U.S. DEPARTMENT OF AGRICULTURE.
DIVISION OF ENTOMOLOGY.

REVISION

OF THE

APHELIININÆ OF NORTH AMERICA
A SUBFAMILY OF HYMENOPTEROUS PARASITES
OF THE FAMILY CHALCIDIDÆ.

BY
L. O. HOWARD,
ENTOMOLOGIST.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., June 15, 1895.

SIR: I have the honor to submit for publication the first number of the proposed technical series of bulletins, which, on account of their character, are intended especially for working entomologists, learned societies and periodicals, and libraries. The Aphelininae, which are monographically considered in this first number, are insects of great economic importance, since they comprise the most abundant of the parasites of our destructive scale insects.

Respectfully,

L. O. Howard,
Entomologist.

Hon. J. Sterling Morton,
Secretary of Agriculture.
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EXPLANATORY TO THE NEW SERIES.

While the work of the Division of Entomology is entirely carried on with the practical end in view, a certain amount of work of a technical character is constantly being done by different members of the force. The condition of our knowledge of North American insects at the present time is such that many forms which from time to time spring into prominence as destructive species, or as connected with destructive species, either as parasites or predatory enemies, are found to be new to science. They must be classified, described, and given names before they can be intelligently considered in economic publications. The practice which has prevailed to a limited extent of naming and describing new species in practical bulletins and reports is one which has met with much disfavor among systematic workers. Isolated descriptions of new species are in themselves sources of great annoyance to all workers, and when these isolated descriptions are published elsewhere than in scientific journals or the proceedings of scientific societies the annoyance becomes intensified. The force of the Division of Entomology comprises several specialists who are doing descriptive work, and largely upon material accumulated in the course of the regular divisional work. They are doing this work as a necessary supplement to the purely economic output of the Division, and to facilitate the investigations of the entomologists of the State Agricultural Experiment Stations. It becomes important that the results of their labors should be published promptly, and as all available sources of publication in this country, such as the Proceedings of the United States National Museum and the Transactions of the American Entomological Society, are chronically overcrowded with manuscripts, and are not published with any degree of promptitude, it is necessary that they should be issued by this Department.

L. O. H.
THE APHELININÆ OF NORTH AMERICA.

By L. O. Howard.

The minute and structurally interesting species of the chalcidid subfamily Apheleininae have been studied by systematic workers since the founding of the type genus by Dalman in 1820. This author differentiated the species *A. insidiator* and *A. abdominalis* from the older genus *Entedon*, with which they had previously been associated. In 1833 Westwood established the genera *Coccophagus* and *Agonioneurus*, Dalman’s *Aphelinus* having contained species of each. In 1834 Nees von Esenbeck established the genus *Myina*, which corresponded exactly with *Agonioneurus*. In 1839 Walker placed both Westwood’s genera together under *Aphelinus*, but in 1840 separated Westwood’s *Coccophagus*. Foerster, in his *Hymenopterologische Studien*, discarded *Aphelinus* on account of its poor definition and *Agonioneurus* on account of its length, retaining *Myina* of Nees and establishing the family *Myinoidea*, with the genera *Myina*, *Mesidia*, and *Coccophagus*. In 1876 Thomson revived *Aphelinus* and established the tribe *Aphelinina*. In 1878 Foerster, in his *Kleine Monographie parasitischer Hymenopteren*, added the new genera *Encarsia* and *Centrodora*, and referred incidentally to the group as *Coccophagoidae*. In 1880 the writer, following Thomson in the revival of the original genus *Aphelinus*, established the higher group as the subfamily *Aphelininae* and described a number of species in the genera *Aphelinus* and *Coccophagus*. Since then he has described occasional species in these two genera and has erected three new genera, viz, *Ablerus*, *Aspidiotophagus*, and *Prospalta*. In 1851 Haldeman erected the genus *Eriophilus* to contain a single species, *E. mali*, parasitic upon *Schizoneura lanigera*, but, as shown by the writer in 1880, this genus is but a synonym of *Aphelinus*. Haldeman made no effort to determine the affinities of his genus, beyond stating that it belonged to the family *Chalcididae*. In the previous year, however, Haldeman erected another genus, *Eretoecerus*, to contain the single species *E. corni*, which he reared from *Aleyrodes* found upon the leaves of dogwood. This genus, which Haldeman considered to be allied to *Mymar*, is, as I am able to show by the rearing of new species, a true aphelinine. In 1891 Ashmead placed the genus *Eunotus* of Walker in the subfamily *Aphelininae* (Proc. Entom. Soc. Wash., vol. ii, p. 108). Foerster had previously noticed the resemblance of this insect in certain characters to this group, but had removed it to the *Pteromalinae*, evidently on account of...
the number of antennal joints. Later investigations, and particularly the discovery of two new closely allied genera which the writer has described in the Journal of the Linnaean Society of London as *Hertertia* and *Erotolocpsia*, have, however, convinced Mr. Ashmead, as he tells me in conversation, that *Eunotus* must properly be placed with the Pirenine. 1

On the whole, not much attention has been paid to the insects of this subfamily in Europe. This is probably largely due to the fact that almost no attempt has been made to rear the parasites of Coccide. It results, therefore, that the aphelinine fauna of the United States is better known than that of Europe. A number of species were reared in the Department of Agriculture by Professor Comstock when he was engaged upon his study of the scale insects of the United States in 1880, and it fell to the lot of the writer to describe the new forms. Since then others have been reared from time to time and described as indicated above. Mr. Ashmead has also described several forms. Fitch described one which he placed in the genus *Platygaster*; Haldeman, as above stated, described two; Le Baron described one (placing it, by the way, in the proper genus), and the Abbé Provancher has described two, viz, *Coccophagus brunneus* and *C. pallipes*. Unfortunately, however, *C. brunneus* is evidently a tetraastichine, while *C. pallipes* is a *Sympiezis* belonging to the subfamily Eulophinæ.

The Aphelininæ are distinguished from their nearest allies, the Eupelmínæ and Encyrtinæ, by the fact that the mesopleura are divided, the middle legs are not specially developed for saltatory purposes (although the insects jump well), and the first tarsal joint of the middle legs is not incrassate, the antennæ are not more than eight-jointed, and the parapsidal sutures are distinct. The mandibles are small, two to three dentate, the maxillary palpi are three-jointed, and the labial palpi are represented by an elongate tubercle. The antennæ are inserted near the clypeus; the scape is long and slender. The front wings lack the postmarginal vein and the abdomen is broadly sessile. In the yellow species, when mounted in balsam, the curious internal structure which is called by Bugnon in his "Developpement, etc., de l'Encyrtus fuscicollis," the "mesophragma" (and which, from the fact that it seems to originate from the hinder portion of the mesoscutellum, is probably

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1 The host relations of *Eunotus* were not known until *E. luridus* Ashm. was found in a lot of parasites sent me by Mr. W. G. Johnson, of the Illinois State Laboratory of Natural History on May 1, 1895. Mr. Johnson had reared this series from a *Lecanium* on plum, together with many specimens of *Pachyneuron altiscutata* How. The *Eunotus* is probably a primary and the *Pachyneuron* a secondary parasite of the *Lecanium*. This coccid parasitism would apparently strengthen the idea of the aphelinine affinity of *Eunotus*; but it must be remembered that *Tomocera californica* How., a true Pirenine, is the most abundant parasite of *Lecanium* scales in California and Hawaii.
properly identified) is seen to extend far back into the abdomen, much farther than with Bugunio’s Encyrtina.

The insects of this subfamily are all, so far as we know, parasitic either upon the Coccidae, Aleyrodidae, or Aphididae. They are evidently many-brooded, and issue from their hosts indifferently throughout the warmer months of the year, and through the winter in the insectary. With the Aleyrodidae, Aphididae, and the Diaspinae among the Coccidae, but one specimen, apparently, issues from a single host insect. With the larger naked scale insects, however, several parasites may issue from a single host. Sufficient observations have not been made upon the early stages of the Aphelininae. Their larvae feed both upon the body of the scale insect and upon the eggs. They attack both sexes of the host, issuing when full grown through circular holes cut through the body walls, and, in the case of the Diaspinae, through the scale. With the scale insects of the genus Pulvinaria, the aphelinine larvae live within the body of the female and not in the waxy egg mass which she secretes.

Economically, the Aphelininae are by far the most important of the parasites of the Diaspinae. Other scale insects are more abundantly parasitized by other groups, notably the Encyrtinae, but with the Diaspinae it is really difficult to find an affected tree which does not bear scales pierced by the exit holes of some aphelinine. It was with a species of the genus Aphelinus that LeBaron made the first attempt at the transportation of a scale parasite from one region to another in which the parasite was supposed not to occur. As a matter of fact, however, while the numbers of the Diaspinae are undoubtedly frequently reduced to a considerable extent by the work of the members of this subfamily, I have never seen a plant affected by scale insects in which the Coccidae were even approximately exterminated by these insects. The claims which were at one time made in California of the extraordinarily beneficial work of Aspidiotiphagus citrinus upon Aspidiotus aurantii have always seemed to me unjustified, and in this opinion I am supported by the evidence of Mr. D. W. Coquillett, who states that upon personal examination of the orchard in which it was claimed that this parasite had nearly exterminated the scale he found that but a small proportion of the dead scale insects contained the issuing holes of the parasites. The great majority of them seemed to have been killed by some disease.

The larvae of the early generations of the species of the genus Aphelinus, as may be inferred from what I have said in the previous paragraph, feed upon the body of the scale insect, but those of the late generations feed upon the eggs. Confirmatory evidence of the incompleteness of the work of the species of Aphelinus has been gained by the careful examination in the early spring of a large number of scales of Mytilaspis pomorum parasitized by Aphelinus mytilaspidis. Under
the healthy wintering scales of the *Mytilaspis* will be found a varying number of sound eggs, but seldom less than 50, while nearly 100 may be found in a few. Examinations which Mr. Pergande made for me in the early spring of 1895 showed that while some of the specimens of *Aphelinus* had issued from the scales late the previous fall (evidently considerably after the egg laying of the females had been completed), others were present in the full-grown larval condition, ready to transform to pupae. The latter were in the great majority. In no case, however, had all of the scale-insect eggs been devoured, even with those scales from which the parasite had emerged the previous autumn. Under these latter scales from 5 to 11 sound eggs were found, while under the scales containing full-grown parasitic larvae from 2 to 18 sound eggs were found. It seems, therefore, that the work of the last generation of *Aphelinus* is no more effective than that of a ladybird beetle, probably not so much so. These beetles tear open the scales and eat the eggs, but frequently do not eat them all. In the latter case, however, the exposure of the eggs may result in their death, whereas the eggs which are left by the *Aphelinus* will undoubtedly hatch. It is unfortunate that the *Aphelinus* larva is not capable of eating everything in sight in the shape of *Mytilaspis* eggs, but we must take the facts as we find them, and it is plain that the good work of these parasites has been overestimated.

When these insects are properly mounted they are not especially difficult to study. The yellow forms have a delicate exoskeleton, and when mounted dry shrivel to some extent. The face falls in and the thorax becomes distorted. If thrown into alcohol they become discolored. If mounted in balsam they also become more or less discolored. All the yellow forms should be mounted in glycerin in a thin cell of Brunswick black. They should be mounted under a lens, and some care taken to spread the wings, legs, and antennae. Several specimens may be mounted to advantage under a single cover glass. In all cases, however, it is important that a colorational description be drawn up from fresh material, since even with glycerin mounts the colors change to some extent and become more sordid. With the black species, as of *Coccophagus*, the shriveling is not so liable to occur, and the larger species particularly can be studied to advantage from dry mounts on tags. Even so, however, where more than one specimen of a given species is collected or reared, it is very advantageous to mount a portion of the series in glycerin, as above described. Details of structure, aside from sculpture, can be more readily studied from slide mounts.

Twigs and leaves infested with scale insects from which it is expected that these little parasites will issue are preferably placed in small, wide-mouthed jars, the mouth of each jar being wide enough to admit the hand. The mouth of the jar is then covered with thin muslin held
in place by a rubber band, or the glass cover may be placed over the mouth. Careful examination of the sides of the jar with a three-quarter-inch lens will usually enable one to find the parasites after they have emerged. It becomes then a critical question how to get them out of the jar and into a very small vial. This is done by turning the jar on its side with the bottom toward a window. The parasites will immediately jump or fly toward the light, when the cover may be removed and the hand, holding a little vial, inserted. The vial is placed over the parasite, which will immediately give a frantic jump back into it, when the orifice may be closed by the finger and the hand withdrawn from the jar. A little wad of cotton saturated with chloroform is then inserted in the neck of the vial, and as soon as the parasite ceases to move it can be taken out with a delicate brush and mounted, as above indicated.

It is sometimes convenient to use a large vial instead of a wide-mouthed jar for this rearing. In this case, as the hand can not be inserted, it is a more complicated operation to remove the parasites after they have issued. Mr. Pergande accomplishes this in an ingenious way by taking a very small vial and wrapping the outside of its mouth with several thicknesses of paper until it forms a stopper to the larger vial. The combined vials are then held with the small one toward the window, and the parasites will immediately fly into the smaller one, where they may be easily killed and from which they may be removed and mounted. It is fortunate that they have this irresistible impulse to fly toward the light, otherwise it would be most difficult to remove them before mounting.

I have not had an opportunity of examining identified European forms of the subfamily. Twenty-seven species were catalogued by Kirchner, as follows:

**MYINIDÆ** Foerster.

511. **G. Agonioneurus** Westw.

1. abdominalis *Nees*. Deutsch.
5. basalis *Walk*. Eng.
6. dancrula *Foerst*. Aachen.
7. dubius *Foerst*. Aachen.
8. facialis *Foerst*. Aachen.
10. flavus *Nees*. Deutsch.

512. **G. Coccophagus.**

1. insidiator *Dalm*. Deutsch., Wien.
3. scutellaris *Dalm*. Schweden.
53. G. Mesidia Foerst.

1. annulicornis Ritzb. Preussen.
3. flavus Nees. Preussen; (Pallidius Ritzb.,) aus Coccus tilii und aceris. Wien.

The Ratzeburgian species of Coccobius, five in number, are catalogued with the Encyrtinae. I have examined the original descriptions of nearly all of the species listed above, but with little satisfaction. They are invariably insufficient to establish specific identities, although their generic affinities can in many cases be told. Thus, of Kirchner's list, abdominalis Dalman (not Nees), tibialis, asychis, basalis Westwood (not Walker), flavus and proelia belong to Aphelinus; while argiope, moeria, inaron, lycimnia, and iderus belong apparently to Coccophagus. Flavicornis and caripes are probably species of Aphelinus. Of Ratzeburg's species, described under Coccobius, notatus is a Coccophagus, and pallidus is an Aphelinus. The position of the remaining three is doubtful, but I should not be surprised if it were eventually ascertained that annulicornis belongs to Physcus, circumscriptus to Prospalta, and latcus to Ablerus. Mr. Ashmead possesses a pair of specimens from Germany labeled in Foerster's handwriting "Coccophagus xanthostictus Ratz.," which, as a matter of course, are correctly placed generically, and which differ specifically from any of our North American species, resembling most closely C. flavifrons Howard, from California.

As to possible identities between European and American forms, we can only guess at present. It is possible that Aphelinus mali (Halde-
man), the widespread American parasite of Aphididae, will prove to be a synonym of A. basalis Westwood, while Coccophagus lecanii (Fitch) may prove a synonym of C. sentellaris (Dalman), and C. immaculatus Howard may prove identical with C. insidiator (Dalm.). The question can not be satisfactorily settled by existing descriptions. To give an idea of the difficulty surrounding this question we give Dalman's description of C. sentellaris: "Niger, scutelli macula flavo, antennis fuscis;

1Since the above was written I have received a small sending of parasites of Coccidae from Prof. A. Berlese, Scuola Reale di Portici, Italy, in which I have been able to recognize three of the species treated in this revision. These are Aspidioti-
tiphagus citrinus (Craw), which Professor Berlese has reared from a species of Mytilaspis on olive, from an Aspidiotus on Acacia longifolia, and from Diaspis rose on Ribes rubrum; Aphelinus funeipennis How., from an Aspidiotus on Acacia longifolia, and Prospalta aurantium (How.), from Aspidiotus edera, and from Leucaispis pinifolia on Pinus canariensis. It is impossible to say whether these three species are of European or American origin. If European, as is quite likely, I am totally unable to identify them with published European descriptions. For the present, therefore, the American names must hold.
pedibus flavis femoribus posticis nigris; alis immaculatis.” (Kongl. Vetenskaps—Akad. Handlingar, 1825, p. 365.)

An Indian species, *Aphelinus thea* Cameron, has been reared by Mr. E. E. Green, of Pundaloya, Ceylon, from *Aspidiotus thea*, and described by Cameron in the Mem. and Proc. Manchester Lit. and Philosoph. Soc., series 4, vol. iv, p. 183.

HOST RELATIONS OF THE SPECIES HERE TREATED.

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<th>Host</th>
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<td>Eretmocerus corni</td>
<td>Aleyrodes corni</td>
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<tr>
<td>Eretmocerus californicus</td>
<td>Aleyrodes on Quercus agrifolia</td>
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<tr>
<td>Pteroptrix flavimedia</td>
<td>Aleyrodes spp. on Iris</td>
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<tr>
<td>Perissopterus pulchellus</td>
<td>Asterolecanium on basswood</td>
</tr>
<tr>
<td>Perissopterus mexicanus</td>
<td>Ceroplastes sp.</td>
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<tr>
<td>Aphelinus mali</td>
<td>Schizoneura lanigera</td>
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<tr>
<td>Aphelinus mytilaspidis</td>
<td>Mytilaspis pomorum</td>
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<td>Aphelinus abnormis</td>
<td>Mytilaspis pomorum</td>
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<tr>
<td>Aphelinus diaspidis</td>
<td>Diaspis rosae</td>
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<td>Aphelinus fuscipennis</td>
<td>Aspidiotus auranti var. citrinus</td>
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<tr>
<td>Encarsia luteola</td>
<td>Aleyrodes sp.</td>
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<tr>
<td>Encarsia coquillettii</td>
<td>Aleyrodes sp. on Sonchus</td>
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<tr>
<td>Encarsia angelica</td>
<td>Aleyrodes sp. on willow</td>
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<tr>
<td>Aspidiotiphagus citrinus</td>
<td>Aspidiotus auranti var. citrinus</td>
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<tr>
<td>Coceophagus lecanii</td>
<td>Lecanium quercirinis</td>
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</tbody>
</table>

Pulvinaria innumerabilis
Lecanium pruinosum.
Parasite.  

Coccophagus lecanii .......... Lecanium persicae.
Coccophagus fraternus ...... Lecanium persicae.
Coccophagus cognatus ...... Lecanium hesperidium.
Coccophagus immaculatus ... Eriococcus azaleae.
Coccophagus flavifrons ...... Lecanium sp. on Pinus australis.
Coccophagus flavosentellum .. Lecanium persicae.
Coccophagus californicus ... Icerya purchasi.
Coccophagus immaculatus ... Aspidiotus aurantii.
Coccophagus sectatus ......... Kermes sp. on Quercus agrifolia.
Coccophagus ochraceus ...... Lecanium sp. on Adenostoma fasciculatum.
Prospalta urtfdiitii .......... Aspidiotus uvae.
Prospalta aurantii .......... Aspidiotus aurantii var. citrinus.
Prospalta aurantii .......... Aspidiotus uncylns.
Prospalta aurantii .......... Aspidiotus pini.
Prospalta aurantii .......... Aspidiotus juglans-regiae.
Prospalta aurantii .......... Mytilaspis citricola.
Prospalta aurantii .......... Mytilaspis albus var. concolor.
Prospalta aurantii .......... Mytilaspis eucalypti.
Prospalta aurantii .......... Lecanium persicae.
Prospalta aurantii .......... Chionaspis sp. on undetermined food plant.
Ablcrus cliiioccampe ......... Chionaspis furfurbs.
Ablcrus cliiioccampe ......... Aspidiotus sp. on pear and apple.
Physcus varicornis .......... Aspidiotus uncylns.
Physcus varicornis .......... Chionaspis quercns.
Physcus varicornis .......... Chionaspis americana Johnson MS.

LIST OF HOSTS AND PARASITES.

Family Aphididae.  

Hosts.  

Aphis brassica .......................... Aphelinus mali.
Aphis monarca .......................... Aphelinus mali.
Siphonophora rose ........................ Aphelinus mali.
Glyphina eragrostidis ................. Aphelinus mali.
Pemphigus fraxinifolii ................. Aphelinus mali.
Schizoneura lanigera ................. Aphelinus mali.

Family Coccide.

Parasites.

Aspidiotus uncylns .................. Prospalta aurantii.
Aspidiotus uncylns .................. Physcus varicornis.
<table>
<thead>
<tr>
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<th>Parasites</th>
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<tr>
<td>Aspidiotus aurantii, var. citrinus</td>
<td>Aspidiotiphagus citrinus.</td>
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<td>Aspidiotus pini</td>
<td>Coccophagus hamulatus.</td>
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<td>Aspidiotus ticius</td>
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<td>Prospalta murtfeldti.</td>
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<td>Encarsia coquillettii.</td>
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<td>Aspidiotus sp. on pear and apple</td>
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<td>Aphelinus abnormis.</td>
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<td>Lecanium tulipifera</td>
<td>Coccophagus flavoscentellum.</td>
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<tr>
<td>Lecanium sp. on Arctostaphylos</td>
<td>Coccophagus flavoscentellum.</td>
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<tr>
<td>Lecanium sp. on Adenostoma</td>
<td>Coccophagus flavoscentellum.</td>
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<tr>
<td>Lecanium sp. on Arctostaphylos</td>
<td>Coccophagus flavoscentellum.</td>
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<tr>
<td>Lecanium sp. on plum</td>
<td>Coccophagus flavoscentellum.</td>
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<tr>
<td>Lecanium sp. on Plinns australis</td>
<td>Coccophagus flavoscentellum.</td>
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<tr>
<td>Lecanium spp. from California</td>
<td>Coccophagus flavoscentellum.</td>
</tr>
<tr>
<td>Asterolecanium on basswood</td>
<td>Perissopterus pulchellus.</td>
</tr>
<tr>
<td>Pulvinaria innumerabilis</td>
<td>Coccophagus lecanii.</td>
</tr>
<tr>
<td>Pulvinaria sp. on Sullengia</td>
<td>Coccophagus flavoscentellum.</td>
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</tbody>
</table>
Hosts.

Pulvinaria sp. on plum ........................................... Coccophagus flavoscutellum.
Pseudococcus aceris .............................................. Coccophagus lecanii.
Pseudococcus yuccae ............................................ Perissopterus mexicanus.
Prosopophora on cottonwood .................................. Perissopterus pulchellus.
Eriococcus azaleae ................................................ Coccophagus immaculatus.
Ceroplastes sp. ..................................................... Perissopterus mexicanus.
Dactylopis destructor ........................................... Coccophagus flavoscutellum.
Icerya purchasi ..................................................... Coccophagus californicus.
Kermes sp. on Quercus agrifolia ............................... Coccophagus scutatus.

Parasites.

Family ALEYRODIDAE.

Aleyrodes corni .................................................. Eretmocerus corni.
Aleyrodes Iris .................................................... Pteroptrix flavimedia.
- Iris achsea ....................................................... Pteroptrix flavimedia.
- Sonchus ............................................................ Pteroptrix flavimedia.
- Willow ............................................................... Pteroptrix flavimedia.
- Sambucus ........................................................... Pteroptrix flavimedia.
- Aquilegia ............................................................. Pteroptrix flavimedia.
- Quercus agrifolia ................................................ Eretmocerus californicus.
- Willow ............................................................... Encarsia angelica.
Aleyrodes sp ....................................................... Encarsia luteola.

ANALYSIS OF THE GENERA.

Tarsi 4-jointed.
Male antennae 3-jointed; female antennae 5-jointed .......................... Eretmocerus
Antennae of both sexes 8-jointed ........................................... Pteroptrix

Tarsi 5-jointed.
Anterior wings with a hairless line extending obliquely and transversely to base of wing.
Three antennal joints before the club of equal length ....................... Mesidia
Three antennal joints before the club of unequal length.
Ovipositor exserted to from one-fifth to one-third length of abdomen.
Notal sclerites normal, wings hyaline ...................................... Centrodora
Mesopostscutellum acutely triangular; forewings with an irregular pattern of rather broad dark lines .......................... Perissopterus
Ovipositor not at all, or but slightly exserted .......................... Aphelinus

Anterior wings without oblique transverse hairless line.
Male antennae 4-jointed (one ring joint); female antennae 6-jointed (3 ring joints) ................................................. Plastocharis
Antennae of both sexes 8-jointed.
Club apparently 2-jointed ............................................... Encarsia
Club 3-jointed.
Stigmal vein lacking; wings with very long fringe .......... Aspidiotiphagus
Stigmal vein present; marginal cilia short.
Marginal vein as long as or longer than submarginal ........................ Coccophagus
Marginal vein much shorter than submarginal ........................ Prospalta
Antennae 7-jointed.
Club composed of but one joint; ovipositor extruded to half length of abdomen .................................................. Iblerus
Club 2-jointed; ovipositor scarcely extruded .............................. Physcus
Genus ERETMOCERUS Haldeman.


This genus, which Haldeman did not place, was put by Cresson, in his Synopsis, in the Mymarinaæ, which subfamily was located with the Proctotrypidaæ. The reason for this placing was probably the fact that Haldeman placed the genus Amitus, described immediately before Eretmocerus, in the Mymarinaæ. Mr. Ashmead, in his monograph of the Proctotrypidaæ, places Amitus in the proctotrypid subfamily Platygastrinaæ, and in making the necessary studies upon this genus, recognized the aphelinine affinities of Eretmocerus, the antennæ figured by Haldeman resembling very considerably the antennæ of the genus Plastocharis Förster. In studying a series of parasites reared by Mr. Coquillett in California from Aleyrodes, I have been delighted to recog-

![Eretmocerus californicus](image-url)

Fig. 1.—Eretmocerus californicus Howard: female, showing side view of genitalia below—greatly enlarged (original).

nize a form which belongs, with little doubt, to Eretmocerus. Haldeman described the genus only from two mutilated specimens reared from Aleyrodes corni, and which he states were "imperfectly examined." Among Mr. Coquillett's specimens were fortunately many males, so that I am able to redescribe the genus in full. The differences between the form which I have studied and Haldeman's description are as follows:

Haldeman states that the tarsi are "apparently pentamerous," eyes hairy, and antennal club ear-shaped (whence the generic name).

In the form which I have studied, the tarsi are 4-jointed (a discrepancy owing, no doubt, to the fact that I have been able to see them clearly under a high power), the eyes are not hairy, and the antennal
club is subellipsoidal. The two latter differences, then, are specific simply, and the first is apparently founded upon imperfect observation on the part of Haldeman.

The generic characters are plainly brought out in the figures. Especial attention is drawn to the fact that the marginal vein is about equal to the stigmal in length. The apical cilia of the forewings are short; the lower border of the mesoscutal parapsides is strongly curved, the male genitalia are, in most specimens, strongly exerted, and the penis is not perceptibly notched. The female genitalia are not produced beyond the tip of the abdomen. The male antennae are 3-jointed, lacking all trace of the two ring joints seen in the female. The club is very long, twice as long as that of the female, subcylindrical, rounded at tip, and furnished with many long sensory spots. The mandibles are 3-dentate.

ANALYSIS OF THE SPECIES OF ERETMOCERUS.

Eyes hairy, antennal club of female oar shaped..........................corni
Eyes naked, antennal club of female ellipsoidal..........................californicus

Eretmocerus corni Haldeman (fig. 2).


Haldeman's original description included both generic and specific characters confused together. The species has not been found since, and we can only quote his words:

"Two mutilated specimens of another species of parasite were raised with the preceding and imperfectly examined. The color is pale flavous; the wings have a subcostal nerve not quite straight, ending in a short stigmal branch about the middle, the wings in all other respects as in _Ami-\textit{tus}; feet slender and apparently pentamous; eyes black, covered with numerous short erect bristles, more distinct than in _Chelonus_; head, thorax, and abdomen closely united, thorax large, abdomen with sides parallel and the apex obtusely rounded; in one specimen (♂ ?) the abdomen seems but half the width of the thorax, and in the other its sides form straight lines with it; antennae (see annexed figure) 5-articulate, shorter than the body, scapus narrowed toward its apex, second articulation obconic, third and fourth very short, fifth oar-shaped (whence the generic name), longer than all the preceding united, widened toward the apex, which is obtusely rounded. It may possibly be parasitic in the larva of the _Ami-\textit{tus}_ described above, as it is somewhat less in size. I propose to name the genus _Eretmo-\textit{cerus}, and the species _E. corni._"

Eretmocerus californicus n. sp. (figs. 1 and 3).

_Female (fig. 1)._—Length, 0.8 mm.; expance, 1.5 mm.; greatest width of fore-wing, 0.23 mm. Antennal scape short, inserted just above
border of mouth. Flagellum a little longer than width of head. Pedicel large, triangular, followed by two ring joints and a long, stout, ellipsoidal club. General color uniform pale yellow; eyes black; ocelli coral red; wing veins nearly hyaline. Ovipositor scarcely visible from above.

Male (fig. 3).—Differs from female mainly in structure of antenna. Scape subjointed, ring joints are absent, and club is very long and as stout as pedicel. Club is flexible and is usually bent downward, the bend occurring a little below the middle; it is a little longer than head and thorax together. The genitalia are strongly exserted, the intromittent organ pointed at tip, and resembling an ovipositor.

Genus PTEROPTRIX Westwood.


It is a pleasure to restore Westwood's _Pteroptrix_ to the group with which he originally considered it to be affiliated. In his original description his opening statement is that it is near _Agonioneurus_ (Aphelinus). The 4-jointed tarsi of this insect have, however, misled other writers. Foerster, largely on this account, placed it in the Tetrastichinae, but showed that it differed from the majority of these forms in the lack of the furrows of the scutellum, and suggested its

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Fig. 3.—_Eremocerus californicus_ Howard: male, showing genitalia below, wing venation and front view of head at left—greatly enlarged (original).

Described from many male and female specimens reared in June and October from an undescribed _Aleyrodes_ on _Quercus agrifolia_ at Los Angeles, Cal., by Mr. D. W. Coquillett.
affinity with the Trichogramminiæ. He seems, however, to have had another and true tetrastichine form before him which he considered identical with Pteroptrix. In his Nachtrag he changes the name Pteroptrix (which, by the way, he spells Pterothrix, as amended by Nees) to Gyrolasia, on account of the preoccupation of the former name by a genus of composite plants. On account of the probability that he had before him a true tetrastichine, we can retain the genus Gyrolasia in the Tetrastichinæ, and since we have what is, with little doubt, Westwood's form, which, upon close study, proves to be an aphelinine in spite of its 4-jointed tarsi, Westwood's original name may be revived under its original form, Foerster's reasons for changing the name being insufficient. The doctrine that "once a synonym always a synonym" will hardly hold here, if we are correct in our supposition that Foerster had a different form before him.

The main characters by which the genus may be distinguished are as follows:

Antennæ 8-jointed, pedicel broad and very short, joints 1 and 2 of flagellum very short and narrow, as in Aphelinus, third, fourth, fifth, and sixth joints forming the club, third sometimes distinct from the club. Mesoscutar parapsides short, reaching only to tegula; scutellum transversely elliptical; marginal vein of forewings long, much longer than stigmal. Wings with rather long marginal cilia. Abdomen rounded, perfectly sessile; middle tibial spurs short; tarsi 4-jointed; first, second, and third joints subequal in length, fourth joint considerably longer. This last is an unusual character and would indicate the possible coalescence of the normal fourth and fifth joints.

Pteroptrix flavimedia (Howard) (fig. 4).   


Male and female.—Length, 0.7 mm.; expanse, 1.9 mm.; greatest width of fore wing, 0.32 mm. Antennæ short, sparsely covered with short hairs; scape slender; pedicel broader, twice as long as broad; funicle 3-jointed, joint 1 very minute (a true ring joint), joint 2 nar-

![Figure 4](image-url)
rower than pedicel, broader than long, considerably larger than joint 1. Joint 3 longer than 1 and 2 together and broader than long. Club very broad at base, 3-jointed, acuminated at tip, broadest portion near end of first joint. Joint 3 longest, joint 1 next, joint 2 shortest. Head with sparse but very noticeable stout hairs. Eyes naked. General color deep black, with slight metallic reflections on dorsum of thorax. Second abdominal segment yellow, but when abdomen is bent upward or shrunk this color is hidden. Antennal scape black; remaining joints yellowish brown; tarsi yellowish; last joint dark brown or black. Femora and tibiae dark brown, except front tibiae, which are lighter. Entire abdomen sometimes light brown, particularly with male, the venter being lighter than dorsum. Mouth-parts honey yellow or light brown, with a honey-yellow band on prosternum at insertion of front coxae. Wing veins black, very distinct, forewings with a large dusky patch below submarginal vein.

Described from many male and female specimens. Types were reared in this office from specimens of *Aleyrodes* collected by Professor Comstock on *Iris* at Los Angeles, Cal., and from an *Aleyrodes* on *Fuchsia* collected in the same locality by Alex. Craw in 1879. A large series of the same species was also bred by Mr. Coquillett eight years later at Los Angeles, Cal., from the same *Aleyrodes* on *Fuchsia* (October 4); from an *Aleyrodes* on *Sonchus* (September 16-21); and from another species of the same genus on willow (September 17), as well as from an *Aleyrodes* on *Sambucus* (October 21). Another series of nine specimens was reared by Mr. T. D. A. Cockerell from *Aleyrodes* on *Aquilegia* at Las Cruces, N. Mex., November 20, 1894; and a single male of what may be the same species was also reared by Mr. Cockerell from an *Aleyrodes* at Kingston, Jamaica.

**Genus MESIDIA Foerster.**


This genus is unknown to me. A very brief characterization, however, which Foerster gives distinguishes it well from all other genera. The forewings have the oblique hairless line, and the three joints before the club of the antennae are of equal length. It is said to be intermediate in its characters between *Coccophagus* and *Aphelinus*.

**Genus CENTRODORA Foerster.**


This genus is also unknown to me. The head is as broad as the thorax, the antennae 6-jointed, scape of male broad; with the female the pedicel is of the usual form, with two ring joints following, of which the first is smaller than the second. The third funicle joint is somewhat longer than the pedicel, and the fourth is very long, but not as
long as the others together. The parapsidal sutures of the mesoscutellum are plain; the mesoscutellum and the mesoscutum are large, the abdomen is as long as the head and thorax, and the ovipositor extrudes about one-third the length of the abdomen; the middle tibia with a long spur, the front femora of the male strongly thickened. The wings are longer than the abdomen, and narrow. The marginal vein is as long as the submarginal and reaches the middle of the wings. The stigmal is short; the hind-wings only have long apical cilia.

PERISSOPTERUS new genus.


Antennae apparently 6-jointed, inserted below middle of face; scape not long, swollen toward tip; pedicel one-third length of scape; funicle joints 1 and 2 very small, almost like ring joints; funicle joint 3 as long as pedicel, broadening toward tip and forming with club a broad-ovate mass; club undivided, about twice as long as funicle joint 3. Face excavated, vertex wide, ocelli at angles of nearly right-angled triangle. Mesoscutal parapsides narrow, very oblique; mesoscutellum broad, rounded at tip; mesopostscutellum and metascutum plainly divided transversely into three sclerites, the central one of each triangular, its rather sharp point directed posteriorly. Forewings with a narrow, oblique, hairless streak, and ornamented with an irregular pattern of rather broad, dark lines, composed of stout black cilia with granular dark dots between; the cells and spaces between these dark lines silver-white and bearing smaller and more delicate white discal cilia; submarginal and marginal veins subequal in length; stigmal given off at about half the wing length, very short and stout; marginal cilia moderate. Hind wings rather broad, rounded at tip, hyaline. Abdomen very concave above in dry specimens, perfectly sessile, rounded at tip; ovipositor extruded for about one-fifth length of abdomen.

This remarkable and handsome genus approaches Aphelinus in the structure of its antennae and Centrodora in its extruded ovipositor. Its middle tibial spur is stronger than is common among the Apheli-
nine, and its extraordinary wing markings, as well as the peculiar formation of the notal sclerites behind the mesoscutellum distinguish it widely from hitherto described genera. The type described by the writer as Aphelinus pulchellus in the Annual report of the Department of Agriculture for 1880 is known from a single female specimen only, which was reared from a common Asterolecanium on linden in the District of Columbia. Upon this single specimen I did not care to erect a new genus. Recently, however, several specimens of an allied though congeneric species have been reared from Coccidae sent in by Mr. C. H. Tyler Townsend from Guadalajara, Mexico. One specimen he reared himself some three years ago from a Ceroplastes, another specimen we have reared from Pseudococcus yuccae collected by Mr. Townsend on Pelargonium at Agnas Calientes, Mexico, and three other specimens have been reared from specimens of Lecanium hesperidum collected by Mr. Townsend on lime at San Luis, Mexico.

**Analysis of the species of Perissopterus.**

General color white, tinged in spots with dark, reddish orange, dotted with black.............................................*pulchellus*

General color light orange-yellow, dotted with black, no admixture of reddish or white.............................................*mexicanus*

(The specific differences between the two species in the wings, as shown in the figure, will enable the readiest recognition of the species.)

**Perissopterus pulchellus** (Howard) (figs. 5a and 6).


*Female.*—Length, 1 mm.; expanse, 2.2 mm.; greatest width of fore-wings, 0.41 mm. (For some unexplained reason the measurements given in the original description are erroneous. Those just given were taken recently from the type.) Head and thorax quite uniformly but finely punctate; mesoscutellum more coarsely than other parts. Head and thorax white, tinged in spots with orange, except at sides of metathorax, which are blackish; propleura white; mesopleura blackish; mesosternum brown; eyes bluish white; antennal scape white, with a longitudinal narrow black stripe below; pedicel white, with a black stripe below, dark brown at base above. Joints 1 and 2 of funicle dark brown; joint 3 white, with a dark brown patch at base and above. Club with basal two-thirds dark brown, yellow at tip; two large brown spots on lower side of cheeks; face and vertex white; hairs on vertex brown, ocelli reddish. All legs white; femora spotted with black, tibiae banded with black. Hind coxae dusky, middle and fore coxae white; each tibia with three equidistant black bands. First, second, and fifth tarsal joints black; third and fourth yellowish; middle tibial spur jet black. Abdomen yellowish, brown above, darker in middle, sometimes black; sides white, with irregular subcircular black markings; ovipositor black; wings hyaline, with an irregular pattern of open net-
work in fuscous; cilia upon fuscous portion very strong and black, on the remainder small and white. The pattern of the network of the type specimen is shown in fig. 5 a, but it varies considerably, as is shown by recently reared additional specimens. The clear oblique line is narrow and perfectly straight; the hind-wings entirely hyaline.

_Male._—Smaller than the female, which it otherwise closely resembles. The general color is darker and the black markings are broader. The penis is long; the abdomen of one specimen is entirely black above and of another yellowish, with black transverse bands at joints.

Originally described from one female specimen reared from Prospophora on linden in the District of Columbia in 1879. Four additional specimens, two females and two males, were reared in April, 1895, from the same host insect. Other specimens have been reared from Chionaspis pinifolii received from Providence, R. I., and from a Prospophora on cottonwood from East Atchison, Mo., sent in by Mr. W. S. Connor, while a single specimen has been reared by Mr. W. G. Johnson, at Champaign, Ill., from a species of Aspidiotus on currant, and is now in the collection of the Illinois State Laboratory of Natural History. All the specimens vary somewhat in wing markings, but the general pattern remains the same as that shown at fig. 5 a.

**Perissopterus mexicanus n. sp.** (fig. 5 b).

_Female._—Length, 0.84 mm.; expanse, 2.3 mm.; greatest breadth of fore-wing, 0.41 mm. Head and thorax closely and finely punctate; eyes smooth; dorsal surface of abdomen faintly shagreened; wing markings of type shown in figure. General color light orange-yellow, without the strong reddish hue and admixture of white seen in pulchellus. Pronotum, tegulae, postscutellum, metascutum, under side of abdomen and
pleura, whitish; mouth-parts also whitish. Antennal scape silvery white, with two oblique black stripes below. Pedicel black at base, the black extending farther forward on the upper side; otherwise silvery white. Ring joints black, third funicle joint concolorous with pedicel; club black at base and tip, with an orange stripe around the middle. All legs white, all femora with four black bands, all tibiae with three black bands, tibial spurs black. First and second dorsal segments of abdomen blackish, third and fourth yellow, fifth black. Mesoscutum and scutellum with many black dots; those on the scutellum number eight, arranged in two transverse rows; those in the anterior row far apart, and those in the posterior row close together. The two interior spots in the first row and the two outer spots in the second row are piliferous. Dorsum of abdomen black; ovipositor black.

Male.—Closely resembles female, differing only in the genitalia and the smaller size.

Described from three females and two males reared from *Lecanion hesperidum*, *Pseudococcus yuccae*, and *Ceroplastes sp.* Guadalajara, Mexico: C. H. Tyler Townsend.

Genus APHELINUS Dalman.

*Fig. 7.—Aphelinus diaspidis* Howard—greatly enlarged (from Insect Life).

*Myina* Nees. Hymenopterorum Ichneumonibus Affinitum, 1834.

In this old and well-known genus the oblique hairless line of the front wings is very distinct. The ovipositor is very slightly extruded, or is entirely hidden. The fringed apical cilia of the fore-wings is very short; the body is robust, eyes naked in the yellow species and hairy
in the black species. The posterior border of the mesoscutellum is rounded and the anterior border is bounded by three straight lines. The antennæ are 6-jointed, scape long and slender, pedicel normal, joints 1 and 2 of the funicle very short, joint 3 about as long as or a little longer than the pedicel, club compact, not jointed, subellipsoidal. The middle tibial spur is very pronounced, mesocentral parapsides rather small, marginal vein very long, longer than submarginal; stigmal and postmarginal short.

**ANALYSIS OF THE SPECIES OF APHELINUS.**

Eyes hairy; general color black; pedicel twice as long as thick.

- Head jet black ........................................... **mali**
- Head bright orange ........................................ **flaviceps**

Eyes naked; general color yellow; pedicel one and one-half times as long as thick.

- Club twice as long as penultimate joint .................. **mytilaspidis**
- Club thrice as long as penultimate joint.  
  Scutellum pointed at base .................................. **abnormis**
  Scutellum normal.  
  Forewings with only a faint cloud beneath stigma .......... **diaspidis**
  Forewings with a distinct fusous cloud occupying the whole discal region and accented below stigmal and at its proximal border. **fuscipennis**

**Aphelinus mali** (Haldeman).


**Female.**—Length, 1.2 mm.; expanse, 2.3 mm.; greatest width of forewing, 0.11 mm. Pedicel twice as long as thick; club nearly three times as long as penultimate joint; head and thorax smooth, shining; mesoscutum with sparse, irregularly placed, and fine punctures; mesocutellum very faintly shagreened; abdomen perfectly smooth; mesopleura at tip faintly shagreened, smooth at base; hind coxae also faintly shagreened; eyes plainly hairy; vertex with rather dense black pile; sparse hairs of thorax black; abdomen ovate, as wide as thorax, concave above. Discal cilia of forewings proximally bordering hairless streak much longer and stouter than those on distal side of streak. Of these proximal cilia there are only two or three irregular rows, the remainder of base of wing being hairless, except immediately below marginal vein, and excepting also the normal bristles arising from the submarginal. General color black, not metallic; base of abdomen, and sometimes apex, yellow-brown; antennæ honey yellow. Front and middle femora and middle and hind tibiae, dark brown, lighter at extremities; front tibiae slightly dusky at base, but in general sordid yellow. Hind femora pale sordid yellow; all tarsi light; wings hyaline; submarginal vein dark brown, marginal much lighter.

**Male.**—Similar to female, slightly smaller; abdomen acuminate. Proximal cilia bordering hairless streak of fore-wings, consisting of a single row for a greater part of the wing width.
Redescribed from thirty-one male and female specimens reared by the writer from Schizoneura lanigera, at Washington, D. C., February 15 and September 20, 1879 (previously reared from the same species by Haldeman in Pennsylvania, Walsh in Illinois, and Riley in Missouri); by F. M. Webster from Glyphina eragrostidis, at La Fayette, Ind., September 6–10, 1885; by the same observer from Aphis brassicae, on turnip; by T. A. Williams, at Lincoln, Neb., from Pemphigus fraxinifolii, June 10, 1890; and by the same observer from Aphis monarda at Ashland, Nebr., May 24, 1890. Mr. Ashmead's specimens, which he described under the name of Blastothrix rosea, were reared from Siphonophora rosea in April, 1881, at Jacksonville, Fla.

Aphelinus flaviceps n. sp.

Male.—Belongs to the same group as A. mali, which it resembles in the proportions of the antennal joints and in the hairy eyes. It is a species of the same general size, and differs from A. mali in the following particulars: The pile of the head is much less conspicuous, and is yellowish instead of black; the mesoscutum is more or less thickly punctate, the punctures being arranged in rows; the mesoscutellum is more coarsely, though still finely, shagreened; mesopleura plainly shagreened over entire surface, not smooth on basal half; hind coxae granulate. Entire thorax black; entire head uniform orange-yellow, except occiput, which has a dark transverse streak. Abdomen dark in the middle above; for the rest concolorous with head. All legs and antennae uniform orange-yellow. Wings hyaline, veins light, the cilia at proximal border of hairless streak larger than those at apical border (more than twice as long and much stouter); they are irregularly placed, and on the lower half of the wing form approximately two rows.

Described from one male specimen collected in the Santa Cruz Mountains, California, by A. Koebeler, in May. Probably parasitic on some Aphidid.

Aphelinus mytilaspidis Le Baron.


Female.—Length, 0.64 mm.; expanse, 1.28 mm.; greatest width of fore-wing, 0.22. Eyes naked; pedicel of antenna one and a half times as long as thick, club twice as long as penultimate joint; thorax smooth, impunctate; abdomen ovate, as wide as thorax. Cilia at proximal border of hairless streak of forewings larger than those at apical border, but hardly twice as long. There are at least seven irregular rows, and they extend back nearly to base of wing, with slight interruption at two-thirds distance from tegula to hind border of hairless streak. General color bright lemon-yellow; scape of pedicel and sometimes funicle joints 1 and 2 of antennae dusky; eyes blackish, ocelli carmine, mandibles brown, all legs yellow, wing veins bright yellow; wings perfectly hyaline.
Male.—Similar to female, slightly smaller; antennal club somewhat truncate at tip.

Described from many male and female specimens, mostly reared at the Department of Agriculture in 1879 and 1880. The species was reared by Le Baron from *Mytilaspis pomorum* Bouc'hé, in Illinois; by Riley from the same species in Missouri; and it is probably the species which caused the round holes observed in this scale by Dr. Fitch in New York. At the Department of Agriculture it has been reared from *Mytilaspis pomorum* from Illinois and the District of Columbia; from *Chionaspis pinifolii* (District of Columbia), and from the same species by Riley in Missouri; and from *Diaspis carueli* Targioni on juniper.

**Aphelinus abnormis** Howard.


Female.—Length, 0.55 mm.; expanse, 1.4 mm.; greatest width of fore-wing, 0.23 mm. General proportions as with *A. mytilaspidis*, from which it differs only in the following respects: The scutellum is pointed anteriorly, seemingly entering a reentering angle on the base of mesoscutum; antennal club three times as long as penultimate joint; color, light lemon-yellow, lighter than the preceding species; antennae dusky; legs with yellowish femora and dusky tibiae and tarsi; wings perfectly clear; veins transparent.

Described from one female specimen reared from *Mytilaspis pomorum* on *Salix caprea*, District of Columbia. No other specimen of this peculiar form has ever been found. There is a possibility that it may be simply a dwarfed and distorted specimen of *A. mytilaspidis.*

**Aphelinus diaspidis** Howard (fig. 7).


Female.—Length, 0.78 mm.; expanse, 1.9 mm.; greatest width of fore-wing, 0.27 mm. Differs at once from *A. abnormis* in the normal character of the scutellum and from *A. mytilaspidis* in the fact that the club is three times as long as the penultimate joint, instead of twice as long. It further differs from *A. mytilaspidis* in the following particulars: The entire space proximad of hairless line of forewing is densely ciliated, the cilia but slightly larger than those distad of this line. At the abrupt upward bend of the submarginal into the marginal a triangular clear space occurs, the distal side of which is curved, the apex touching the beginning of the marginal vein. The forewings have a delicate fuscous patch bending outward from below the stigma and covering the entire disk from that point back to the triangular clear space. The incision between the penultimate joint of the antennae and the club is not well marked, joint 5 apparently forming part of the club. Color dull, rather dark yellow; eyes black, ocelli very dark red, antennae dusky, darker at tip; a narrow dark transverse line on the occiput
behind the eyes. Femora and tibiae fuscous; tarsi nearly white; wing veins fuscous. Abdominal segments 1 to 5 each with a dusky transverse dorsal band interrupted toward the middle; abdomen subovate, somewhat truncate at tip; ovipositor slightly exserted.

**Male.**—Unknown.

Described from twelve female specimens reared from *Diaspis rosa* from Fort George, Fla., and the same species collected at Santa Barbara, Cal., and from the same species collected in the District of Columbia. All specimens were reared in February. Professor Riley reared nine females from a *Mytilaspis* on an orchid, an undetermined species of *Dycaste* from Japan, received February 6, 1874, from Mr. George Thurber, of The American Agriculturist.

*Aphelinus fuscipennis* Howard.


**Female.**—Length, 0.6 mm.; expanse, 1.3 mm.; greatest width of fore-wing, 0.2 mm. Closely resembles *A. diapсидis*, the differences, aside from its smaller size and the more pronounced infuscation of the wing, being purely colorational. General color, dull honey yellow; antennae fuscous, almost black at tip; eyes blackish; ocelli dark crimson; a distinct transverse black band on the occiput behind the eyes; the scutellum dusky at tip; abdomen with five dusky lateral transverse bands; legs and wing veins honey yellow; fore-wings with an indefinite fuscous patch below stigma and another well-defined, darker, somewhat crescent-shaped streak near the base, bounded by the basal clear space.

**Male.**—Closely resembles the female, but is slenderer and in general darker in color.

Described from many female specimens and comparatively few males, reared from *Aspidiotus perniciosus* at San Jose, Cal.; Los Angeles, Cal.; San Francisco, Cal.; New Brunswick, N. J., and Riverside, Md.; from *Chionaspis euonymi* from Fort George, Fla.; from *Mytilaspis gloveri* in hothouses in the District of Columbia, and from *Mytilaspis pomorum* on horse-chestnut in the District of Columbia. Professor Berlese has reared this species in Italy from an *Aspidiotus* on *Acacia longifolia*.

**Genus PLASTOCHARIS** Foerster.

*Plastocharis* Foerster. Hymenopterologische Studien, Heft. 11, 145, 1856.

*Tryphasius* Foerster. Loc. cit., 83.


The best description of this genus is given by Foerster in his Kleine Monographien, page 68. It is not known to occur in this country. The male antennae have one ring joint and a very long flagellar club. The female antennae have three ring joints and a shorter club. The middle tibiae have a long spur and the tarsi are 5-jointed. The base of
the wing is hairless, and the oblique line is therefore lacking. The forewings on their last third have a very long fringe of hairs, their length not equaling the wing breadth. Basal half of forewing brownish. Hind-wings with very long marginal cilia, extending around upon the fore margin nearly to the vein; ovipositor is not extruded (fig. 8).

**Genus ENCARSIA Foerster.**

*Encarsia* Foerster, Kleine Monographien, 1878, pp. 65, 66.

The characters briefly given by Foerster include the following:

Head not so broad as the thorax; side of the ocelli about as far from the middle of the ocellus as from the border of the compound eyes. Antennae 8-jointed, flagellar joints of equal length and cylindrical, last two closely joined. Mesoscutum broad, with sharp parapsidal furrows, scutellum very strongly developed, broad, almost semicircular. The abdomen as long but not as broad as the thorax and broadly oval pointed. Tarsi 5-jointed. The thickly ciliated wing has the submarginal not much longer than the marginal, the postmarginal wanting, and the stigmal very short and forming a considerable angle with the costa. The hairless line is wanting; the hind border of the hind-wings with long cilia.

But one European species, *E. tricolor*, is known.

**Analysis of the Species of Encarsia.**

First funicle joint not swollen.

- Pedicel one-third longer than first funicle joint; joint 2 considerably longer than joint 1 ......................................................... *bicola*
- Pedicel considerably shorter than first funicle joint; joint 2 equal in length to joint 1 .......................................................... *coquilletti*

First funicle joint somewhat swollen, longer and broader than pedicel, and broader and slightly stouter than second funicle joint .......................... *angelica*
Encarsia luteola n. sp.

Female.—Length, 0.63 mm.; expanse, 1.3 mm.; greatest width of fore-wing, 0.19 mm. Pedicel stout, two-thirds as broad as long, and about one-third longer than first funicle joint. Joint 2 of funicle one-third longer than joint 1; joint 3 twice as long as joint 1; joints 4 and 5 as long as 3; terminal joint a trifle longer; all joints well separated, subcylindrical, increasing very slightly in width to club. Thorax without perceptible sculpture. Eyes dark, ocelli coral red, wings perfectly hyaline, general color yellowish. Vertex with black transverse line between the eyes. Upper portion of head somewhat orange, face lighter. Dorsum of thorax dark orange, becoming somewhat dusky at sides, particularly at insertion of wings; abdomen light pale yellow. All legs and antennae uniform light yellow, club of antennae slightly dusky. Submarginal vein fuscous, marginal and stigmal faintly yellowish.

Described from one female specimen reared August 14, 1881, from Aleyrodes at Washington, D. C.; food-plant unknown.

Encarsia coquilletti n. sp. (fig. 9).

Female.—Length, 0.88 mm.; expanse, 1.7 mm.; greatest width of fore-wing, 0.27 mm. Pedicel of antennae twice as long as broad, a little more than half as long as and about as broad as joint 1 of funicle; remaining joints of funicle subequal in length, slightly rounded at extremities, and slightly flattened laterally. Dorsum of thorax faintly shagreened; abdomen smooth; abdomen broadly ovate. Eyes black, ocelli reddish, wings faintly dusky on basal half, general color black; joints between segments of abdomen lighter; all tibiae and tarsi dusky, femora banded in the middle with black, trochanters pallid, antennal scape dark brown, funicle light brown.

Male.—Differs from the female in not having the abdomen broadly ovate, wings perfectly hyaline, legs all slightly fuscous, and entire abdomen yellow or light brown.

Described from five females and two males reared by Mr. D. W. Coquillett, at Los Angeles, Cal., from Aleyrodes on Sonchus, September 18–21.
Encarsia angelica n. sp.

**Male.**—Length, 0.74 mm.; expanse, 1.7 mm.; greatest width of forewing, 0.25 mm. Pedicel as broad as long, less than half as long as joint 1 of funicle; funicle joint 1 as wide as or slightly wider than pedicel, rounded at base, more truncate at tip, appearing swollen in comparison with next joint; joint 2 a little longer than joint 1 and narrower, cylindrical; joints, 3, 4, and 5 each a trifle longer than its predecessor, otherwise resembling it. Terminal joint a little shorter than its predecessor, rounded at base and tapering to somewhat pointed tip. Thorax and abdomen smooth. General color brownish yellow, darker on pronotum and anterior portion of mesoscutum at sides of parapsides and metanotum, and on dorsum of abdomen; a dark line between the eyes and under ocelli. Tegulae brown; all legs uniform pale straw-yellow.

Described from one male specimen reared from *Aleurodes* on willow September 17, at Los Angeles, Cal., by Mr. D. W. Coquillett.

**Genus ASPIDIOTIPHAGUS** Howard.


**Female.**—Antennae 8-jointed; scape long, slender; pedicel a little longer than its apical width; funicle joints 1, 2 and 3 increasing in width, but each approximating pedicel in length; club long, distinctly 3-jointed, basal joint shortest, apical joints subequal, terminal joint pointed. Lateral ocelli equidistant from each other and margin of compound eyes. Parapsides of mesoscutum widely separated, very narrow posteriorly, broadening out rapidly toward tegulae; mesoscutellum like that of *Aphelinus*, its scapula longitudinally elongate and extending forward to lateral widening of the parapsides; metanotum very narrow. Abdomen short, broadly sessile and broadly rounded at tip. Spur of middle tibiae very slender, as long as the short first tarsal joint. Forewings long, narrow; submarginal and marginal veins subequal in length; postmarginal lacking; stigmal very slight and parallel with costa, situated at half the wing length and exactly opposite to the termination of thickening of hinder margin of wing, this being also the widest point of the wing; cilia of wing surface rather sparse, a clear rounded space immediately below stigma, and a narrow clear line around margin; marginal vein bristly; marginal cilia very long, longer than wing width, those on costal margin just beyond stigma nearly as long as those on hind margin. Hind-wings very narrow, with long marginal cilia and but one row of discal cilia on outer third; marginal vein ending abruptly and extending up apparently beyond costa.

Differs from *Coccophagus* in wings and from *Encarsia* in antennæ and wings.
Aspidiotiphagus citrinus (Craw.). (fig. 10).

*Coccophagus citrinus* Craw. *Destructive Insects, Sacramento, Cal.*, 1891.
Aspidiotiphagus citrinus Howard. *Insect Life*, vol. vi, p. 234, 1891.

Female.—Length, 0.58 mm.; expanse, 1.16 mm.; greatest width of fore-wing, 0.09 mm. Antennæ light yellow-brown; eyes black, ocelli bright red; head yellow; occiput dark brown; pronotum dark brown; mesonotum yellow; metanotum yellow-brown; abdomen brown; legs uniformly dusky yellow; wings with marginal vein dark fuscous, and a broad fuscous band extending directly across wing from marginal vein as a base. Spiracular hairs on pre-anal abdominal joint very long. Thorax somewhat wider than head or abdomen, these being subequal in width.

Redescribed from fourteen female specimens reared January 18 and 24, February 2, and March 13, 1889, by Mr. D. W. Coquillett from

![Fig. 10.—Aspidiotiphagus citrinus (Craw.)—greatly enlarged (from Insect Life).](image)

*Aspidiotus aurantii* Maskell, var. *citrinus*, from San Gabriel, Cal. Mr. G. W. Johnson has also sent me six specimens reared at the Illinois State Laboratory of Natural History from *Aspidiotus ficius* occurring on *Citrus decumana* in the university greenhouse. Professor Berlese has reared this species in Italy from an *Aspidiotus* on *Acacia longifolia* and from *Diaspis rosea*.

Genus COCCOPHAGUS Westwood.


Ratzeburg's genus *Coccobius* includes, as will be seen from the synonymical list, certain species of *Coccophagus* and certain species of *Aphelinus* as well. His antennal figure is that of *Aphelinus*, but his descriptions include species which apparently belong to *Coccophagus*, notably *C. notatus*.

In this genus the antennæ are 8-jointed, the scape rather short and stout; pedicel one-third the length of the scape and about the same
thickness. Joints 1, 2 and 3 of the funicle increase very slightly or not at all in thickness and decrease slightly in length. Club very plainly 3-jointed, a little broader at middle than at base, pointed or rounded at tip, and rather longer than funicle joints 2 and 3 together. With the male the club is less compact and is narrower than with the female. Mesoscutum large, posterior border with a slight re-entering angle. Parapsidal sutures curved, mesoscutellum about as long as broad, rounded behind; wings equally hairy, except at immediate base. No hairless line; marginal vein as long as or longer than submarginal; postmarginal lacking; stigmata very short. Middle tibial spur strong, not as long as first tarsal joint. Eyes invariably hairy.

The species of Coccophagus, with the exception of C. ochraceus, are all black in color, and frequently with a portion of the mesoscutellum and metanotum bright orange or yellow. With certain species the female has the scutellum partly yellow, while the male is entirely black. Of the sixteen species catalogued by Cresson, annulipes Ashmead, as there stated, belongs to the encyrtine genus Aphycus; brunneus Provancher and compressicornis Provancher do not belong to this subfamily, but probably to the Tetrastichine, while pallipes Provancher belongs to Sympiesis. Of the remaining species Fitch's lecanii will hold, and Ashmead's flavoscutellum and the writer's ciridus are synonymical, and Ashmead's species has priority. There remain eight of the writer's species, certain of which have been thrown together after studying more abundant material, as will appear in the following pages. To these he has since added californicus (Insect Life, vol. i, p. 269), auranti (loc. cit., vol. vi, p. 231), and lunulatus (loc. cit., vol. vi, p. 233). Of these auranti should be placed in Prospalta, as indicated in Insect Life (vol. vii, p. 7.)
ANALYSIS OF THE SPECIES OF Coccophagus.

Females.

Wings hyaline.
General color dark honey-yellow ........................................... ochraceus
General color black.
Hind border of mesoscutum with a band of yellow; scutellum entirely black ........................................... scutatus
Hind border of scutum black; scutellum more or less yellow.
Head rather coarsely punctulate; apical two-fifths of scutellum yellow, except for black spot at tip......................... lunulatus
Head not coarsely punctulate.
Scutellum with a narrow but complete marginal yellow band.
Scutellum with apical half yellow; tegula black.
Punctures of scutum arranged in longitudinal rows; front and middle tibiae yellow................................. lecanii
Not so arranged; all tibiae dark .................................. cognatus
Scutellum yellow only at tip; all tibiae brown, yellow at either end; tegula black ................................................... fraternus
Nearly all of scutellum and postscutellum yellow; tegula brown.

Scutellum black; face yellow; punctuation of mesonotum nearly obsolete
Scutellum with sparse round punctures, a regular row around hind border of scutum .................. immaculatus
Wings dusky; body uniformly purplish black ................................... purpureus

Males.

Entire body black.
A regular row of round punctures bordering hind edge of mesonotum. immaculatus
Mesoscutum with sparse punctures, but without such a regular row.
Tegula brown; all tibiae and tarsi yellow; hind tibiae occasionally with dusky patch near base ....................... flavoscentellum, lecanii
Tegula black; all tibiae dark brown in middle, whitish at either end. fraternus
Mesoscutellum tipped with yellow.
General color, brown; mesoscutum irregularly but sparsely punctate... cognatus
General color, black; punctuation nearly obsolete, ................... flavifrons
Scutellum black; mesoscutum with terminal yellow bands ......... scutatus
General color honey-yellow ......................................................... ochraceus

Coccophagus lecanii (Fitch.)


Female.—Length, 1 mm.; wing expanse, 2.25 mm.; greatest width fore-wings, 0.42 mm. Antennae as long as the thorax; head, pronotum, and mesoscutum finely and sparsely punctured and furnished with short bristles, punctures of mesoscutum arranged in longitudinal rows.

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Mesoscutum also has a fine shagreening. Mesoscutellum and parapsides of mesoscutum very finely shagreened, without larger punctures; abdomen smooth. General color black, shining, tegulae brown; eyes dark reddish brown; antennae light brown, with darker longitudinal raised lines on flagellar joints. Hairs of thorax whitish, lighter on mesoscutellum. Last half of mesoscutellum and center of postscutellum bright lemon-yellow. Wing veins dark brown. All femora brown or black, somewhat yellowish at either extremity. All tibiae straw-yellow, with the exception of the posterior pair, which have a brown annulus near base; all tarsi straw-yellow, with the fifth joint dark brown.

**Male.**—Averages about half the size of the female; abdomen small, much narrower than thorax; antennae longer than thorax, scutellum dark.

Described from many male and female specimens. Parasitic upon *Lecanium quercitronis* Fitch, New York; *Pulvinaria immemrabilis*, Illinois, Miss Smith; District of Columbia (Division of Entomology); Cambridge, Mass., W. Trelease; Flatbush, Long Island, New York, J. L. Zabriskie; *Lecanium pruinum*, Los Angeles, Cal., D. W. Coquillett; *Lecanium persica*, Ithaca, N. Y. (Department of Agriculture); *Pseudococcus aceris*, Jamaica Plain, Mass., J. G. Jack; *Lecanium hesperidum*, District of Columbia (Department of Agriculture); Los Angeles, Cal. (Department of Agriculture); *Lecanium* on plum, Medina, Ohio, F. M. Webster.

**Coccophagus fraternus** Howard.


**Female.**—Length, 0.78 mm.; expanse, 2 mm.; greatest width forewings, 0.36 mm. Thoracic punctures much as with *C. lecanii*, but mesoscutum is smoother and the larger punctures are not arranged in longitudinal rows. Thoracic bristles black, except those on mesoscutellum, which are white. Tip of mesoscutellum bright yellow, somewhat orange, dividing line between yellow and black very irregular. Center of postscutellum only slightly yellowish. All coxae and femora black, whitish at tips. All tibiae dark brown in middle, whitish at either end.

**Male.**—Somewhat smaller than female; antennae longer, club proportionately considerably longer, each of the joints as long as each of the immediately preceding funicle joints. Coloration like that of female, except that the yellow tip of mesoscutellum is wanting.

Described from many female and male specimens. Parasitic upon *Lecanium persica*, District of Columbia (Department of Agriculture); Agricultural College, Michigan (A. J. Cook).
Coccophagus cognatus Howard.


**Female.**—Length, 1.2 mm.; wing expanse, 2.1 mm.; greatest width of fore-wing, 0.34 mm. Antennae not quite so long as thorax. General color dark brown, nearly black; last half of mesoscutellum and tip of metascutellum orange-yellow; anterior coxae, femora, and tibiae, fuscous; tarsi whitish, last two joints slightly dusky; middle femora and coxae nearly black, tibiae somewhat dusky, tarsi as with fore tarsi; hind coxae, femora, and tibiae dark, tibiae as with others.

**Male.**—Length of body, 0.6 mm.; expanse of wings, 1.4 mm.; greatest breadth of fore-wing, 0.25 mm. Antennae nearly as long as head and thorax together. General color brown; scutellum and metascutellum just tipped with light yellow-brown. In all other respects resembles the female.

Described from many specimens. Parasitic upon *Lecanium hesperidum*, District of Columbia (Department of Agriculture); *Lecanium* on plum, Bramley, Ontario (J. Fletcher and T. D. A. Cockerell); *Lecanium persica*, Lake Shore and Mapleville, Md. (Department of Agriculture).

Coccophagus immaculatus Howard.


**Female.**—Length, 1.2 mm.; wing expanse 2.35 mm.; greatest width of fore-wings, 0.47 mm. Antennae slightly longer than thorax. Mesoscutum and mesoscutellum sparsely furnished with round punctures, of which there is a regular row around hind border of mesoscutum. Between the punctures is a faint shagreening. All hairs blackish, metanotum honey-yellow. General color black; eyes reddish brown, with a yellowish border above; ocelli dark red; antennae light yellowish brown, with dark brown longitudinal carinae on each joint except scape and pedicel; mesoscutellum shining black, slightly metallic in some lights; wing veins dark brown; front femora black; middle and hind femora black, except at base, which is whitish; front tibiae dusky, light at knees; middle and hind tibiae light yellow; all tarsi whitish, last joint fuscous; front coxae dark brown, middle and hind coxae and all trochanters yellowish; ovipositor yellow, sheaths brown.

**Male.**—Length, 0.9 mm.; wing expanse, 2.3 mm.; greatest width of forewing, 0.43 mm. Antennae as long as thorax; club compact, the lines separating the joints of the club somewhat oblique. Colors as with female, except that metanotum and all coxae are black.

Described from three males and three females. Parasitic on *Eriococcus azalea*, District of Columbia (Department of Agriculture). The punctured scutellum is unique.
Coccophagus purpureus Ashmead.


*Female.*—Length, 0.10 inch. Robust and of a uniform purplish black color throughout, including abdomen, coxae and femora; the surface is very finely punctated, and the tibiae and tarsi are yellow; wings, except at base, brown.

Captured on gall-berry bushes.

I have not seen this species, but Mr. Ashmead tells me that there is no doubt it is a true *Coccophagus*. It differs from all known species in the infuscated wings.

Coccophagus flavifrons Howard.


*Female.*—Length, 1 mm.; expanse, 2 mm.; greatest width fore-wings, 0.35 mm. Punctuation of thorax nearly obsolete. Scutellum perfectly smooth, except for faint shagreening. Hairs black; eyes, clypeus, occiput, abdomen, and dorsum of thorax black, with a bluish metallic luster upon abdomen. Face, antennal scape, all tibiae, middle femora, honey-yellow; hind femora black at base, yellowish at tip; front femora brownish at base, yellow at tip; tegulae dark yellow or brown; edge of mesoscutum just above tegulae, also brown; wing veins fuscous.

*Male.*—Somewhat smaller; uniform black except tegulae, which are brownish; antennae light brown, scape black; all femora black, except at tips; all tibiae and tarsi yellow; extreme tip of meso- and metascutellum yellowish.

Described from three females and one male. Parasite upon *Leuca nium* sp. on *Pinus australis* (A. Koebele, Department of Agriculture).

Coccophagus flavoscutellum Ashmead.


*Female.*—Length, 1.03 mm.; wing expanse, 1.96 mm.; greatest width of fore-wing, 0.35 mm. General color, shiny black; antennae light brown, with the customary dark brown longitudinal carinae; greater part of mesoscutellum and visible portion of metascutellum bright orange-yellow, the line of juncture of the two colors on the mesoscutellum straight and sharp; tegulae yellow-brown; all coxae and femora brown, yellow at joints; all tibiae and tarsi yellow, occasionally a dusky patch near base of hind tibiae; fifth tarsal joint brown. Entire mesoscutum very finely punctate.

*Male.*—Length, 0.35 mm.; wing expanse, 1.47 mm.; greatest width of fore-wing, 0.25 mm. Color as in female, except that the tegulae are brown and the scutellum is black, sometimes yellow at extreme tip.
Redescribed from many male and female specimens. Parasitic upon *Lecanium hesperidum*, Crescent City, Fla., H. G. Hubbard; Jackson-ville, Fla., W. H. Ashmead; Los Angeles, Cal., A. Koebele; *Lecanium* sp., New Alameda, Cal., H. W. Turner; *Dactylotypus destructor*, District of Columbia, Th. Pergande; *Lecanium* sp., Los Angeles, Cal., D. W. Coquillett; *Lecanium tulipiferæ*, Molino, Fla. (Department of Agriculture); *Pulvinaria* on plum, Florence, S. C. (Department of Agriculture); *Pulvinaria* sp. on *Sullenia*, Rockport, Tex., E. A. Schwarz; *Pulvinaria innumerabilis*, Roslyn, N. Y., L. H. West (Department of Agriculture); *Lecanium* sp. on *Adenostema*, Alameda, Cal., A. Koebele; *Lecanium* sp. on *Arctostaphylos*, Sonoma, Cal., A. Koebele; *Lecanium* sp. on plum, Ottawa County, Ohio. F. M. Webster.

*Coccophagus californicus* Howard.


Female.—Length, 1.4 mm.; expance, 2.1 mm.; greatest width of forewing, 0.39 mm. Abdomen broader than thorax and one-third longer. Pedicel and joints 2 and 3 of funicle subequal in length; joint 1 of funicle one-third longer. Eyes rather more plainly hairy than usual. General color dark brown, nearly black, no punctuation visible. Mesoscutellum lighter in color than rest of thorax, except at immediate base, its posterior edge with a narrow band of bright lemon-yellow extending from one lateral angle around the curved border to the opposite lateral angle, of nearly equal width throughout, at its widest portion measuring 0.027 mm.; all coxae brown; all trochanters yellowish white; all femora brown, yellow at tip; more yellow at tip of front femora, less at tip of middle, and still less at tip of posterior femora; front tibiae light yellow, very slightly dusky; middle tibiae entirely light yellow; hind tibiae yellowish, with a brownish shade near base; all tarsi yellowish white, last joint dusky. Wings hyaline, veins light brown distinct.

Described from one female specimen reared from a female *Icerya purchasi* at Los Angeles, Cal., July 6, 1887, by Mr. D. W. Coquillett.

*Coccophagus lunulatus* Howard (fig. 11.)


Female.—Length, 0.93 mm.; expance, 2 mm.; greatest width of forewing, 0.39 mm. Head rather coarsely punctulate, opaque; mesonotum very finely shagreened, somewhat glistening; mesoscutellum with apical bristles very long; abdomen smooth, shining. General color black; apical three-fifths of mesoscutellum bright orange, with an irregular black spot at tip, and with the dividing line between the orange and black irregular; tegulae black; antennæ with the scape black and the flagellum dark fuscous; front legs, including coxae, light orange yellow, considerably lighter than the mesoscutellum; middle and hind coxae and hind femora black; middle and hind trochanters, tibiae, and tarsi and
middle femora light orange-yellow. Wings hyaline, veins dark brown, marginal cilia very short.

Described from one female reared December 5, 1892, from Aspidiotus auranti, received from D. W. Coquillet, Los Angeles, Cal.

Coccophagus scutatus n. sp.

Female.—Length, 1.6 mm.; expanse, 3.3 mm.; greatest width of fore-wing, 0.58. Punctuation of head and mesothorax scaly, more marked on mesoscutum. Thoracic bristles long and sparse, particularly long on hind border of pronotum and border of mesoscutellum. Parapsidal grooves very indistinct. Occiput, metanotum, and abdomen smooth and shining. Wing veins very heavy. General color black, mesoscutellum and postscutellum without a trace of yellow; mesoscutum with broad transverse band of orange extending from tegula to tegula, the anterior border being nearly straight, while posterior border follows the central backward curve of the scutum. Antennae dusky, legs pale fuscous, coxae dark, femora with a middle brownish band, middle tibia darker in the middle and hind tibia dark brown on basal half. Wings clear, veins dark brown.

Male.—Rather smaller, but closely resembles female. The mesoscutal band is of a pale orange; the antennae are lighter in color; the scape yellowish; front and middle legs, with the exception of basal half of coxae, entirely light lemon-yellow. All of hind coxae and femora concolorous with other legs, but basal half of hind tibia is nearly black. Lower half of face also somewhat yellowish, particularly along the borders of the antennal groove.

Described from five females and one male reared by A. Koebele in October from a Kermes on Quercus agrifolia at Los Angeles, Cal. Also nine specimens reared by D. W. Coquillet from the same host at Los Angeles.

Differs from all other species of Coccophagus known to me in the possession of the scutal band.

Coccophagus ochraceus n. sp.

Female.—Length, 0.7 mm.; expanse, 1.53 mm.; greatest width of fore-wing, 0.3 mm. Differs at once from all other species of the genus in having the general color ochraceous or dark honey-yellow instead of black. Head and mesonotum very finely and sparsely punctate, also very delicately shagreened. Normal natal hairs blackish; abdomen smooth. General color, as just stated, dark ochre-yellow. Eyes dusky, ocelli dark red. Antennae yellowish, except pedicel, which is blackish. Mesopleura and terminal segments of abdomen dark brown, nearly black. All legs concolorous with thorax. Wings hyaline, veins uniformly fuscous.

Male.—Punctuation of notum a trifle more pronounced than with the female, mesoscutum appearing slightly rugose; antennae slightly dusky.
Described from three males and one female, reared July, 1887, at Alameda, Cal., by A. Koebele, from Lecanium on Adenostema fasciculatum.

This species interferes with a suggested generalization made by the writer in a paper entitled "The hairy eyes in Hymenoptera" (Proc. Entom. Soc. Wash., vol. i, p. 195) to the effect that the hairy eyes in the subfamily Aphelininae are associated with a black color. This holds with the typical genus Aphelinus, in which all the yellow species have naked eyes, the two black species (A. mali and A. flaxiceps) having hairy eyes. Having a yellow species of Cocceophagus, we should expect naked eyes; but here hairiness of the eyes seems to be a generic character.

Genus PROSPALTA Howard.


Female.—Anterior wings with no oblique transverse hairless line below stigma. Antennæ 8-jointed; club 3-jointed; all joints subequal in length; first joint of club widest. Head transverse; ocelli at corners of an oblique-angled triangle. Eyes naked. Thorax wider than head; mesoscutal parapsides club-shaped, broadening suddenly on distal side; axillae extending anteriorly to swelling of parapsides; metascutellum broad and short; legs rather stout; all tarsi short; first joint of hind tarsi only as long as second; first joint of middle and front tarsi longer than second. Ovipositor slightly extruded. Wings broad; submarginal vein reaching nearly to middle of wing; marginal much shorter than submarginal; stigmal very short, its anterior border nearly parallel with costa, its posterior border extending into disk of wing at an angle of 45° with costa; outer margin of fore-wing with rather short cilia; hind margin of hind-wings with somewhat longer cilia. First abdominal joint much the longest; abdomen as a whole equaling thorax in length; whole body tapering gradually from tegulae to tip of abdomen.
Anterior wings with two fuscous patches; joint 1 of funicle wider than pedicel. _murtfeldtii_

Anterior wings perfectly hyaline; joint 1 of funicle narrower than pedicel. _aurantii_

**Prospalta murtfeldtii** Howard (fig. 12).

_Prospalta murtfeldtii_ Howard. _Insect Life_, vol. vii, p. 6, 1894.

**Female.**—Length, 0.69 mm.; expanse, 1.7 mm.; greatest width of fore-wing, 0.3 mm. Joint 1 of funicle wider than pedicel; flagellum gradually widening from base of pedicel to base of club. Surface of body nearly smooth; scutellum slightly shagreened. General color light yellow; mesoscutum with brownish patch covering entire disk; mesoscutellum with two large brown patches, one each side of middle line; axilike each with a brown patch; metanotum brownish; base of abdomen brown; tip of abdomen also brown; antennae brown, with the exception of joints 2 and 3 of the funicle, which are whitish; all coxae and femora light honey-yellow, except that hind femora are dusky at base; front tibiae with a dusky ring near middle; first and second tarsal joints of forelegs dusky; middle and hind tibiae each with two dusky bands; first tarsal joint of middle and hind legs dusky; wings hyaline with a fuscous basal patch, and a triangular median fuscous patch with its apex at stigmal vein and its base reaching somewhat less than half of outer hind margin; entire disk of wing densely, finely, and uniformly ciliate; apical spur of tibiae rather short. Hind-wings with two rows of discal cilia and an interrupted third row on outer third. Hind marginal cilia somewhat longer than wing width.

Described from five balsam-mounted female specimens reared by Miss Mary E. Murtfeldt, at Kirkwood, Mo., from _Aspidiotus uva_. Received November 4, 1888.

Since the original description was published I have received a series of thirteen specimens of this insect from Mr. W. G. Johnson, of the State Laboratory of Natural History, at Champaign, Ill. Eleven of this series Mr. Johnson reared from a new species of _Aspidiotus_ on cherry twigs, and the other two from a new species of _Aspidiotus_ on currant canes, both at Champaign, Ill. The specimens received from Mr. Johnson were all mounted dry, on tags, while the type specimens from Miss Murtfeldt were mounted in balsam. It becomes apparent that Miss Murtfeldt's specimens must have been mounted very soon after they issued from the host insect. The colors are lighter, in general, than those of the matured and dried specimens. The second funicle joint of the antennae is dusky, like the first funicle joint, and not white, like the third. The general color of the thorax, instead of being yellow, is dark brown. The basal joints of the abdomen are yellowish, with the tip brown. The obvious conclusion is that all these parasites should be allowed to mature in color before being mounted in balsam.
**Prospalta aurantii** (Howard) (fig.13).

*Coccophagus aurantii* Howard. *Insect Life*, vol. vi, p. 231, 1894.

**Female.**—Length, 0.7 mm.; expanse, 1.16 mm.; greatest width of fore-wing, 0.18 mm. Joint 1 of funicle shorter and narrower than pedicel and than joint 2, which is subequal to pedicel in length and width, joint 3 shorter than joint 2. Surface of thorax smooth. General color, light brownish yellow; occipital line, margin of pronotum and a median stripe on mesoscutum, scapulae, outer edge of metanotum, abdomen, especially lateral margin, darker; antennae and legs light fuscous; eyes black, ocelli red; wings hyaline, veins slightly dusky. Fore-wings with disk densely, finely, and uniformly ciliate, costal margin with very short marginal cilia beginning at stigma, growing gradually longer at tip of wing and on lower outer margin becoming half the width of wing; broadest portion of wing beyond stigma; hind-wings as with preceding species.

Described from two female specimens reared May 9, 1887, by D. W. Coquillett from *Aspidiotus aurantii*, var. *citrinus*, from San Gabriel, Cal.

Specimens of this species occur in the collection of the Department of Agriculture, reared from the following species of Cocciidae: *Aspidiotus ancyclus* Putn. var., on linden, District of Columbia; *Mytilaspis citruscola* Pack. on orange, Florida; *Aspidiotus pinii* Comst. on *Pinus rigida*, Ithaca, N. Y.; *Mytilaspis albus*, var. *concolor* Ckll., Cockerell, Las Cruces, N. Mex.; *Mytilaspis eucalypti* Crawford MS., Adelaide, South Australia, October 5.

Mr. W. G. Johnson has also sent me from the collection of the Illinois State Laboratory of Natural History at Champaign, Ill., a large series of this species reared from a species of *Chionaspis* on an undetermined food-plant (probably introduced) growing on the university campus. Professor Berlese has also sent me specimens of this species reared in Italy from *Aspidiotus edercv* and from *Leucaspis pinifoliae* on *Pinus canariensis*.

The figure of this insect in *Insect Life* (reproduced above) is not colorational.
The extraordinary geographical range, as indicated by this summary of the specimens at hand, would seem to indicate the possibility that this species is originally an inhabitant of Europe, and that it has been introduced into the United States and Australia. It is evidently a very important species. It is the so-called "golden chalcid" referred to in California reports.

Genus *ABLERUS* Howard.


**Female.**—Fore-wings with no transverse hairless streak below stigma. Antennæ apparently only 7-jointed, club appearing unjointed; antennæ simple, slightly clavate; scape slender; pedicel as long as, or slightly longer than, funicle joint 1; funicle joints 1, 2, and 4 subequal in length, 3 rather shorter; club as long as three last funicle joints together, furnished with two minute papillar projections at tip; mesoscutar parapsides clavate, but not broadening suddenly into a club; mesoscutellum transverse; abdomen semiovate; ovipositor extruded for more than half the length of abdomen. Wings short, narrow; marginal vein nearly as long as submarginal; stigmal long, slender, one-third length of marginal, squarely truncate at tip, extending at a very slight angle into disk of wing; marginal vein with three principal bristles, submarginal with one; cilia of border of wings as with *Prospalta*; hind border of fore-wings with a longitudinal hairless streak and a slight fold extending from base of wing nearly to middle; thickening of anal margin opposite tip of marginal vein of hind-wings seems to extend forward into this fold; marginal vein of hind-wings with closely set row of minute bristles. First tarsal joint of all legs as long as two succeeding joints together. Middle tibial spur as long as corresponding first tarsal joint.

*Ablerus clisiocampae* (Ashm.) (fig. 14).


**Female.**—Length, exclusive of ovipositor, 0.7 mm.; ovipositor, 0.18 mm.; expanse, 1.5 mm.; greatest width of fore-wing, 0.19 mm. Hairs of
anal spiracle nearly as long as ovipositor. General color black, somewhat metallic, notal sclerites of thorax having a greenish luster, while abdomen appears bluish; antennae black, with funicle joints 2 and 4 silvery white, and apical three-fourths of club light brown, with a somewhat silvery tinge. Head in life, and shortly after the insect has issued, whitish, with occiput yellow-brown and occipital line black; brown patch including ocelli. Eyes bright red. In dry mounts the head shrivels considerably and becomes light brown in color. Legs dark brown; all tibiae with a silvery white distal apex. Spurs of middle tibiae black; tarsal joints 1, 2 and 5 dark brown or black; 3 and 4 whitish. Fore-wings with proximal three-fourths deeply and uniformly infuscated, except two light longitudinal streaks near base; apical one-fourth hyaline; discal cilia very minute, but closely placed; sparse, however, toward distal anal portion and toward base of wing.

Redescribed from ten freshly issued females reared July 6 and 7, 1894, from female specimens of *Chionaspis furfuracea*, District of Columbia. Mr. W. G. Johnson has also reared two females from a species of *Aspidiotus* on pear and apple at Champaign, Ill.

In view of these rearings, as well as from the well-known and quite uniform host habit of the group, it becomes probable that Mr. Ashmead’s type came from a scale insect in the near vicinity of or perhaps hidden by the Clisiocampa eggs from which he thought he reared it.

**PHYSCUS new genus.**

Type: *Coccophagus varicornis* Howard.

**Female.**—Antennae 7-jointed; inserted at border of clypeus; scape slender; pedicel as long as first funicle joint; second and third funicle joints subequal and each longer than joint 1; club long, ovate, acute, 2-jointed; joint of division before middle. Eyes hairy. Mesoscutal parapsides very narrow; axillae also narrow; scutellum nearly as long as broad. Discal cilia of fore-wings uniform in distribution, but those proximad of stigma shorter and considerably more delicate than those distad; marginal vein about as long as submarginal; stigmal short, but with a well-defined neck and with a rounded knob; radial angle narrow. Marginal cilia rather short; discal cilia of hind-wing very delicate and rather sparse. First tarsal joint of front and hind legs as long as two following joints; first tarsal joint of middle legs as long as three following joints; middle tibial spur long. Ovipositor slightly extruded.

**Male.**—No fresh or balsam-mounted males are at hand, and characters cannot be studied from the poor material which we have.

**Physcus varicornis** (Howard).


**Female.**—Length, 0.7 mm.; expanse, 1.4 mm.; greatest width of forewing, 0.25 mm. Mesonotum very faintly longitudinally shagreened,
nearly smooth, shining; tegula, pleura, and abdomen smooth. Wings hyaline. General color glistening black; antennal scape dusky; pedicel nearly white; first funicle joint dark brown; joints 2 and 3 nearly white, somewhat yellowish; club light brown; mesopostscutellum nearly white; all coxae black; trochanters nearly white; all femora and tibiae black or dark brown, lighter at extremities; tarsi all nearly white, including terminal joints; pile on sides of abdomen and hind femora white, showing distinctly against the black surface.

Described from one female specimen, reared March 1, from Aspidiotus aecylus on linden, District of Columbia. There is also a large series of specimens of this species in the National Museum collection reared from Chionaspis quercus, at Alameda, Cal., by A. Koebele, in August. Among the series is a number of males, but none are in condition for description. Such antennal fragments as remain, however, show that the antennae are probably of a uniform brown color. Mr. W. G. Johnson has also sent me from the State Laboratory of Natural History at Champaign, Ill., a series of five specimens reared from his manuscript Chionaspis americana on elm.