington, April 17, Hubbard and Schwarz (U.S.N.M.). Paratypes in these collections: C.S., U.S.N.M.

Gyrophaena sonorae sp. nov. Figure 122, *a*, *b*.

Closely related to *anomala* and *hubbardi;* distinguished from them by the dense asperate punctation of pronotum and elytra and by the male abdominal characters, which are rather similar to those of *hubbardi*.

Length. 1 mm. *Coloration.* Reddish-brown, apex of abdomen darker. *Punctation.* Head with a number of fine, non-umbilicate punctures; pronotum and elytra densely, asperately punctate and pubescent; abdomen very sparsely pubescent. *Sculpture.* Reticulate throughout. *Antennae.* Segments 4–10 uniformly and conspicuously incrassate. *Pronotum.* Lateral margins converging slightly, the anterior angles somewhat depressed; sides broadly rounded into base, the posterior angles obsolete; base oblique laterally, transverse at middle, not sinuate. *Male abdomen.* Seventh tergite with a pair of medial tubercles; eighth tergite (fig. 122, *b*) emarginate. Aedeagus distinctive (fig. 122, *a*).

Holotype.—A male from Flagstaff, Arizona. In the collection of the California Academy of Sciences.

Gyrophaena apacheana sp. nov. Figure 122, *c*, *d*.

Distinguished from *sonorae* by its pronotum, which has distinct posterior angles and a sinuate basal margin, by its conspicuously pubescent abdomen, and by the male abdominal characters.

Length. 1 mm. *Coloration.* As in *sonorae*. *Punctation.* Head finely punctured and moderately pubescent; pronotum and elytra with moderately dense asperate punctation; abdomen conspicuously pubescent, the pale hairs rather long and dense. *Sculpture.* Reticulate throughout. *Antennae.* As in *sonorae*. *Pronotum.* Basal margin distinctly bisinuate from posterior angle to the middle; posterior angles distinct; broadest about one-third the distance from base, the sides then converging appreciably to the much depressed anterior angles. *Male abdomen.* Seventh tergite with a pair of very small medial tubercles and possibly a third one a short distance in front of them. Eighth tergite (fig. 122, *d*) with apical margin produced very slightly medially into a small acute tooth; surface of tergite with a pair of setigerous tubercles. Aedeagus distinctive (fig. 122, *c*).

Holotype.—A male from Cloudcroft, New Mexico, collected in August at 9,000 feet elevation by W. Knaus. In the collection of the California Academy of Sciences.

Paratypes.—One female, same data as type. One from Cloudcroft, New Mexico, collected by H. F. Wickham (U.S.N.M.).

Gyrophaena ojibway sp. nov. Figure 121, *g*, *h*.

The pronotum of this species, with its depressed anterior angles, its converging sides, and conspicuous asperate punctation, indicates

that *ojibway* is more closely related to *sonorae* and *apacheana* than to *anomala*. The antennae, with their very slender basal segments and broad outer segments, and the aedeagus are very distinctive features of this species.

Length. 1 mm. *Coloration.* Uniformly piceus. *Punctation.* Head sparsely and finely punctured; pronotum with fine, moderately dense, asperate punctation. Elytra with dense asperate punctation. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment slender and slightly elongated, no wider than the third; fifth obtrapezoidal, the base no wider than the fourth; sixth feebly transverse, segments 7–10 strongly incrassate, the tenth wider and longer than the others; eleventh large, oval, as large as the ninth and tenth together. *Pronotum.* 1.7 times as wide as long. Sides of pronotum strongly convergent apically, the anterior angles depressed; base strongly arcuate, the basal angles distinct. *Male abdomen.* Eighth tergite (fig. 121, *h*) with a broad, rather shallow emargination. Aedeagus distinctive (fig. 121, *g*).

Holotype.—A male from the Chequamegon National Forest, 15 miles west of Mellen, Wisconsin; collected August 22, 1947, by Charles Seevers. In the collection of Chicago Natural History Museum.

Gyrophaena laevicollis Kraatz. Figure 121, *a*, *b*.

Gyrophaena laevicollis Kraatz, 1854, Stett. Ent. Zeit., **15**: 186.

Agaricochara laevicollis Kraatz, 1858, Naturg. Ins. Deutschl., Coleopt., **2**: 362; Wüsthoff, 1937, Decheniana, **95B**: 144, pl. xi, figs. 57, 58.

This European species has much longer elytra (one-third longer than pronotum) than the other species of the subgenus; in addition, its pronotal asperities are weak, its elytral asperities strong, and its antennae unusually robust. The eighth male tergite and aedeagus are distinctive (fig. 121, *a*, *b*).

Material examined.—Vienna, Austria: 13 specimens.

Gyrophaena aspera Fauvel. Figure 121, *d*.

Agaricochara aspera Fauvel, 1872, Faune Gallo-rhen., Coleopt., **3**: 644; Wüsthoff, 1937, Decheniana, **95B**: 144, pl. xi, figs. 59, 60.

This species, which occurs in southern Europe and northern Africa, is closer to some of the American species than to *laevicollis*. Its pronotal structure closely resembles that of *sonorae* and *apacheana;* the sides converge strongly in front and the anterior angles are strongly depressed, while the base is strongly oblique in its outer one-third and almost transverse at the middle. The pronotal asperities of *aspera* are fine, and those of the elytra quite coarse. Like *anomala*, the males are not distinguishable from the females externally. The aedeagus is distinctive (fig. 121, *d*).

Material examined.—Tunis and Algeria: 11 specimens (C.A.S.).

Gyrophaena geniculata Mäklin

Gyrophaena geniculata Mäklin, 1853, Bull. Soc. Natur. Mosc., (3), **26**: 184.

Fenyes (1918) believed this species to be an *Agaricochara*, although this opinion was probably not based on an actual examination of specimens; there are none in his collection. Mäklin's description is as follows: "Nigra, nitida, subtiliter at creberrime punctulata, antennarum basi, geniculis tarsisque testaceis, ano piceo; thorace basi anguste marginato, ante scutellum interdum utrinque impresso." The description does not enable one to place this species accurately.

Type locality.—Alaska: "Ad sinum Nutschek in insula Chtagaluk a D. Holmberg rarissime inventa." (Mäklin.)

Gyrophaena boleti Linnaeus. Figure 122, *e*, *f*.

Staphylinus boleti Linnaeus, 1758, Syst. Nat., 10th ed., **1**: 423.

This small European species has all of the characteristics of an *Agaricochara* except that its pronotum is only one and one-half times as broad as long. This difference does not seem to be sufficiently important to justify placing *boleti* in a separate category, *Agaricophaena* Reitter, as many have done.

Material examined.—Germany, Hungary, Moravia: 14 specimens (C.A.S.).

Gyrophaena simplex sp. nov. Figure 122, *g*.

I am assigning this species to *Agaricochara* with hesitancy. The meso- and metasternal processes have apparently fused so that their limits are not discernible, except possibly by difference in texture; if this is a reliable criterion, the metasternal process is rather long. The male abdomen is not modified, a situation found so far only in *Agaricochara*. The antennae conform to the type found either in *Gyrophaena* s. str. or *Agaricochara*. The following characteristics seem to indicate that it does not belong in this subgenus: the relatively narrow pronotum (only one-half wider than long), and the smooth, non-asperate, non-pubescent integuments. The aedeagus is so simple as to be of little value in determining relationship.

Length. 1.5 mm. *Coloration.* Uniform light testaceous. *Punctation.* Head almost impunctate, bearing only a few scattered punctules; pronotum and elytra

almost impunctate. *Sculpture.* Head, pronotum and elytra shining; head and pronotum with only a trace of reticulation; elytra weakly reticulate. *Antennae.* Long and loosely organized; fourth segment moderately large; fifth somewhat larger, transverse; 5–10 transverse, moderately incrassate. *Pronotum.* 1.55 times as wide as long. *Male abdomen.* Tergites unmodified. Aedeagus as in figure 122, *g*.

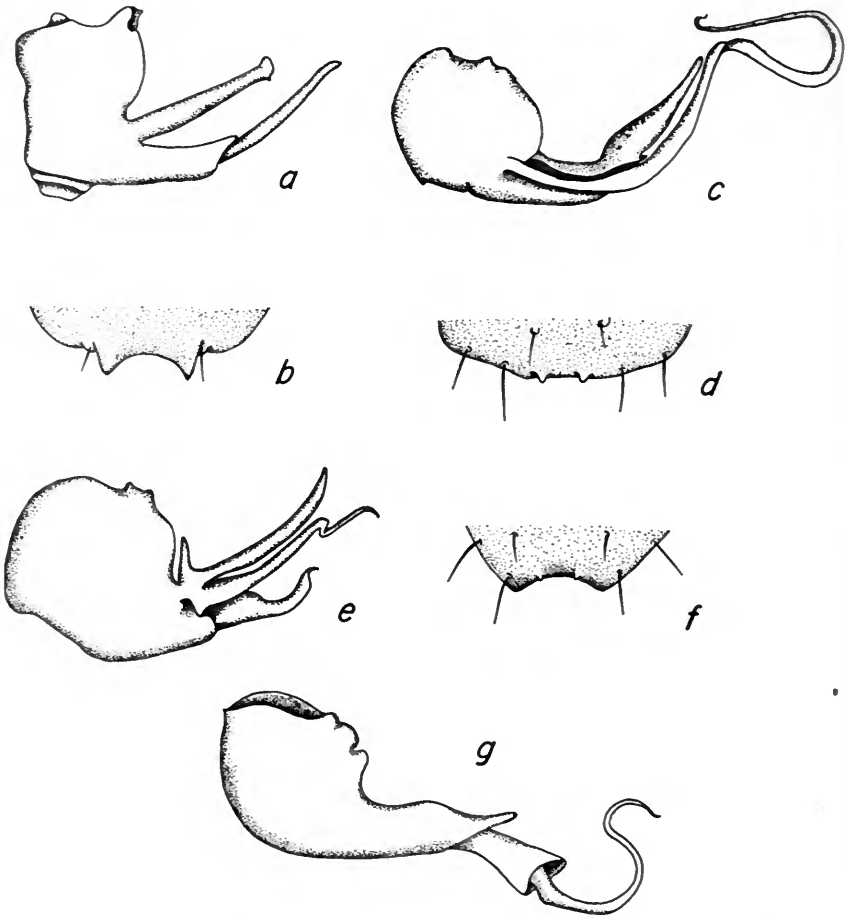

FIG. 122. *Gyrophaena:* Subgenus *Agaricochara.* Aedeagi (median lobes, lateral view) and male eighth tergites (dorsal view). *a, b. Gyrophaena sonorae* sp. nov. *c, d. G. apacheana* sp. nov. *e, f. G. boleti* L. *g. G. simplex* sp. nov.

Holotype.—A male from Smith Station, LaPorte County, Indiana; collected July 19, 1947, by Charles Seevers. In the collection of Chicago Natural History Museum.

Genus **PHANEROTA** Casey

Phanerota Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 278; Fenyes, 1918, Gen. Insect., **173A**: 96.

Type of the genus.—*Aleochara fasciata* Say (through synonymy; =*Gyrophaena vinula* Erichson) (designated by Fenyes, 1918).

Eyes coarsely faceted and extremely large, occupying the entire side of the head; infra-orbital carina absent; antennae long and slender, with segments 4–10 slightly incrassate, and with 5–10 subequal in length; pronotal hypomera visible from the side; meso- and metasternal processes subequal in length (fig. 99, *a*), and with both processes margined; eighth male tergite emarginate, the emargination usually lobed medially; aedeagus as in figure 123, *a;* spermatheca distinctive (fig. 99, *j*).

All of the American species belong to the subgenus *Phanerota;* these include, besides the three North American species, two from Mexico (*peninsularis* Casey and *sallaei* Sharp), two from Central America (*gracilicornis* Sharp and *occulta* Sharp), one from Cuba (*cubensis* Casey), and two from Brazil (*boops* Sharp and *debilis* Sharp).

The subgenus *Acanthophaena* Cameron (Stylops, 1934, **3**: 23), of the Indo-Malayan area, differs chiefly in the presence of large lateral, spinose appendages of the fifth male sternite. It has usually been considered a subgenus of *Gyrophaena,* but this is not so.

Key to North American Species

1. Head reticulate; ground color of body testaceous; tergites 5–9 dark. *dissimilis* Erichson (p. 750)
   Head not reticulate; ground color of body flavate; the sixth tergite dark.. 2
2. Elytra of most of the males carinate.....*carinata* sp. nov. (p. 749)
   Elytra of males without carinae..... 3
3. Apices of elytra and sixth tergite dark.....*fasciata* Say (p. 747)
   Flavate throughout; Lower California.....*peninsularis* Casey (p. 749)

Phanerota fasciata Say. Figure 123, *a–c.*

Aleochara fasciata Say, 1834, Trans. Amer. Phil. Soc., **4**: 469.

Phanerota fasciata Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 286.

Gyrophaena vinula Erichson, 1840, Gen. Spec. Staph., p. 186.

Gyrophaena flavocincta Jekel, 1873, Coleopt. Jekel, **1**: 49.

Phanerota ocularis Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 287.

Phanerota angularis Casey, ibid., p. 287.

Phanerota floridana Casey, ibid., p. 288.

Length. 1.4–2.5 mm. *Coloration.* Flavate, often with a faint reddish tinge; head rufo-piceus to black; outer apical angles of elytra brown to black, the size of this triangular area variable, but never very extensive; sixth tergite cloudy to

black, adjacent tergites sometimes cloudy. *Punctation.* Vertex of head with 12 to 15 coarse, umbilicate punctures on each half; elytra sparsely and aciculately punctate. *Sculpture.* Head smooth, very rarely with suggestion of reticulation; pronotum not reticulate; elytra obsoletely strigulose; abdomen distinctly but finely reticulate. *Antennae.* Segments 1–3 long and slender, the first about twice as long as the second or third; fourth segment obtrapezoidal, length and width approximately equal; segments 5–10 subequal in length, slightly incrassate, the tenth subquadrate or slightly transverse. *Male abdomen.* Eighth tergite (fig. 123, *b*, *c*) emarginate, the border within the emargination with an arcuate lobe, variable in size. Apical angles of third sternite not prolonged. *Female abdomen.* Eighth tergite emarginate, but usually without the arcuate lobe.

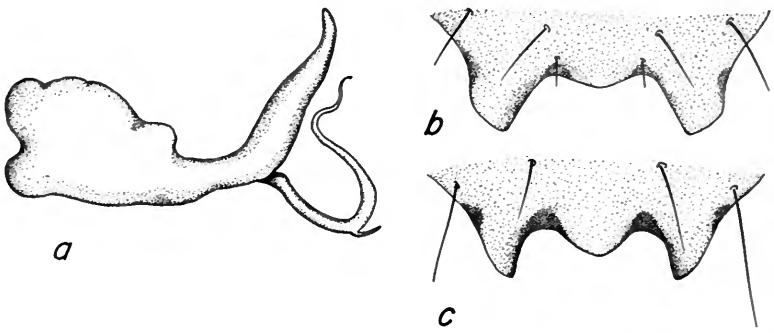

FIG. 123. *Phanerota fasciata* Say. *a.* Aedeagus, median lobe (lateral view). *b*, *c.* Male eighth tergites, dorsal view.

Type localities.—Of *fasciata*, Pennsylvania; of *ocularis*, Catskill Mountains, New York; of *angularis*, Dallas, Texas; of *floridana*, Palm Beach, Florida.

Material examined.—New York: 9 specimens, New York City (A.M.N.H., C.S.); 1, Staten Island (C.A.S.); 6, Long Island, M. L. Linell (U.S.N.M.); 9, no locality (C.A.S., A.M.N.H.). New Jersey: 2, Hoopatong (A.M.N.H.); 2, Brookville, C. Leng (C.S.); 2, Lakehurst, August 23 (C.F.). Pennsylvania: 3, Jeannette (C.A.S.); 2, no locality (C.A.S.). Maryland: 10, Baltimore, June 1, 1909, July 19, 1909, F. E. Blaisdell (C.A.S.); 2, Forest Glen, August 10, H. F. Wickham (U.S.N.M.). District of Columbia: 4, Rock Creek Park, September 26, 1942, Chapin and Blackwelder (U.S.N.M.); 5, Washington, April 12 to July 22, Hubbard and Schwarz (U.S.N.M.). Virginia: 6, Ocean View, September 23, 1928, E. A. Chapin (U.S. N.M.); 2, Pennington, July 16, Hubbard and Schwarz (U.S.N.M.). North Carolina: 2, Black Mountains (A.M.N.H.); 1, Craggy Mountains (A.M.N.H.); 1, Asheville (A.M.N.H.). Georgia: 1, Clayton, Leng coll. (C.S.). Florida: 20, Enterprise (C.A.S., A.M.N.H.); 6,

Pensacola (A.M.N.H.); 1, Monticello (A.M.N.H.). Mississippi: 6, Lucedale, June 3, 1929, H. Dietrich (Cornell); 4, New Augusta, July 11, 1929, H. Dietrich (Cornell); 1, Richton, June 28, 1929, H. Dietrich (Cornell). Tennessee: 42, Gatlinburg, June 17, 1942, H. Dybas. Kentucky: 1, Bardstown, June 12, 1942, C. Seevers; 36, Crofton, June 15, 1947, C. Seevers. Ohio: 1, Cincinnati (C.A.S.). Indiana: 11, Smith Station, LaPorte County, August 22, 1942, September 20, 1945, C. Seevers; 29, Indiana Dunes State Park, August 21, 1943, H. Dybas; June 16, 1944, July 28, 1945, C. Seevers; 2, Beverly Shores, October 8, 1943, June 11, 1945, C. Seevers; 3, Dune Acres, July 25, 1941, H. Dybas; 7, Bass Lake, July 29, 1939, H. Dybas; 7, Evansville, June 20, 1943, H. Dybas. Michigan: 6, Lakeside, July 3, 1943, July 4, 1945, September 20, 1945, C. Seevers. Illinois: 6, Chicago, July 20, 1945, C. Seevers; 16, Oswego, September 2, 1939, H. Dybas; 5, Aurora, June 27, 1947, C. Seevers; 64, Fox, Kendall County, June 27, 1947, C. Seevers; 4, New Lenox, July 1, 1945, C. Seevers; 6, Rockford, June 13, 1944, H. Dybas. Wisconsin: 84, Edgerton, July 8, 1947, H. Dybas. Iowa: 1, Iowa City, H. F. Wickham (C.A.S.). Kansas: 39, Topeka, September 7, 1942, August 25, 1945, June 24, 1946, C. Seevers; 1, Benedict (C.A.S.). Missouri: 2, Paris, June 14, 1946, C. Seevers. Arkansas: 2, Hot Springs, July 2, 1935, C. Seevers. Louisiana: 14, Forest Hill, Rapides Parish, August 22, 1945, R. L. Wenzel.

Phanerota peninsularis Casey

Phanerota peninsularis Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 289.

Closely resembling *fasciata* in all respects, but somewhat paler in color, the elytra with no trace of cloudiness and the sixth tergite very faintly darkened.

Type locality.—San José del Cabo and Sierra El Taste, Lower California, Mexico.

Material examined.—In addition to Casey's types, a female from Santo Domingo del Taste, Lower California, in Chicago Natural History Museum (Horn collection; labeled *Gyrophaena* sp. indet.).

Remarks.—This species is known only from southernmost Lower California. There are no records of *Phanerota* in southwestern United States and it is possible that *peninsularis* is isolated in Lower California. Even though it differs from *fasciata* in very minor respects, there is at present no alternative to regarding it as a distinct species.

Phanerota carinata sp. nov.

Closely related to *fasciata;* the males are distinguished by their carinate elytra and by minor, perhaps unreliable, color differences (the dark areas of the elytra and abdomen more extensive). Females and a few non-carinate males are probably indistinguishable from *fasciata.*

Length. 2–2.5 mm. *Coloration.* Female: ground color pale flavate; head, elytral apices, and fifth and sixth tergites dark. Males: ground color flavate to testaceous; head, apical half of elytra, and sixth tergite dark (seventh and eighth tergites dark testaceous). *Elytra.* Males with a prominent, acute carina near each outer apical angle, and an inconspicuous smooth elevation near each inner angle. Females and a few males lack the carinae. *Male abdomen.* Eighth tergite emarginate, and feebly lobed within the emargination. *Female abdomen.* Eighth tergite feebly emarginate.

Holotype.—A male from Harahan, Jefferson Parish, Louisiana, collected August 4, 1944, by Henry Dybas. In the collection of Chicago Natural History Museum.

Paratypes.—Louisiana: 303 specimens, Harahan, August 3, 4, 16, 19, 20, and September 20, 1944, H. Dybas; 93, Norco, St. Charles Parish, August 29–31, 1944, H. Dybas; 79, Norco, September 8, 1944, Charles Remington. Paratypes in these collections: C.S., C.A.S., U.S.N.M., I.N.H.S., A.M.N.H., C.N.H.M., M.C.Z.

Other material.—Florida: 2 males, Enterprise, May 13, C. V. Riley coll. (U.S.N.M.). Texas: 1 male, Columbus, June 13, Hubbard and Schwarz (U.S.N.M.).

Remarks.—This species seems to replace *fasciata* in the Gulf states, and probably extends south into Mexico, where other species with carinate elytra are found. To what extent the ranges of *fasciata* and *carinata* overlap has not been determined, but in areas where both species do occur, it may be impossible to identify many isolated examples (females and non-carinate males might belong to either species).

Approximately 7 per cent of the males of *carinata* which I examined in detail lacked carinae on the elytra. Fifty specimens (26 with carinae, 24 without carinae) were placed in KOH to reveal the genitalia; all of the carinate and two of the non-carinate individuals were males. It is possible in most cases to distinguish males from females without dissection, as the male eighth tergite has a feeble lobe within the emargination.

Phanerota dissimilis Erichson

Gyrophaena dissimilis Erichson, 1840, Gen. Spec. Staph., p. 186.
Phanerota dissimilis Casey, 1906, Trans. Acad. Sci. St. Louis, **16**: 288.

Distinguished from *fasciata* by the reticulate sculpture of the head and by differences in coloration. The darker, testaceous ground color and the more extensive black marking of the elytra and abdomen are in contrast with *fasciata*.

Length. 2–3 mm. *Coloration.* Ground color testaceous; elytral markings variable, but usually with the apical half or more black; abdomen with a variable number of tergites black (as a rule, with the apical half of the abdomen dark). The entire body of some individuals is rather dark. *Punctation.* As in *fasciata*. *Sculpture.* Head strongly reticulate. *Antennae.* As in *fasciata*. *Male abdomen.* Outer apical angle of third sternite sometimes prolonged as a short spine. Eighth male tergite and aedeagus very similar to those of *fasciata*.

Type locality.—The Carolinas.

Material examined.—Pennsylvania: 1, Jeannette (C.A.S.). Maryland: 3, Baltimore, June 1–28, 1909, F. E. Blaisdell (A.M.N.H.). District of Columbia: 1, Washington, June 26, Hubbard and Schwarz (U.S.N.M.). Virginia: 1, Fairfax County, September 23, 1915, A. Nicolay (A.M.N.H.); 3, Ocean View, September 23, 1928, E. A. Chapin (U.S.N.M.). West Virginia: 3, Grafton, Hubbard and Schwarz (U.S.N.M.). North Carolina: 1, Asheville (A.M.N.H.). Georgia: 1, Demarest, June 10, 1939, Valentine; 2, Clayton (A.M.N.H.). Florida: 42, Enterprise, May 11–June 7, Hubbard and Schwarz (U.S.N.M., C.A.S., A.M.N.H.); 2, Key Largo, Leng coll. (C.S.); 3, Pensacola, October 13, 1914 (A.M.N.H.); 2, Tampa, April 13, Hubbard and Schwarz (U.S.N.M.). Alabama: 2, Selma, Hubbard and Schwarz (U.S.N.M.). Mississippi: 5, Lucedale, June 3, 1929, H. Dietrich (Cornell). Tennessee: 2, Great Smoky Mountain National Park, June 17, 1942, H. Dybas; 1, Nashville (C.A.S.). Kentucky: 27, Sky Bridge, Powell County, June 12, 1947, E. C. Williams (C.S.); 1, Laurel County, Hubbard and Schwarz (U.S.N.M.). Indiana: 1, Smith Station, LaPorte County, September 20, 1945, C. Seevers; 2, Indiana Dunes State Park, July 28, 1945, C. Seevers; 41, Evansville, June 19, 1943, H. Dybas. Michigan: 4, Lakeside, June 3, 1943, September 20, 1945, C. Seevers; 2, Detroit, Hubbard and Schwarz (U.S.N.M.). Illinois: 11, Oswego, September 2, 1939, H. Dybas; 5, Fox, Kendall County, June 27, 1947, C. Seevers; 2, Aurora, September 8, 1939, H. Dybas; 1, Rockford, June 13, 1944, H. Dybas; 2, Quincy (C.A.S.). Iowa: 1, Iowa City (C.A.S.). Missouri: 2, Paris, June 14, 1946, C. Seevers. Kansas: 22, Topeka, September 7, 1943, August 25, 1945, June 24, 1946, C. Seevers; 2, Benedict (C.A.S.). Louisiana: 3,950, Harahan, August 3–September 20, 1944, H. Dybas; 81, Norco, July 30–September 8, 1944, Charles Remington (I.N.H.S.); 70, Forest Hill,

Rapides Parish, August 19, 1945–October 21, 1945, Rupert Wenzel (C.S.); 1, Tallulah, September 6, 1930, P. A. Glick (C.F.). Texas: 3, Columbus, May 31–June 13, H. F. Wickham; 2, no locality, C. V. Riley coll. (U.S.N.M.); 1, Cypress Mill, May 15, 1889, Leng coll. (C.S.).

Remarks.—Despite the fact that I seldom have difficulty in separating *dissimilis* and *fasciata*, there are certain aspects of their distribution that cause me to wonder if they are distinct species. Both range over most of the eastern United States (south of 43°), and occur together with great frequency. In a high percentage of cases, a series of *Phanerota* from the same locality (even the same fungi) contains specimens of both. It is rather surprising that two such closely related species would occupy the same habitat niche so frequently over such a wide range.

These "species" may be different genotypes of the same species. Individuals are rather easy to place in one category or the other; specimens of *fasciata* have non-reticulated heads and a characteristic coloration, while specimens of *dissimilis* have reticulate heads and a different color pattern. These combinations of characters are rather constant, with extremely few intermediates. The aedeagi are indistinguishable and offer no aid in species determination.

The situation in Louisiana and Texas lends some weight to the view that *dissimilis* and *fasciata* are distinct species. As I have indicated earlier, *fasciata* seems to be replaced by *carinata* in the Gulf states. On the other hand, *dissimilis* seems to reach the peak of its abundance in this region and extends far into Texas (and possibly into Mexico).

On the evidence at hand, I can only assume that two species exist. It is doubtful that the problem can be solved without genetic studies, but how feasible these would be I do not know.

Genus **ENCEPHALUS** Kirby

Encephalus Kirby, 1829, in Stephens, Syst. Cat. Brit. Insects, p. 268; Kirby, 1832, in Stephens, Illust. Brit. Ent. Mand., **5**: 163; Westwood, 1833, Mag. Zool., (3), **9**: 2.

Type of the genus.—*Encephalus complicans* Kirby (monobasic).

Body short, stout, convex. Head strongly deflected, its sides strongly converging behind. Eyes moderate in size, finely faceted. Infra-orbital carina present. Antennae short, segments 4–10 strongly incrassate. Prothorax strongly convex; pronotum one and three-quarters to twice as broad as long. Pronotal hypomera

strongly inflexed, invisible from the side. Mesosternum nearly in a vertical plane; mesosternal process very wide and long, extending to the posterior limits of the middle coxae; metasternal process absent.

Remarks.—The known range of this genus is extended to the New World by the addition of an American species, *americanus* sp. nov. Four species from the Palearctic region and one from New Zealand have previously been recorded. I have been able to procure only one species, *complicans*, for study.

Encephalus complicans Kirby

Encephalus complicans Kirby, 1832, in Stephens, Illust. Brit. Ent. Mand., **5**: 164.

Length. 2 mm. *Coloration.* Head and pronotum black, elytra black, their disks rufous; abdomen rufo-piceus. *Punctation.* Head very feebly punctate; pronotum feebly punctate, with one moderately strong medial pair of punctures; pronotum without a punctate basal impression; elytra very feebly punctate. *Sculpture.* Reticulate throughout. *Antennae.* Fourth segment small, subquadrate; fifth segment small, transverse; segments 5–10 strongly incrassate, tenth more than twice as wide and long as fifth. *Pronotum.* Twice as wide as long. *Elytra.* Sutural length only about four-fifths the pronotal length; elytra conjointly concave at middle. *Male abdomen.* Eighth tergite with four slender processes, the medial pair as long as the others. Aedeagus very similar to that figured for *americanus*.

Material examined.—Europe: 1 male (U.S.N.M.).

Encephalus americanus sp. nov. Figure 124, *a*, *b*.

Distinguished from *complicans* by the following characters: Pronotum somewhat less than twice as wide as long, its surface

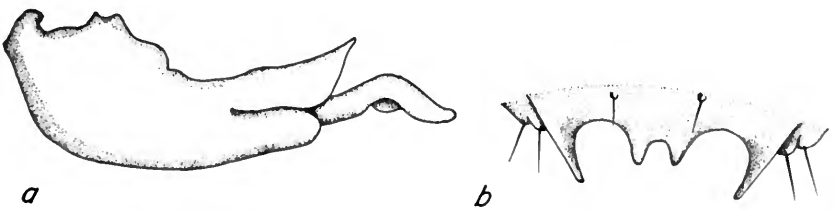

FIG. 124. *Encephalus americanus* sp. nov. *a*. Aedeagus (median lobe, lateral view). *b*. Eighth tergite of male (dorsal view).

with a punctured, basal impression; elytra subequal to pronotum in length, their surface not concave, but more densely and coarsely punctate.

Length. 2 mm. or less. *Coloration.* Rufous throughout, except for paler elytral disk. *Punctation.* Head with about eight moderate punctures medial

to each antenna; pronotum sparsely punctured, and with one strong medial pair of punctures; subbasal impression of pronotum with confused punctation; elytra rather coarsely punctate except for a wide area on each side of suture. *Sculpture.* Reticulate throughout. *Antennae.* Similar to those of *complicans*, except that the fifth segment may be a bit more robust. *Pronotum.* 1.7–1.8 times as wide as long. *Elytra.* Sutural length slightly shorter than pronotum or subequal to it. *Male abdomen.* Eighth tergite (fig. 124, *b*) with four slender processes. Aedeagus as in figure 124, *a*.

Holotype.—A male from the Bear Paw Mountains of Montana, collected September 17, by Hubbard and Schwarz. In the collection of the United States National Museum.

Paratypes.—British Columbia: 4, Creston, May 18, 1951, G. Stace Smith. Montana: 2 males, Bear Paw Mountains, August 26, Hubbard and Schwarz. In the following collections: U.S.N.M., C.N.H.M., and G. S. Smith.

Other material.—Illinois: Antioch, October 8, 1929, F. Psota (C.N.H.M.). This specimen agrees moderately well with the types, but there may be some question about the authenticity of the locality.

Remarks.—This is the first species of *Encephalus* to be recorded from the New World. The genus apparently has a rather wide range in the northern Nearctic region; one specimen (California Academy of Sciences) from Mount Pleasant House, New Hampshire, labeled *E. americanus* Fenyes (MS.) is closely related to the Montana species but differs in antennal structure. More material is needed from New England to determine whether this is a distinct species.

CHECK LIST OF HOLARCTIC GYROPHAENAE

Gyrophaena rufa Melsheimer (1844, p. 31) from Pennsylvania should be included in the following list, but as yet it has been impossible to associate the name with any known species of *Gyrophaena*. I recently had an opportunity to examine the two specimens labeled *rufa* in the Melsheimer collection (M.C.Z.), but inasmuch as they are females, I was unable to determine which of the North American species is *rufa*. This will be a difficult problem to solve.

In Agassiz' *Lake Superior, Its Physical Character, Vegetation, and Animals* Le Conte (1850) listed two species of *Gyrophaena, amenda* and *bellula*. Inasmuch as descriptions did not accompany the names, they are obviously nomina nuda.

Synonyms of North American species are included, but not those of the European species.

Genus **GYROPHAENA** Mannerheim

Subgenus **Gyrophaena** Mannerheim

NANA Group

nana Paykull	Europe, British Columbia, Montana, Wyoming, Manitoba, northern Wisconsin, northern Michigan, Ontario, Maine, Massachusetts
perpolita Casey	
franciscana Seevers	Arizona
sierrae Seevers	California
tenebrosa Casey	Colorado, New Mexico
gentilis Erichson	Europe
rugipennis Mulsant and Rey	Europe

NEONANA Group

neonana Seevers	Pennsylvania, Indiana, Wisconsin, North Carolina
bilobata Seevers	New Mexico, Arizona, Montana, northern Wisconsin

KEENI Group

keeni Casey	British Columbia, Washington, Montana, Wyoming, Maine, New Hampshire, Massachusetts, New York, Tennessee, Florida
brevicollis Seevers	Indiana, Illinois, Missouri, North Carolina
caseyi Seevers	Michigan, Pennsylvania, New York, North Carolina
monticola Casey	Colorado, New Mexico, Arizona
nanoides Seevers	Wisconsin, Iowa, Indiana, Ontario, District of Columbia, Virginia

LAETULA Group

laetula Casey	Massachusetts, New York, Pennsylvania, District of Columbia, Virginia, Tennessee, Kentucky, Indiana, Illinois, southern Wisconsin
fustifer Casey	
centralis Casey	
minima Erichson	Europe
munsteri Strand	Europe
poweri Crotch	Europe

ILLIANA Group

illiana Seevers	Illinois, Indiana, Wisconsin
wisconsinica Seevers	Wisconsin, Illinois
rhodeana Casey	Rhode Island

SCULPTIPENNIS Group

sculptipennis Casey	Massachusetts, New Hampshire, New York, northern Wisconsin

FASCIATA Group

fasciata Marsham	Europe
involuta Casey	Maine, Massachusetts, New York, northern Wisconsin
neomexicana Seevers	New Mexico

EGENA Group

egena Casey	Massachusetts, Rhode Island, Pennsylvania, Ontario, North Carolina
exilis Casey	

LOBATA Group

lobata Casey	New York, District of Columbia, Michigan, Indiana, Illinois, Wisconsin, Kansas

AFFINIS Group

affinis Sahlberg	Europe, Maine, New Hampshire, Massachusetts, New York, New Jersey, Pennsylvania, District of Columbia, West Virginia, North Carolina, Tennessee, Kentucky, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, New Mexico, Washington, British Columbia
subpunctata Casey	
lacustris Casey	
dybasi Seevers	Wisconsin, Illinois, Indiana, Missouri, North Carolina
rosskotheni Wüsthoff	Europe

CONICIVENTRIS Group

coniciventris Casey	Maryland, District of Columbia, South Carolina, Tennessee, Kentucky, Indiana, Michigan, Wisconsin, Illinois, Missouri, Kansas
genitiva Casey	
arizonae Seevers	Arizona
barberi Seevers	New Mexico
blatchleyi Seevers	Michigan, Indiana
huachucae Seevers	Arizona
spatulata Seevers	Arizona
manca Erichson	Europe

PULCHELLA Group

pulchella Heer	Europe
antennalis Casey	Massachusetts, New York, North Carolina
chippewa Seevers	Northern Wisconsin, northern Michigan, North Carolina
laurana Casey	Colorado
criddlei Casey	Manitoba
simulans Seevers	Illinois, Maryland
gilvicollis Casey	New York, Pennsylvania, District of Columbia, Virginia, West Virginia, Indiana, Michigan
insolens Casey	Michigan (Isle Royale), Canada
modesta Casey	New Hampshire, New York, Michigan, Indiana, Illinois, Minnesota
stroheckeri Seevers	Indiana, Wisconsin, North Carolina
simpliciformis Seevers	Indiana, Illinois
obsoleta Ganglbauer	Europe

FUSCICOLLIS Group

fuscicollis Casey.....New York, Pennsylvania, District of Columbia, Illinois, Wisconsin
blackwelderi Seevers.....District of Columbia, Virginia, West Virginia, North Carolina, Kentucky, Indiana, Missouri

VITRINA Group

vitrina Casey.....Maine, New York, Pennsylvania, West Virginia, North Carolina, Tennessee, Kentucky, Indiana, Michigan, Ontario, Wisconsin, Illinois
attonsa Casey
indiana Seevers.....Indiana

FROSTI Group

frosti Seevers.....Massachusetts, New Jersey, Indiana

BIHAMATA Group

bihamata Thomson.....Europe
flavicornis Melsheimer.....Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, Tennessee, Kentucky, Indiana, Michigan, Ontario, Wisconsin, Illinois
gaudens Casey.....Wisconsin, Illinois, Indiana, Michigan, Ontario, Pennsylvania, Massachusetts
kansana Seevers.....Kansas, Illinois
longispinosa Seevers.....Kansas, Missouri, Louisiana, Texas
michigana Seevers.....Michigan, Illinois, Wisconsin
uteana Casey.....Utah, Colorado, California, British Columbia
pacifica Casey

STRICTULA Group

strictula Erichson.....Europe
californica Casey.....California, British Columbia, Colorado
gracilis Seevers.....Northern Wisconsin
subnitens Casey.....Maine, New York, Ontario, Michigan, Wisconsin, Manitoba, Minnesota, Illinois, Missouri, Kansas
polita Gravenhorst.....Europe

COMPACTA Group

compacta Casey.....Rhode Island, Indiana, Missouri, Mississippi, Louisiana
micans Casey
gerhardi Seevers.....Illinois, Kansas
obesula Casey.....Pennsylvania

European Species Not Assigned to Groups

lucidula Erichson.....Europe
joyi Wendeler.....Europe
joyioides Wüsthoff.....Europe
nitidula Gyllenhal.....Europe
laevipennis Kraatz.....Europe

Subgenus **Eumicrota** Casey

corruscula Erichson	Massachusetts, New York, New Jersey, Pennsylvania, District of Columbia, Virginia, West Virginia, South Carolina, Georgia, Florida, Alabama, Tennessee, Kentucky, Ohio, Indiana, Michigan, Wisconsin, Illinois, Iowa, Missouri, Kansas, Louisiana, Texas
atoma Casey	Florida, North Carolina, Tennessee, Illinois, Wisconsin, Missouri, Kansas, Nebraska
oligotina Casey	
minutissima Casey	Louisiana, Mississippi, Indiana, Florida
sayi Seevers	Louisiana, Alabama
socia Erichson	Maine, New York, Pennsylvania, Maryland, District of Columbia, Virginia, West Virginia, South Carolina, North Carolina, Florida, Tennessee, Kentucky, Ohio, Indiana, Michigan, Wisconsin, Illinois, Missouri, Kansas, Arkansas, Louisiana, Texas
humeralis Casey	
texanella Casey	
melania Casey	
pallidula Casey	
insolita Notman	
pinalica Casey	Arizona, New Mexico
spinosa Seevers	Arizona

Subgenus **Agaricochara** Kraatz

anomala Notman	Florida, Indiana
apacheana Seevers	New Mexico
hubbardi Seevers	Missouri, Illinois, Michigan, District of Columbia
ojibway Seevers	Northern Wisconsin
simplex Seevers	Indiana
geniculata Mäklin	Alaska
aspera Fauvel	Europe
laevicollis Kraatz	Europe
boleti Linnaeus	Europe
sonorae Seevers	Arizona

Genus **PHANEROTA** Casey

fasciata Say	New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina, Georgia, Florida, Mississippi, Tennessee, Kentucky, Ohio, Indiana, southern Michigan, Illinois, southern Wisconsin, Iowa, Kansas, Missouri, Arkansas, Louisiana
vinula Erichson	
flavocincta Jekel	
ocularis Casey	
angularis Casey	
floridana Casey	
carinata Seevers	Florida, Louisiana, Texas
peninsularis Casey	Lower California
dissimilis Erichson	Pennsylvania, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, Indiana, Michigan, Illinois, Iowa, Missouri, Kansas, Louisiana, Texas

Genus **ENCEPHALUS** Kirby

complicans Kirby	Europe
kraatzi Hochhuth	Europe
americanus Seevers	Montana, Illinois

Genus **BRACHIDA** Mulsant and Rey

exigua Heer.....Europe

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New names in **bold-faced** type